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On

**Emerging Intelligent Automation and Optimization Methods in
Applied Science and Computational Engineering Mathematics**

Organized by

**Quest Institute for Integrative Science and Technology
(QIIST) and Quest Technologies, Tiruchirappalli, India**

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SPECIAL ISSUE VOLUME 13 NO (6) 2020

Design of Multiband Microstrip Patch Antenna Using Hfss for 3g/4g Wireless Communication Mahendrakumar S, Guna Sekar T, Vanitha K and Kokila P	01-05
An Improved Lsb Data Steganography Using Elliptic Cuve Cryptography G.Ravivarma, K.Gavaskar, N.S.Kavitha, K.Shahanas Banu, K.G.Asha and S.Aarthi	06-11
Arrhythmia Using Ensemble Learning P. Alagambigai, J. Serin and Jemima Simeon	12-18
IoT Based Food Waste Recycling and Monitoring System M.Lizzy Nesa Bagyam, B.Raja Nithya, D.Rubikumar, S.Sangeetha and J.Santhosh	19-22
Spammer Detection and Fake Consumer Identification on Social Sites Using Content Filter Formula A.Sivasankari, A.Vignesh and D.Siva	23-28
Multimetric Rpl for Heterogeneous IoT Environment G Murugesan, V C Diniesh, M Suresh, N Nishrhutha, B Navitha Banu and C Ranjith Babu	29-33
Detection of Leaf Disease Using Deep Learning A Deep Learning Based for Automated Detection Dr Agusthiyar R, Shyamala Devi J and Saravanabhavan N M	34-38
Implementation of Spurious Power Suppression Technique (SPST) Adder for Signal Processing and Communication Gomathi S, Dr.Sasikala S, Chitra M, Ramya S, Nandhini M and Pratheep	39-44
Art of Image Augmentation with Cartoon Models P.M.Kavitha, M Anitha and Dr. K. Pushpalatha	45-49
An Extensive Study on Various Cryptographic Alogrithms and its Impact on Cloud Computing Security A.Vikram and Dr.Gopinath Ganapathy	50-55
An Analysis on Deep Learning with its Advancements S. Senthilarasi and Dr. S. Kamalakkannan	56-62
Efficient Road Side Framework Placement using VANET for Reducing Network Delays G.Vamsi Krishna, R.Shankar, N.Vadivelan and M.Nalini	63-70
Investigation on enabling Intelligence through Deep Learning and Computer Vision-based Internet of Things (IoT) systems in a Classroom Environment M.Lakshaga Jyothi and Dr.R.S.Shanmugasundaram	71-82
Covid-19: A IoT Drone Design for Prevent and Monitor Community Spread Sathish Kumar L and M. Nalini	83-88
A mixed Approach of Deep Learning and Machine Learning Techniques for Improving Accuracy in Stock Analysis and Prediction Mrs.D.Kanchana, Assistant Professor(S.G) and Mrs.J.Shobana, Assistant Professor(S.G)	89-95
Portable Rtl-Sdr Based Frequency Analyzer Arunthathi.C, Aravind Narayanan.R and Dr. B. Aruna Devi	96-103
Smart Bus System Ragavee. A, Rishikesh.R and Dr. B. Aruna Devi	104-108
Comparison of Different Bio Inspired Optimization Algorithms for Improving Network Lifetime in Wireless Sensor Networks P Preetha, and N.V Eldhose	109-114
Design of Linearly Polarized Circular Disc Shaped Patch with Split Ring Resonator using FR4 Material for Bandwidth Improvement and Square Ring in Ground Dr. N. Satyanarayana Murthy	115-118
Deep Learning Based Human Emotion Recognition from Speech Signal Dr. M.P. Flower Queen, Dr.S.Perumal Sankar, Dr. P. Babu Aurtherson and P. Jeyakumar	119-124



Registered with the Registrar of Newspapers for India under Reg. No. 498/2007
Bioscience Biotechnology Research Communications
SPECIAL ISSUE VOLUME 13 NO (6) 2020

Design and Performance Analysis of Rhombus Shape Microstrip Patch Antenna for Wireless Vehicular Communication Dr.S.Kavitha, S.Abarna, R.Gowthami, D.Sathya Prakash and B.Gokulkumar	125-130
Design of High Performance Binary Circuits for Low Power Applications Kathirvelu M and Rajendran A	131-135
Capacity Enhancement in Mobile Cellular Communications J. Ganesh and Dr. A. Rajendran	136-141
Military Based Voice Controlled Spy Bot with Weapon Detector Dr.S.Kavitha, Dr. S.T.SadishKumar T.Menaga, E.Gomathi, M.Sanjay and V.S.Abarna	142-146
Sarcasm Sentiment Detection and Classification Model on Twitter Ezhilmathi S, Dhanamathi A, Loganathan R and Elanchezhiyan E	147-152
Design of area efficient and Low power Square Root Carry Select Adder Mr.T.Jayachandran and Dr.K.Sharmilee and K.K.Sangeetha	153-156
High Dimensional Data Space Using Shrinkage Diversity Dr.Venkateshwaran Loganathan, Dr.G.Selvavinayagam and Dr.K.Loheswaran	157-159
Mobile Ad-Hoc Network Qos Improving Based On Wale Optimized Aodv Routing Protocol Dr. P. Revathi	160-163
Investigation on Automated Surveillance Monitoring for Human Identification and Recognition using Face and Iris Biometric Dr.R.Jayavadivel, Associate Professor, Dr.S.Jayachitra, Associate Professor and Dr.P.Prabaharan, Associate Professor	164-172
Cloud Computing Task Scheduling Based on Pigeon Inspired Optimization Dr.K.Loheswaran	173-177
AI based Classification of Chest Xray for COVID-19 Diagnosis: A Study Pratheep Kumar P, V Mary Amala Bai and Sreekala K K	178-182
Literature Review on High Dimensional Data Clustering Techniques Dr.G.Selvavinayagam, Dr.Venkateshwaran Loganathan and Dr.K.Loheswaran	183-187
Quality of Life and Mobile with Internet Addiction Among Engineering College Students: A Correlation Study Dr.R.Thamilselvan, Dr.K.Palanisamy, Dr.P.Natesan, Dr.R.R.Rajalaxmi and Dr.E.Gothai	188-194
Hybrid Machine Learning Algorithm and Principle Component Analysis based Face Recognition Attendance System Dr.T.Avudaiappan, L.Praveen Kumar, B.Sabarish and S.S.Prasanna	195-202
An Iot Based Integration of Smart Agro and Discernment of Leaf Canker Identification D.Vijayakumar and M.Mahalakshmi	203-208
Review Analysis of Twitter Sentimental Data S.Kasthuri and Dr.A.Nisha Jebaseeli	209-214
MANET Wormhole Attack Preventing Using Two-Phase Hybrid Cryptography Cryptograph Security Algorithms Dr. T. Prabakaran	215-219
Big Data Analytics—an Influence of Deep Learning Dr. C. Chandralekha, S. Divya and N. Aiswarya	220-223
Literature Review on Optical Layer Protection Scheme Dr. S. Umarani, Mr. P.Chandrasekar and Manjulababu	224-229
Study on Utility of AI/ML in UAS Based Cyber Physical Systems Priyanka Sharma and M Nagarajan	230-233
Automatic Cassava Plantation using Bluetooth S.Jegan, R.Aravindh Raj, M.Elakkiya, P.Madan and P.Mounika	234-236
Abnormality Detection of Optic Disc Using Entropy Based Algorithm and Cnn N.S. Kavitha, Dr.N.Kasthuri, S.Logaaras, S.Monika and G.Muthukumar	237-243
Certain Investigation on Palm Vein based Authenticating System Brindha Samarasam and Manikandaprabu Nallasivam	244-248
Intravenous Fluid Alert Management Connected to Smartphone Using Iot P.Matheshwaran, S. Akshaya, S. Krithika, B.C.M. Hiran mayee and A.Nivetha	249-253

Registered with the Registrar of Newspapers for India under Reg. No. 498/2007
Bioscience Biotechnology Research Communications
SPECIAL ISSUE VOLUME 13 NO (6) 2020

Water Quality Monitoring System Using Internet of Things Anant N. Halornekar, Siya D. Shetgaonkar, Ramkrishna U. Naik, Sharven R. Naik, Chaitali Karekar, J. William	254-258
Dynamic Mechanical Analysis of Acid Treated Surface Modified Natural Fillers Reinforced Epoxy Based Polymer Composite Dr.P.Babu Aurtherson, R.Suthan, Dr.K.Hari Ram, Dr.M.P.Flower Queen and Dr.S.Perumal Sankar	259-268
Secured Authentication Using Image Shield Protection P.Matheswaran, H.Priyadharshini, R.Shalini and M.Thilagavathi	269-274
A Review on Workload Characteristics for Multi Core Embedded Architectures using Machine Learning Techniques R.Sivaramakrishnan and Dr.G.Senthilkumar	275-279
A Hybrid Method for Deduplication and Redundancy Checking in Cloud Storage with Side Channel Attack R. Vignesh M.E and Dr. J. Preethi M.E	280-285
An 8-Bit Subranging ADC Using 48nm FINFET Technology for Low Power Consumption S.Tamil Selvi, P. Arul, V. Kumaravel and Dr.K.Helen Prabha	286-291
Decreasing Routing Traffic in Mobile Ad Hoc Networks Using Neighbor Nodes Coverage R.Hemalatha, K.Helen Prabha, Hemalatha Rajasekaran and M.Shakunthala	292-296
Virtual Human for War Field Hemalatha Rajasekaran, K.Helen Prabha G, R Hemalatha and G.Brenie Sekar	297-299
An Effective Analysis and Prediction of Diabetes using LightGBM Algorithm Ashwin Kanna K, Abhishek CH, Jaison S and Dr Sethukarasi T	300-305
Convergence Heuristic Function based Route Planning Algorithm for Energy-Efficient VANET GPS Navigation System S.Jaya Prakash, Dr.K.S.Giridharan, R.Regan, Dr.P.Rajaram and S.Ramesh	306-311
Medical Report Management and Transaction using BlockChain Subhasri N, Prathipa A, Srivarshini S and Dr.B. Jaison	312-315
Detection of Diabetic Retinopathy in Retinal Images with Advertent Information Sushmitha N, Ragavi R, Sneha T and L.Raji	316-320
Prognosis of Sepsis using Machine Learning Algorithms Subhasri N, Prathipa A, Srivarshini S and Dr.B. Jaison	321-325
Smart Agriculture Using Iot and Machine Learning Shiela David	326-329
A Unified Approach for Image Classification Using Transfer Learning Asha R and Gowthamy J	330-334
Iot Based Sensor for Water Purifier Judy Flavia B and N. Jeenath Shafana	335-339
Design of Partitioned VLSI systems for Reliable Processing M.Chitra, Dr. Sita Devi Bharatula, S.Suganya and M.Suresh	340-343
Even Vertex Square Difference Labeling Graphs K.V.Udayanatchi, M.Kannan and K.V.TamilSelvi	344-348
Layout Based Control of Electrical Appliances using Internet of Things T. C. Kalaiselvi and S. Swathi	349-353
Sentiment Analysis in Social Media and their Recent Trends Dr.A.Swaminathan and Dr.R.Raju	354-362
Feasibility Analysis for Targeted Nodes Using Signal Strength Dr.N.Vijayalakshmi, Mrs.S.Suriya and Mrs.S.Sindhu	363-365
A Survey on Aspect-Based Opinion Mining Techniques Chongtham Rajen Singh and Dr. R. Gobinath	366-378
Detection of Traffic Signal Violation Using Ultrasonic Sensors J.Shyamala Devi and S. Suriya	379-381
Analysis of Electrical Performance of a Fire Fighting Rover A.Prabhu, A.Subramaniya Siva and R.Saranraj	382-385

EDITORIAL COMMUNICATION

The special Issue of Bioscience Biotechnology Research Communications Vol 13 Number (6) 2020 on **Emerging Intelligent Automation and Optimisation Methods in Applied Science and Computational Engineering Mathematics** aims to provide an original research articles from scholars, researchers, academia and industry on the emerging technological problems in areas of Electrical, Electronics, Information and Communication. Mathematical sciences are part of nearly all aspects of everyday life the discipline has underpinned such beneficial modern capabilities as Internet search, medical imaging, computer animation, numerical weather predictions, and all types of digital communications. The issue examines the current state of the mathematics and explores the changes needed for the discipline to be in a strong position and able to maximize its contribution to the nation. It finds the vitality of the discipline excellent and that it contributes in expanding ways to most areas of science and engineering, as well as to the nation as a whole, and recommends that training for future generations of mathematical scientists should be re-assessed in light of the increasingly cross- disciplinary nature of the mathematical sciences. In addition, because of the valuable interplay ideas and people from all parts of the mathematical sciences.

The special issue organized by **Quest Institute for Integrative Science and Technology (QIIST) and Quest Technologies, Tiruchirappalli, India**, contains 61 articles in the field of Pure, Applied and Computational Engineering Mathematics. It is also the prime time to render our sincere and wholehearted thanks to the Coordinators of the Special Issue Mr Thirumalraj Karthikeyan, Founder of QIIST and CEO of Quest Technologies, Tiruchirappalli, India. and Mr Sakthi Prakash P Treasurer of QIIST and General manager of Quest Technologies, Tiruchirappalli, India for their timely suggestions, assistance and consultations beside their busy schedule which derived us to reach to many professors, researchers, scholars, and students all over India. All submissions are well supported by proof with a direct and simulated comparison to the technical solutions, designs and implementations. The articles available in this issue will be helpful for the researchers working in these new emerging areas. Best wishes for your contribution to this special issue - Emerging Intelligent Automation and Optimisation Methods In Applied Science and Computational Engineering Mathematics!

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CONTENTS



VOLUME 13 • NUMBER 6 • SPECIAL ISSUE 2020

Design of Multiband Microstrip Patch Antenna Using Hfss for 3g/4g Wireless Communication.....	01-05
Mahendrakumar S, Guna Sekar T, Vanitha K and Kokila P	
An Improved Lsb Data Steganography Using Elliptic Curve Cryptography.....	06-11
G.Ravivarma, K.Gavaskar, N.S.Kavitha, K.Shahanas Banu, K.G.Asha and S.Aarthi	
Arrhythmia Using Ensemble Learning.....	12-18
P. Alagambigai, J. Serin and Jemima Simeon	
IoT Based Food Waste Recycling and Monitoring System.....	19-22
M.Lizzy Nesa Bagyam, B.Raja Nithya, D.Rubikumar, S.Sangeetha and J.Santhosh	
Spammer Detection and Fake Consumer Identification on Social Sites Using Content Filter Formula.....	23-28
A.Sivasankari, A.Vignesh and D.Siva	
Multimetric Rpl for Heterogeneous IoT Environment.....	29-33
G Murugesan, V C Diniesh, M Suresh, N Nishrhutha, B Navitha Banu and C Ranjith Babu	
Detection of Leaf Disease Using Deep Learning A Deep Learning Based for Automated Detection.....	34-38
Dr Agusthiyar R, Shyamala Devi J and Saravanabhavan N M	
Implementation of Spurious Power Suppression Technique (SPST) Adder for Signal Processing and Communication.....	39-44
Gomathi S, Dr.Sasikala S, Chitra M, Ramya S, Nandhini M and Pratheep	
Art of Image Augmentation with Cartoon Models.....	45-49
P.M.Kavitha, M Anitha and Dr. K. Pushpalatha	
An Extensive Study on Various Cryptographic Algorithms and its Impact on Cloud Computing Security.....	50-55
A.Vikram and Dr.Gopinath Ganapathy	
An Analysis on Deep Learning with its Advancements.....	56-62
S. Senthilarasi and Dr. S. Kamalakkannan	
Efficient Road Side Framework Placement using VANET for Reducing Network Delays.....	63-70
G.Vamsi Krishna, R.Shankar, N.Vadivelan and M.Nalini	
Investigation on enabling Intelligence through Deep Learning and Computer Vision-based Internet.....	71-82
of Things (IoT) systems in a Classroom Environment M.Lakshaga Jyothi and Dr.R.S.Shanmugasundaram	
Covid-19: A IoT Drone Design for Prevent and Monitor Community Spread.....	83-88
Sathish Kumar L and M. Nalini	
A mixed Approach of Deep Learning and Machine Learning Techniques for Improving Accuracy.....	89-95
in Stock Analysis and Prediction Mrs.D.Kanchana, Assistant Professor(S.G) and Mrs.J.Shobana, Assistant Professor(S.G)	
Portable Rtl-Sdr Based Frequency Analyzer.....	96-103
Arunthathi.C, Aravind Narayanan.R and Dr. B. Aruna Devi	
Smart Bus System.....	104-108
Ragavee. A, Rishikesh.R and Dr. B. Aruna Devi	
Comparison of Different Bio Inspired Optimization Algorithms for Improving Network.....	109-114
Lifetime in Wireless Sensor Networks P Preetha, and N.V Eldhose	

Design of Linearly Polarized Circular Disc Shaped Patch with Split Ring Resonator.....	115-118
using FR4 Material for Bandwidth Improvement and Square Ring in Ground	
Dr. N. Satyanarayana Murthy	
Deep Learning Based Human Emotion Recognition from Speech Signal.....	119-124
Dr. M.P. Flower Queen, Dr.S.Perumal Sankar, Dr. P. Babu Aurtherson and P. Jeyakumar	
Design and Performance Analysis of Rhombus Shape Microstrip Patch Antenna.....	125-130
for Wireless Vehicular Communication	
Dr.S.Kavitha, S.Abarna, R.Gowthami, D.Sathya Prakash and B.Gokulkumar	
Design of High Performance Binary Circuits for Low Power Applications.....	131-135
Kathirvelu. M and Rajendran. A	
Capacity Enhancement in Mobile Cellular Communications.....	136-141
J. Ganesh and Dr. A. Rajendran	
Military Based Voice Controlled Spy Bot with Weapon Detector.....	142-146
Dr.S.Kavitha, Dr. S.T.SadishKumar T.Menaga, E.Gomathi, M.Sanjay and V.S.Abarna	
Sarcasm Sentiment Detection and Classification Model on Twitter.....	147-152
Ezhilmathi S, Dhanamathi A, Loganathan R and Elanchezhian E	
Design of area efficient and Low power Square Root Carry Select Adder.....	153-156
Mr.T.Jayachandran and Dr.K.Sharmilee and K.K.Sangeetha	
High Dimensional Data Space Using Shrinkage Diversity.....	157-159
Dr.Venkateswaran Loganathan, Dr.G.Selvavinayagam and Dr.K.Loheswaran	
Mobile Ad-Hoc Network Qos Improving Based On Wale Optimized Aodv Routing Protocol.....	160-163
Dr. P. Revathi	
Investigation on Automated Surveillance Monitoring for Human Identification.....	164-172
and Recognition using Face and Iris Biometric	
Dr.R.Jayavadivel, Associate Professor, Dr.S.Jayachitra, Associate Professor and Dr.P.Prabaharan, Associate Professor	
Cloud Computing Task Scheduling Based on Pigeon Inspired Optimization.....	173-177
Dr.K.Loheswaran	
AI based Classification of Chest Xray for COVID-19 Diagnosis: A Study.....	178-182
Pratheep Kumar P, V Mary Amala Bai and Sreekala K K	
Literature Review on High Dimensional Data Clustering Techniques.....	183-187
Dr.G.Selvavinayagam, Dr.Venkateswaran Loganathan and Dr.K.Loheswaran	
Quality of Life and Mobile with Internet Addiction Among Engineering College Students: A Correlation Study.....	188-194
Dr.R.Thamilselvan, Dr.K.Palanisamy, Dr.P.Natesan, Dr.R.R.Rajalaxmi and Dr.E.Gothai	
Hybrid Machine Learning Algorithm and Principle Component Analysis based Face Recognition Attendance System.....	195-202
Dr.T.Avudaiappan, L.Praveen Kumar, B.Sabarish and S.S.Prasanna	
An Iot Based Integration of Smart Agro and Discernment of Leaf Canker Identification.....	203-208
D.Vijayakumar and M.Mahalakshmi	
Review Analysis of Twitter Sentimental Data.....	209-214
S.Kasthuri and Dr.A.Nisha Jebaseeli	
MANET Wormhole Attack Preventing Using Two-Phase Hybrid Cryptography Cryptograph Security Algorithms.....	215-219
Dr. T. Prabakaran	
Big Data Analytics--an Influence of Deep Learning.....	220-223
Dr. C. Chandralekha, S. Divya and N. Aiswarya	
Literature Review on Optical Layer Protection Scheme.....	224-229
Dr. S. Umarani, Mr. P.Chandrasekar and Manjulababu	
Study on Utility of AI/ML in UAS Based Cyber Physical Systems.....	230-233
Priyanka Sharma and M Nagarajan	
Automatic Cassava Plantation using Bluetooth.....	234-236
S.Jegan, R.Aravindh Raj, M.Elakkiya, P.Madan and P.Mounika	

Abnormality Detection of Optic Disc Using Entropy Based Algorithm and Cnn.....	237-243
N.S. Kavitha, Dr.N.Kasthuri, S.Logarasi, S.Monika and G.Muthukumar	
Certain Investigation on Palm Vein based Authenticating System.....	244-248
Brindha Samarasam and Manikandaprabu Nallasivam	
Intravenous Fluid Alert Management Connected to Smartphone Using Iot.....	249-253
P.Matheshwaran, S. Akshaya, S. Krithika, B.C.M. Hiran mayee and A.Nivetha	
Water Quality Monitoring System Using Internet of Things.....	254-258
Anant N. Halornekar, Siya D. Shetgaonkar, Ramkrishna U. Naik, Sharven R. Naik, Chaitali Karekar, J. William	
Dynamic Mechanical Analysis of Acid Treated Surface Modified Natural Fillers.....	259-268
Reinforced Epoxy Based Polymer Composite	
Dr.P.Babu Aurtherson, R.Suthan, Dr.K.Hari Ram, Dr.M.P.Flower Queen and Dr.S.Perumal Sankar	
Secured Authentication Using Image Shield Protection.....	269-274
P.Matheswaran, H.Priyadharshini, R.Shalini and M.Thilagavathi	
A Review on Workload Characteristics for Multi Core Embedded Architectures.....	275-279
using Machine Learning Techniques	
R.Sivaramakrishnan and Dr.G.Senthilkumar	
A Hybrid Method for Deduplication and Redundancy Checking in Cloud Storage with Side Channel Attack.....	280-285
R. Vignesh M.E and Dr. J. Preethi M.E	
An 8-Bit Subranging ADC Using 48nm FINFET Technology for Low Power Consumption.....	286-291
S.Tamil Selvi, P. Arul, V. Kumaravel and Dr.K.Helen Prabha	
Decreasing Routing Traffic in Mobile Ad Hoc Networks Using Neighbor Nodes Coverage.....	292-296
R.Hemalatha, K.Helen Prabha, Hemalatha Rajasekaran and M.Shakunthala	
Virtual Human for War Field.....	297-299
Hemalatha Rajasekaran, K.Helen Prabha G, R Hemalatha and G.Brenie Sekar	
An Effective Analysis and Prediction of Diabetes using LightGBM Algorithm.....	300-305
Ashwin Kanna K, Abhishek CH, Jaison S and Dr Sethukarasi T	
Convergence Heuristic Function based Route Planning Algorithm for Energy-.....	306-311
Efficient VANET GPS Navigation System	
S.Jaya Prakash, Dr.K.S.Giridharan, R.Regan, Dr.P.Rajaram and S.Ramesh	
Medical Report Management and Transaction using BlockChain.....	312-315
Subhasri N, Prathipa A, Srivarshini S and Dr.B. Jaison	
Detection of Diabetic Retinopathy in Retinal Images with Advertent Information.....	316-320
Sushmitha N, Ragavi R, Sneha T and L.Raji	
Prognosis of Sepsis using Machine Learning Algorithms.....	321-325
Subhasri N, Prathipa A, Srivarshini S and Dr.B. Jaison	
Smart Agriculture Using Iot and Machine Learning.....	326-329
Shiela David	
A Unified Approach for Image Classification Using Transfer Learning.....	330-334
Asha R and Gowthamy J	
Iot Based Sensor for Water Purifier.....	335-339
Judy Flavia B and N. Jeenath Shafana	
Design of Partitioned VLSI systems for Reliable Processing.....	340-343
M.Chitra, Dr. Sita Devi Bharatula, S.Suganya and M.Suresh	
Even Vertex Square Difference Labeling Graphs.....	344-348
K.V.Udayanatchi, M.Kannan and K.V.TamilSelvi	
Layout Based Control of Electrical Appliances using Internet of Things.....	349-353
T. C. Kalaiselvi and S. Swathi	
Sentiment Analysis in Social Media and their Recent Trends.....	354-362
Dr.A.Swaminathan and Dr.R.Raju	
Feasibility Analysis for Targeted Nodes Using Signal Strength.....	363-365
Dr.N.Vijayalakshmi, Mrs.S.Suriya and Mrs.S.Sindhu	
A Survey on Aspect-Based Opinion Mining Techniques.....	366-378
Chongtham Rajen Singh and Dr. R. Gobinath	
Detection of Traffic Signal Violation Using Ultrasonic Sensors.....	379-381
J.Shyamala Devi and S. Suriya	
Analysis of Electrical Performance of a Fire Fighting Rover.....	382-385
A.Prabhu, A.Subramaniya Siva and R.Saranraj	

Design of Multiband Microstrip Patch Antenna Using Hfss for 3g/4g Wireless Communication

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ABSTRACT

This paper deals with a modest method of designing a Multiband Microstrip Patch Antenna (MMPA). The MMPA operates at various frequencies namely 0.9GHz, 1.5GHz, 1.8GHz, 2.1GHz and 2.45GHz. This antenna is intended to function on only one frequency band. On adding several I-slots the antenna characteristics can be enhanced to operate over several bands. This method seems to be simple and its design comprises of a microstrip patch antenna containing four slots which is inserted on the topmost portion of the radiating patch. Design and simulation of patch antenna are done with the help of Ansoft HFSS 13.0 software.

KEY WORDS: MICROSTRIP PATCH ANTENNA, MULTIBAND, HFSS AND PATCH ANTENNA PARAMETERS.

INTRODUCTION

The Multiband Microstrip Patch Antenna (MMPA) is a familiar antenna having several advantages such as its minor size, minimum price, light weight and quite easy fabrication. Due to various advancements in wireless technologies, the necessity for an antenna which is capable of operating at multiple resonant frequencies is increasing day by day. A, Deshmukh & V and Neelam Phatak (2015). Antenna which has the ability to operate on multiple frequency bands is termed to be a multiband antenna. The multiband resonant frequency patch antenna is designed in such a way by introducing slots on the topmost portion of the radiating patch. Practically, the slots can be of any shapes like U, V, L, and T.

The antenna can be used on different applications like GSM mobile phones, 3G, 4G LTE, GPS, WLAN, Wimax, Wi-Fi and many others. G. Byun, H. Choo and S. Kim (2015). A simple design approach for the multiband microstrip patch antenna by introducing slots is briefly presented in this paper. Also, the effects on the usage of slots on the microstrip patch antenna are also discussed. The antenna design deals with a simple idea, where the slots are created to produce multiband resonant frequencies. G. C. Huang et al., (2015). Initially, MMPA of rectangular shape is taken and slots are inserted on radiating patch's topmost portion. The simulation results are presented and the parameters like return loss and the antenna radiation pattern are illustrated.

Design of the Antenna: For designing a multiband MMPA, the material used is FR-4 substrate having dielectric constant as 4.3 and 1.6 mm thickness is the material used. K.S. Tamilselvan et al., (2012). The patch height is considered to be 0.1mm whereas the volume is taken as 77mm×36mm×1.6mm for the antenna structure. Multiple resonant frequencies can be generated with the help of slots. H. Dashti and M. H. Neshati., (2014). Microstrip line is fed to this antenna having 50mm feeding length, 3mm

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width and it is partially grounded where the ground length is considered to be 7mm. A Rectangular microstrip patch antenna is taken for our first design and inserting slots are performed to investigate lower and higher bands M. I Hossain et al., (2015).

Mathematical Calculation:

1. Width calculation (W):

$$W = \frac{c}{2f_0 \sqrt{\frac{\epsilon_r + 1}{2}}}$$

W=36mm

2. Effective dielectric constant calculation ϵ_{eff} :

$$\epsilon_{eff} = \frac{\epsilon_r + 1}{2} + \frac{\epsilon_r - 1}{2} \left[1 + 12 \frac{h}{w} \right]^{-2}$$

$\epsilon_{eff} = 3.9790$

3. effective length calculation (L_{eff}):

$$L_{eff} = \frac{c}{2f_0 \sqrt{\epsilon_{eff}}}$$

$L_{eff} = 29\text{mm}$

4. Length extension calculation (ΔL):

$$\Delta L = 0.412h \frac{(\epsilon_{eff} + 0.3) \left(\frac{w}{h} + 0.264 \right)}{(\epsilon_{eff} - 0.258) \left(\frac{w}{h} + 0.8 \right)}$$

$\Delta L = 0.65631 \text{ mm}$

5. Actual Length of patch calculation (L):

$$L = L_{eff} - 2\Delta L$$

L = 27 mm

Table 1: Design parameters and its dimensions of MMPA

Design Parameters	Width(mm)	Length(mm)
Substrate	36	77
Ground	36	7
Feed line	3	50
Patch	36	27

A.Design of a rectangular patch antenna: Initially, rectangular MMPA is designed at 0.9GHz resonant frequency. The antenna dimensions are presented below in Table 1. The simulated design is depicted in Figure 1. The results obtained during the simulation are represented

in Figure 2 and 3 which deals with the return loss and radiation pattern L. Hui et al., (2017).

Figure 1:A Rectangular shaped MMPA

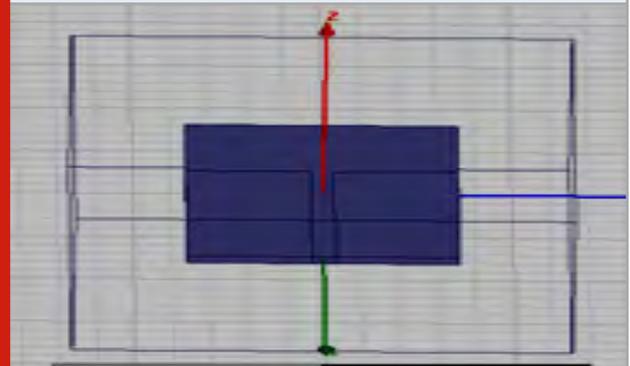
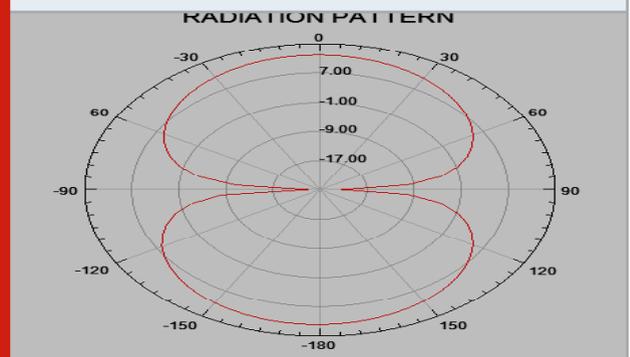


Figure 2: Return loss for MMPA



Figure 3: 2D Radiation pattern at 0.9GHz



B. I-slotted microstrip patch antenna design: An I slot is created on top of the antenna structure S. Mahendrakumar and T.GunaSekar (2016). The I-slot dimensions are described in Table 2. The designed structure is simulated and shown in Figure 4. The result shows that MMPA with dualband resonant frequencies are obtained at 0.9GHz and 1.5GHz. The plot for return loss and radiation pattern is depicted in Figure 5 and 6.

C. I-L slotted patch antenna design: Another slot is made on the antenna structure top level as represented in Figure 7 and Table 2 deals with its corresponding

dimensions S. Mahendrakumar and K. SenthilPrakash (2011). Simulation result shows that tri- banded resonant MMPA is formed at 3 frequencies namely 0.9GHz, 1.5GHz and 1.8GHz. The plot for return loss and the radiation pattern are depicted in Figure 8 and 9.

Table 2. Design parameters and its dimensions of slotted MMPA

Design Parameters	Width(mm)	Length(mm)
Substrate	36	77
Ground	36	7
Feed line	3	50
Patch	36	27
Slot1	34	1
Slot2	24	1
Slot3	1.5	3
Slot4	21.65	1
Slot5	18.2	1

Figure 4: l-slotted MPA Rectangular

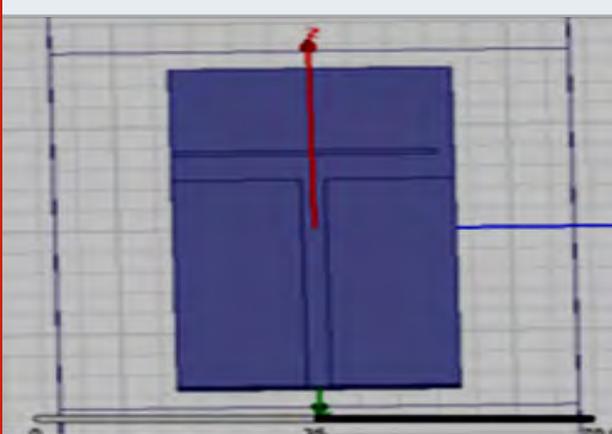
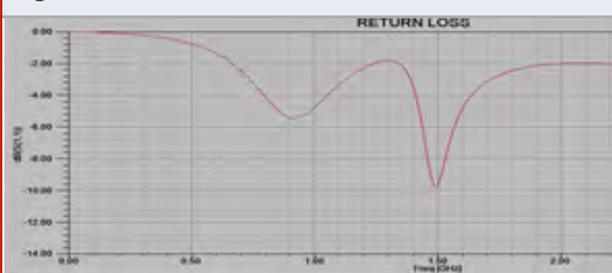


Figure 5: Return loss for anl-slotted MMPA



D. l-l-l slotted patch antenna design: 3 slots are made on a microstrip patch antenna as demonstrated in Figure 10 and its corresponding dimensions are shown in Table 2. Simulation result shows that a quad banded resonant MMPA is formed at 4 frequencies namely 0.9GHz, 1.5GHz, 1.8GHz and 2.1GHz. The plot for return loss and its radiation pattern obtained are depicted in Figure 11 and 12.

Figure 6: Radiation pattern of l-slotted MMPA 2D(1.5GHz)

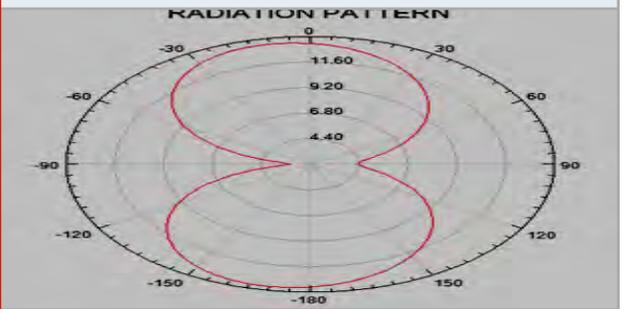


Figure 7: Dual slotted MMPA

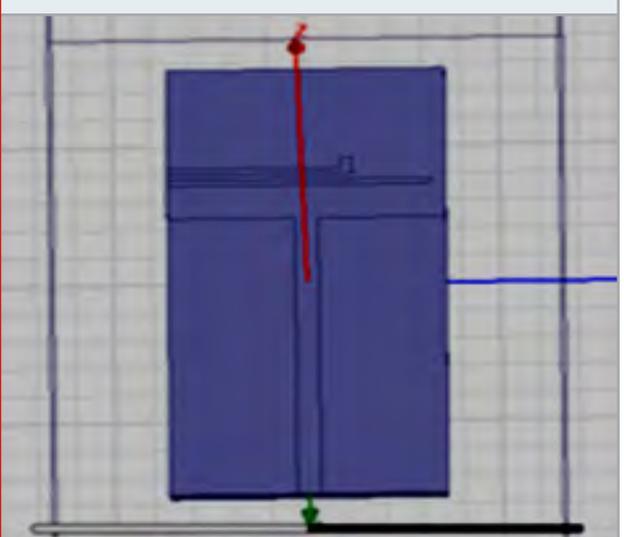


Figure 8:Return loss plot for a dual slotted MMPA



Figure 9: Radiation pattern of l-l slotted MMPA 2 at 1.8GHz

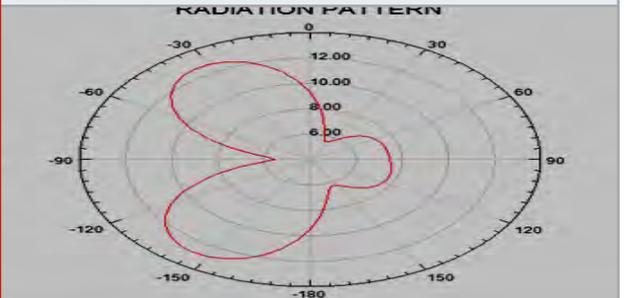


Figure 10: Triple slotted MMPA

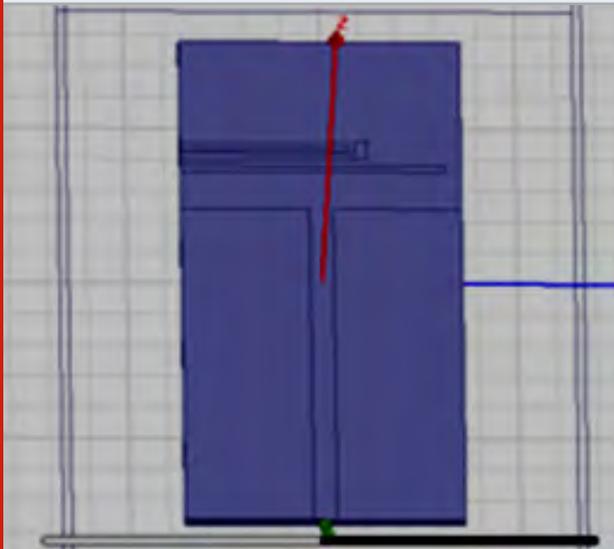


Figure 13: Tetra slotted MMPA

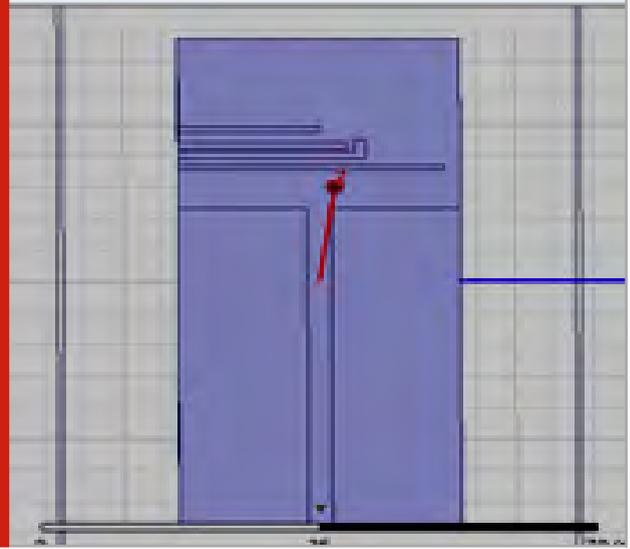


Figure 11: Return loss plot for a triple slotted MMPA



Figure 14: Return loss for a tetra slotted MMPA



Figure 12: Radiation pattern of 1-L-1 slotted MMPA 2D at 2.1GHz

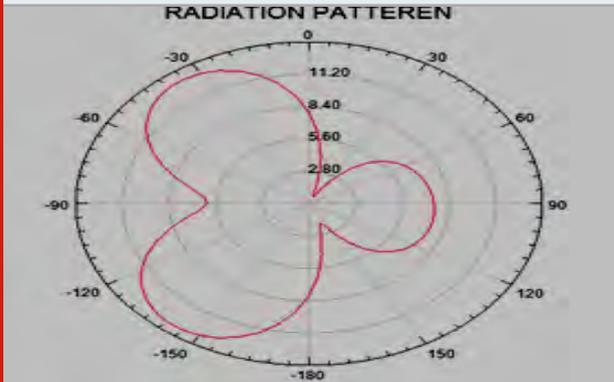
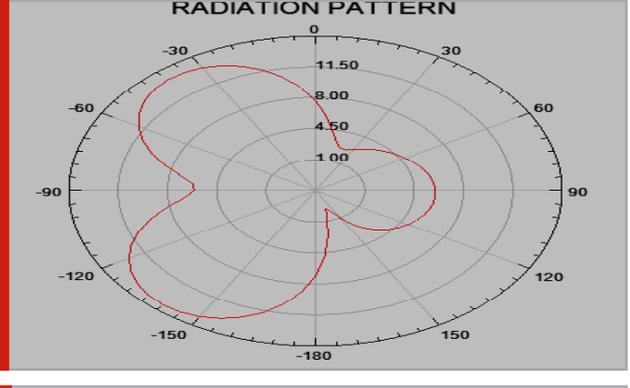


Figure 15: Radiation pattern of 1-L-1-1 slotted MMPA 2D at 2.45GHz



E. 1-L-1-1 slotted patch antenna design: Totally 4 slots are created on a microstrip patch antenna as represented in Figure 13 and its corresponding dimensions are stated in Table 2. The simulation result shows that penta banded resonant MMPA is formed at 5 different frequencies namely 0.9GHz, 1.5GHz, 1.8GHz, 2.1GHz and 2.45GHz. The plot for return loss and its radiation pattern are represented in Figure 14 and 15. The obtained return loss at various frequencies for a tetra slotted MMPA is depicted in Table 3.

Table 3. Return loss-Tetra slotted MMPA

Frequency	Return loss
0.9GHz	-5.6686 dB
1.5GHz	-9.6780 dB
1.8GHz	-5.6012 dB
2.1GHz	-4.2368 dB
2.45GHz	-3.3537 dB

CONCLUSION

Multiple l-slots are introduced on radiating patch for the proposed multiband antenna design. By increasing the number of l-slots, the antenna structure is designed to operate at dual, triple, quad and penta band frequencies. This antenna is capable of operating at multiple frequencies like 0.9GHz, 1.5GHz, 1.8GHz, 2.1GHz and 2.45GHz. Simulations for the proposed antenna are performed using HFSS software.

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An Improved Lsb Data Steganography Using Elliptic Curve Cryptography

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ABSTRACT

In the modern era of computer networks, the features used for security purpose are the steganography and cryptography. The main idea is to transmit the data securely without the loss of data. So, for data transmission providing acceptable level of security is essential and also it should reduce the time complexity of the security algorithm. Here we have employed the “Elliptic Curve Cryptography” scheme to encrypt the data and the “Least Significant Bit” steganography algorithm to insert the data in a gray scale image. Then the image is compressed before sending through the internet.

KEY WORDS: ELLIPTIC CURVE CRYPTOGRAPHY (ECC), STEGANOGRAPHY, LEAST SIGNIFICANT BIT (LSB).

INTRODUCTION

Cryptography also called as cryptology is a technique, which is used to transmit the data securely, and also it prevents the third parties from reading the secret message by providing some secret keys. The main applications of cryptography include e-commerce, chip-based payment cards, digital currencies, computer passwords, and military communications for security purpose Amna Shifa et al., (2018). Cryptography is used to convert the readable information into a non-readable one, which could be read only by the receiver who holds the private key. The main purpose of cryptography is to perform encryption and decryption of the message. The sender who needs to share the information shares the private key only to the receiver in order to prevent the third parties taking out the message Gavaskar K and Ragupathy (2019). The cryptography method is hard to compute

by the adversaries. There are many algorithms used for encryption and decryption namely, DES (data encryption standard), AES (advanced encryption standard), RSA (Rivest-Shamir-Adleman).

Steganography is the process of hiding the secret message inside the image in the least significant bit of the image in order to share the secret message only to the receiver to whom the sender desires to share the message Gavaskar K et al., (2019). At the receiver side, the receiver extracts the information with the help of the private key given by the sender. Here the secret message is being sent secretly to the receiver without the loss of message in the middle of transmission. The meaning of the word steganography is the “hidden” or “hiding” which is used to hide the message inside the LSB of the image Jayati Bhadra et al., (2018). The message to be hidden inside the image is first encrypted and then embedded inside the LSB of the image and the message is then being decrypted at the receiver side before the receiver views the original message. The message is encrypted in order to transmit the message, which could not be read by the adversaries and could be read only by the receiver who needs to get the message Kim.C.R et al., (2018).

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MATERIAL AND METHODS

Existing System: Encryption plays a major role in the transmission of data without the loss of data where the message which is to be transmitted is first converted into a non-readable text and it could be read only by the receiver who has the key and those who don't have the key could not read the message (i.e.) the third parties Laiphrakpam D S and Khumanthem (2015). Encryption is the process of converting a message which is called as plain text into an encrypted message which is called as cipher text which could be read only by the receiver who has the private key. Here keys are generated. There is a possibility of decrypting the message without the key but it need more skill and knowledge. The receiver who receives the encrypted message could easily decrypt the message with the help of the private key given by the sender without the loss of data. The process of decryption is being performed in the receiver side with the help of the private key possessed by the receiver given by the sender Muhammad.K (2016).

Classification of Encryption Algorithms

Advanced Encryption Standard (AES): A cryptographic algorithm that can be used to protect the electronic data is the advanced encryption standard. The AES algorithm is a symmetric key algorithm that can encrypt and decrypt the information Ms.ShrideviShetti and Mrs.Anuja S (2013). Encryption converts data to an unreadable form called cipher text, decrypting the cipher text converts the data back into its original form, called plaintext. The AES algorithm is capable of using cryptographic keys of namely 128, 192, and 256 bits to encrypt and decrypt the data in blocks of 128 bits.

Data Encryption Standard (DES): One of the symmetric key algorithm is the Data encryption standard which is used for the encryption of electronic data. Although its short key length of 56 bits, criticized from the beginning, makes it too insecure for most current applications, it was highly influential in the advancement of modern cryptography methods Shabina N. Ahmed and Vinod Todwal (2019).

Rivest–Shamir–Adleman (RSA): This asymmetric algorithm uses two different keys, this is also called as public key cryptography. although it's been through some issues of getting broken, which have then been resolved.

Drawbacks of Existing System

The drawbacks of the existing system based on the key size and others are

- Symmetric keys are used in DES and AES algorithm.
- Both for encryption and decryption public keys are used in DES and AES algorithm.
- No safer transmission of data.
- Since symmetric key is used for both encryption and decryption, the third person could make an easy access to the data.
- In RSA algorithm, the key size is bigger.

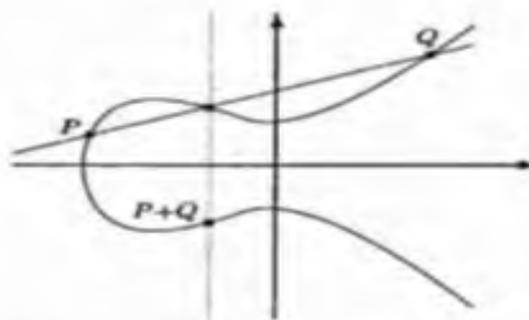
Proposed System: In the proposed method, the image is encrypted and decrypted by using the elliptic curve cryptography algorithm and the least significant bit steganography is performed in order to hide the text inside the LSB of the encrypted image for more security purpose and retrieve the text that is hidden in the LSB of the encrypted image by using the decryption algorithm in the receiver side.

Steps in Elliptic Curve Cryptography: The below steps are involved in encryption and decryption part of the elliptic curve cryptography

1. Key generation is the first and foremost step.
2. Public key should be broadcasted to all the sender.
3. Encryption module.
4. Steganography module.
5. Compression of the image to be performed.
6. De-Compression of the image is performed.
7. De-LSB module.
8. In Decryption module the text is decrypted with the help of private key.

Encryption module: In this proposal, ECC is selected as an encryption method. Public key is used for encryption process, which is of short length. The Figure 1 is the common elliptic curve cryptography curve when the encryption and decryption algorithm takes place.

Figure 1. ECC Curve



Steps involved in key generation:

1. Private key should be selected.
2. Receive the public key from the user.
3. Circulate the public key.

Steps involved in encryption part:

1. First select the message to be secretly hidden inside image.
2. The message must be encrypted with the public key and the ECC algorithm.

Decryption Module

Steps involved in decryption part:

1. Get the image in which the text is embedded.
2. The image must be resized.
3. Separate the message by finding the LSBs to get

back the encrypted message.

4. With the help of private key and ECC algorithm decrypt the message.

Steganography module: Steganography is the process of hiding the text inside the image where the ascii value of the text is converted into a binary value and then it is embedded into the LSB bit of the image's pixels.

The process that are involved in the steganography method are

1. Change the text message into its binary values namely 0's and 1's.
2. Select the output image same as that of the input image.
3. Apply the same for each and every pixel.
4. Change the pixel value into the binary value.
5. Get the image in which the message is to be embedded.
6. Add one or two pixels to the existing pixel in order to avoid the error.
7. The image pixel varies from 0 to 255.
8. In the least significant bit of the image pixel by using the steganography method hide the message.
9. The message would be converted into the binary value and hidden inside the LSB of the image.
10. The pixel value in the image would also be converted into the binary value.

Image-ECC and LSB-Steganography: As that of the text encryption and decryption using elliptic curve cryptography the image is also encrypted using the encryption algorithm and decrypted using the decrypted algorithm in the receiver side.

Images consists of various information and also for the transmission of secret messages the image plays a major role wherein we could hide the secret message inside the image and transmit the image to the receiver which reduces the process and also the time. The image is also being encrypted and decrypted as that of the encryption and decryption of the text. Most of the images are very important and the images are needed to be sent secretly without the loss of data. Here the message is being just hidden rather than encrypting the message and then the finally the image is encrypted where the receiver could just decrypt the image using the private key and could view the message rather than decrypting the message Yang Ren-Er et al., (2014).

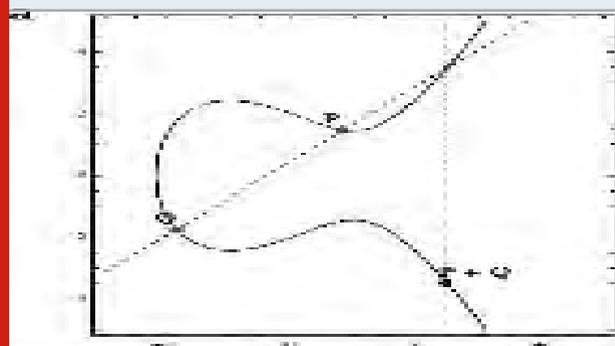
It reduces the process where in we could just encrypt and decrypt the image rather than encrypting and decrypting the text. Here for encryption and decryption of the image Elliptic Curve Cryptography method is being used. Here the key size used is smaller than the other cryptographic methods. Elliptic curve cryptography is being chosen because the discrete logarithmic problem is present which is difficult to solve and the computation of elliptic curve discrete logarithmic problem is also very difficult for the

adversaries. Here two keys are used namely public key and the private key. The key size is very small. Elliptic Curve Cryptography is a public key method.

Mathematical Operation: The mathematical operations used in the Elliptic curve cryptography are listed below.

Point Addition: The point addition is being performed in the co-ordinate points of the elliptic curve where two points are being added by drawing a straight line from the initial point. It is represented in the figure 2.

Figure 2: Point Addition



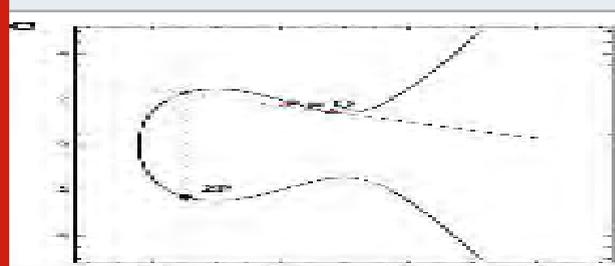
Point Subtraction: The figure 3 represents the point subtraction where the resultant of the point addition is being subtracted using the private key given by the sender.

Figure 3: Point Subtraction



Point Doubling: The point doubling is being performed to sum up the points which have the same axis value and also to compute the keys namely the public key and the private key. It is shown in the figure 4.

Figure 4: Point Doubling



Pixel Grouping into a Single Integer: The pixel value of the image in the byte format ranges from 0 to 255 and if needed we could add some extra pixel values. There are numerous amount of pixels in the image and if we perform each and every operation on the pixel (i.e.) one by one it would take much time and increase the time complexity so grouping of every pixel into a single big integer reduces the time. Also the grouping of pixel depends upon the Elliptic Curve cryptography parameters and if the parameters are large grouping of pixel varies and depends on it. It reduces the time complexity and also increases the security purpose.

Getting the Group of Pixels from the Big Integer: Once the pixel value is being grouped into a single big integer for the Elliptic curve operation it is then being prepared for next operation where it ranges from 0 to 256 and from the big integer ranges from 0 to 255 and the extra pixels will be omitted.

Image Encryption

The image encryption steps are as follows

1. Select the image, which is to be encrypted.
2. Get the pixel value of the image which ranges from 0 to 256
3. Add one or two pixels in the image in order to avoid the error.
4. Select the message that is to be hidden in the image
5. The sender sends the private key only to the receiver.
6. The public key is being published to everyone
7. Embed the message to be transmitted
8. With the help of the public key encrypt the image
9. Send the encrypted image to the receiver.

Image Decryption

The decryption algorithm are as follows

1. Get the encrypted image which ranges from 0 to 255 from the sender.
2. With the help of the private key given by the sender decrypt the image
3. After decryption of the image the hidden message in the LSB of the image could be viewed.

RESULTS AND DISCUSSION

Encryption and Decryption using Elliptic Curve Cryptography: Encryption and decryption of an image and the text is done by using the elliptic curve cryptography algorithm. This method is mainly done to transfer the image or a text in a secure manner.

Key Generation and Select the Image: For data encryption and decryption, we should generate a public key, secret key and private key to transfer the data in a secure manner. The algorithms are given below.

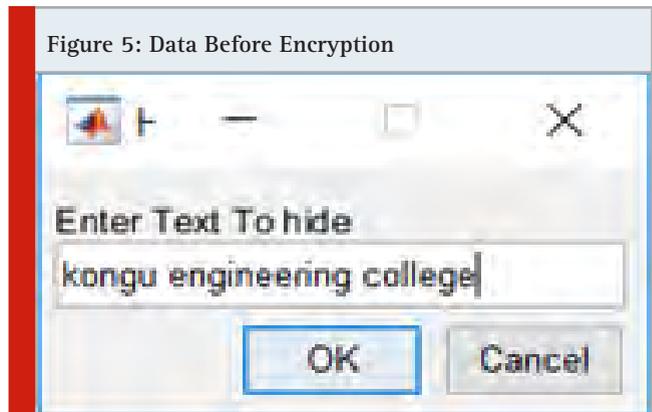
User A key generation

- The sender A selects a random number k_A from 1 to $n-1$.
- The sender A then generates the public key with the help of the formula
- public key $P = k_A * G$
- k_A - is the sender's private key
- G - Generation point

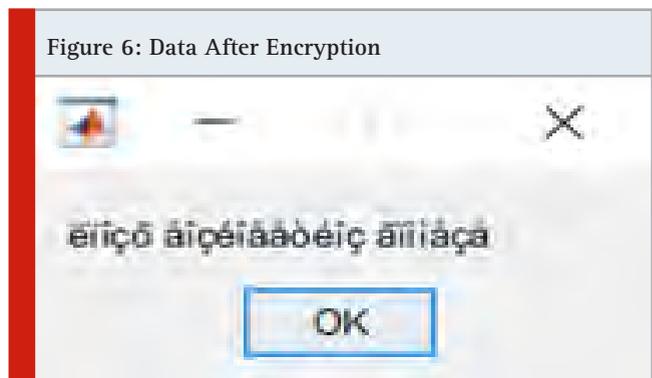
User B key generation

- The sender B generates the public key with the help of the formula
- public key $R = k_B * G$
- k_B - Receiver's private key
- G - Generation point
- Secret key generation
- Secret key of A, $K = k_A * R$. The secret key of A is obtained by multiplying the private key of A and the Public key of B.
- Secret key of B, $K = k_B * P$. The secret key of B is obtained by multiplying the private key of B and the key of A.

Encrypt the data using LSB: Encrypt the secret message with "elliptic Curve Cryptography" with the public key published by the receiver. In the Figure 5 the data is given in the text box as "kongu engineering college". This given data is encrypted in the sender side by using the encryption algorithm. Where we will use the public key for the encryption purpose.



Elliptic Curve Encryption Algorithm: By using the encryption algorithm the text is encrypted by using the encryption algorithm as shown in the Figure 6.



- The sender A needs to send a message 'pm' to the receiver B.
- Here the text pm is embedded with the help of taking the ASCII value of pm and multiplying it with a integer. The text now would be embedded in the point s.
- Here the cipher text C_m is obtained by using the formula
- $C_m = (k * G, s + k * R)$,
- k - random integer, G - Generation point, pm - message R - public key of the receiver B
- The cipher text which is the encrypted text will be found in C_m which consists of a pair of points.

Decrypt the Data from the Image: Decrypt the data by using the private key in the receiver. Decrypt the text by using the decryption algorithm and retrieve the original text that is send by the sender.

Decryption algorithm

- To decrypt the cipher text the receiver B first multiplies the first point kG with the private key kB of the receiver B. $kB(k * G)$
- The receiver then subtracts the result from the second point
- $P_m + k * R - kB(k * G)$
- The receiver could then get the original text 'pm'.

Figure 7: Decrypted Data from the Image



Steganography Method using Elliptic Curve Cryptography:

The steganography method is used to hide the data inside the image at the least significant bit of the image's pixels. For the steganography method we have to choose a image to hide the data. Figure 8 is the original image in which we have to hide the data inorder to transfer the data in a more secure manner.

Figure 8: Original Image



For the steganography method, we have to resize the image for inorder to know the image's rows and columns. The Figure 9 gives the resized image from the original image.

Figure 9: Resized Image



Steganography method is used along with the elliptic curve cryptography which means the encrypted data is hidden inside the resized image. There will be no such difference between the resized image and the data hidden inside the image. The left side of the Figure 10 gives the resized image before the data is hidden. The right side image gives the encrypted data hidden inside the image.

Figure 10: Encrypted Data Hidden inside the Image



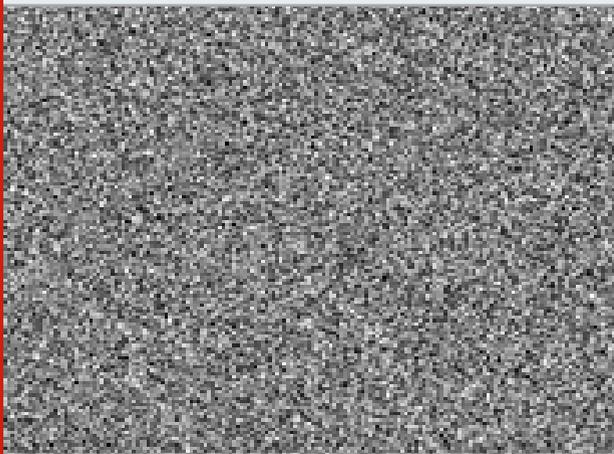
The above Figure 11 is the original image that undergoes the image encryption and decryption using the elliptic curve cryptography.

Table 1. Frequency Band with bandwidth



The Figure 12 is the encrypted image from the original image using the encryption algorithm given below

Figure 12: Encryption Image after ECC



CONCLUSION AND FUTURE SCOPE

The text encryption and decryption using ECC holds good if the public key size is not very large. Moreover the processing time will be more than the simple encryption method. But it is secure than the one layer of security enforced by applying only encryption method of data. If the secret data is large then it has to be compressed and other encryption method should be used in place of ECC. In the case it is required to check the processing time of the method as it is the vital parameter for the cost of processing. In image encryption and decryption using ECC we have performed the operation by grouping the pixel. It may take some time to compute elliptic curve cryptography. By Grouping the pixels into a single

integer computation time is reduced. When the original image is used the computation time is increased and so to reduce the computation time the image compression has to be done.

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Arrhythmia Using Ensemble Learning

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ABSTRACT

Arrhythmia is a cardiologic issue that demonstrates strange rhythm of the heart which might be lethal to the human heart. Consequently, there is a requirement for snappy location of different cardiovascular arrhythmia conditions and this research intends to help in the initial step of the conclusion. This research paper uses supervised machine learning algorithms to analyze various features of ECG to detect the presence of Arrhythmia. The dataset used is a standard one taken from the UCI Machine Learning Repository and is a multiclass dataset having unbalanced distribution of sample sizes. Data pre-processing was performed followed by feature selection where the attributes which contribute the most for class prediction is chosen. Feature selection algorithms such as Boruta and RPART were used and Boruta gave better results in terms of accuracy. A classifier model was built to detect and classify the type of Arrhythmia using ensemble learning methods such as Bagging and Boosting. Classification results of the models were verified using evaluation metrics such as Accuracy and AUC (Area Under the Curve). The classifier model performed well based on the features selected from the Boruta algorithm and gave accuracies greater than 80% for detection and classification.

KEY WORDS: DATA MINING, DETECTION, CLASSIFICATION, ENSEMBLE LEARNING, CARDIAC ARRHYTHMIA, BORUTA, RPART.

INTRODUCTION

Heart rhythmic problems occurs when the electrical impulses that coordinate the heartbeat malfunction causing the heart to either beat too fast, too slow or irregularly. An irregular heartbeat can either be harmless or life threatening. Arrhythmia can be diagnosed by measuring the heart activity using ECG or electrocardiograph and then analysing the recorded data

Olshansky et al., (2016). Different parameter values are often extracted from the ECG waveforms and may be used alongside other physiological information about the patient like age, medical record, etc., to detect cardiac arrhythmia. A heart rate that is too fast which is above 100 beats per minute in adults is called tachycardia, and a heart rate that is too slow below 60 beats per minute is called bradycardia. Symptoms of arrhythmia may include heavy palpitations or a pause between heartbeats. There are several reasons for cardiac arrhythmia to occur. A few include having a heart attack, scarring of tissues due to a previous heart attack, blocked artery, high blood pressure etc. If left untreated cardiac arrhythmia may lead to a stroke or a heart failure which ultimately leads to death.

ARTICLE INFORMATION

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The manual translation of long-term information records is repetitive and tedious. In such cases, the chance of onlooker blunder or misreading of indispensable data can't be neglected. Arrhythmia detection and classification from complex electrocardiogram (ECG) signals is one of the most challenging problems. Health condition of the heart is commonly reflected in states of the ECG waveform and rate at which it thumps. Most of the significant data in the ECG signal is amassed in the P wave, QRS complex and T wave. Positions, just as the extent of these waves alongside time spans, for example, PR interval, QRS width, QT interval, and ST fragment are deliberately seen by the accomplished cardiologists for making clinical examinations and conclusion of arrhythmia Olshansky et al., (2016). Programmed arrhythmia locators can have a high effect in forestalling the danger of stroke or unexpected cardiovascular demise in high-hazard cardiac patients. Therefore, accurate detection as well as classification of the type of cardiac arrhythmia is extremely important and this research aims to help in the first step of the diagnosis by detecting the presence of cardiac arrhythmia.

The dataset used for this research is the standard Arrhythmia dataset taken from the UCI Machine Learning Repository. There are 452 medical records of patients with 279 variables like age, weight and patient's ECG related data. The data set is labelled with 16 different classes. Class 1 corresponds to normal ECG with normal heartbeat rhythm and classes 2 to 15 denote the presence of a different type of arrhythmia. For the problem of prediction of Cardiac Arrhythmia, two approaches were taken. In the first approach, binary classification is performed to determine the presence of arrhythmia in the given dataset. For the second approach multiclass classification is performed to determine the type of arrhythmia that was present in the dataset.

Literature survey conducted for this research work in the prediction of cardiac arrhythmia as well as various methods used for classification and data pre-processing are as follows. Raghavendra et al., (2011) presented dynamic time warping (DTW) distance-based approach for classification of arrhythmic ECG beats. The DTW calculation is end up being a potential strategy that can be joined into smartphone/mobile environments for the real-time detection of arrhythmias in wearable portable medicinal services frameworks in telemedicine situation.

(Gupta et al.) applied popular classification methods to detect and classify arrhythmia into 14 different variants. A new approach combining SVM and Random Forests classifiers was implemented. Feature selection package named mRMR technique was used to select the features which have maximum correlation with output labels and minimum correlations among themselves. It used some advanced techniques for discretizing the real valued columns. A serial classifier consisting of RF and linear kernel SVM gave a generalization error of 22.6% and an accuracy of 77.4% was obtained. Samad et al., (2014) compared three classifiers for their accuracies for the

detection of cardiac arrhythmia. The algorithms that were used for classification are supervised machine learning algorithms. The classifiers used are Nearest Neighbour, Naive Bayes, and Decision Tree classifier algorithm. The calculated accuracies by their classifiers were 66.9645%, 59.7696%, and 45.8487% for k-NN, Decision Tree and Naïve Bayes respectively.

Umale et al., (2016) proposed a new approach to classify and predict cardiac arrhythmia by Extreme Learning machine will provide effective results compared to other algorithms. In a single layer of hidden nodes used classification or regression, where one time randomly assigned weights connecting inputs are never updated. The weights between the hidden nodes and the outputs are found out in a single step. Enhanced performance of prediction and classification was observed using this approach.

Mustaqeem et al., (2016) proposed different classification approaches for multiclass classification of arrhythmia. Support vector machine approaches like one-against-one (OAO), one-against-all (OAA), and error-correction-codes (ECC) are employed to detect the presence of arrhythmia are applied to identify the presence of arrhythmias. To achieve better results suitable wrapper-based feature selection methods were applied. There has been a wide variety of classification methods were to detect the presence of Arrhythmia. Even though they predict the presence of Arrhythmia successfully have some difficulties such as unable to present good performance in handling large databases and unable to test all Arrhythmia classes. To overcome the difficulties, an automatic heartbeat classification is proposed by Anwar et al., (2018). MIT-BIH cardiac arrhythmia dataset with 13724 heartbeats and MIT-BIH supra-ventricular cardiac arrhythmia dataset with 22151 heartbeats is used for testing. The morphological features of each heart beat is obtained by using Discrete wavelet transform (DWT). The proposed methodology resulted in improved accuracies using three-fold cross validation.

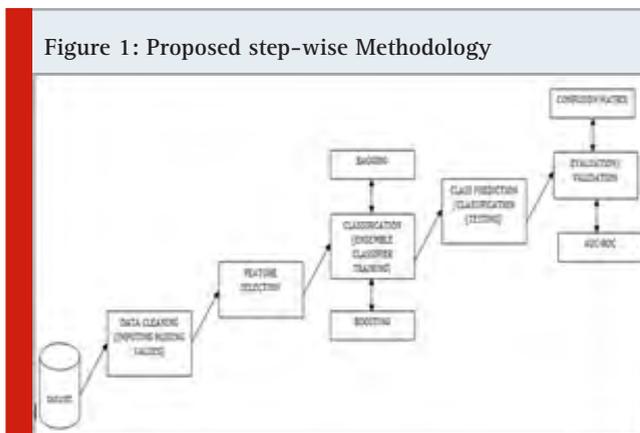
Gajowniczek et al., (2020) proposed a new weighting algorithm to be applied to each tree in the Random Forest model that was developed and the comprehensive examination of the optimal parameter tuning for the ECG. It consists of signals from ICU patients that triggered an alarm for five types of cardiac arrhythmia. The classification problem's main aim was to determine in regards whether the alarm should or should not have been generated. It was proved that the proposed weighting improved classification accuracy by triggering alarms for the three most challenging out of the five investigated arrhythmias comparing to the standard Random Forest model.

Hannun et al., (2019) suggested an evaluation of a deep learning approach for ECG analysis. It was applied across a wide variety of classes that were not previously reported. They had developed a deep neural network (DNN) to classify twelve arrhythmic rhythm classes with 91 thousand ECG reports of 53 thousand patients. The

specificity was fixed at the average specificity achieved by cardiologists; the sensitivity of the DNN exceeded the average cardiologist sensitivity. These results prove that deep learning model can classify a broad range of distinct arrhythmia effectively. A research gap that was identified was that not many papers had achieved a high accuracy rate for classification of cardiac arrhythmia. Some cross validation and comparisons between algorithms can also be used to justify the results. Many papers that handled the UCI repository data for cardiac arrhythmia did not perform effective feature selection or dimensionality reduction methods while handling such large number of attributes.

MATERIAL AND METHODS

The proposed methodology for the detection and classification of cardiac arrhythmia includes the following process. The missing values in the dataset will be handled by data cleaning methods. Since the dataset has a large set of attributes feature selection methods such as Boruta and RPART will be applied on the dataset to select the required attributes. Following this, the dataset will be divided into training and testing sets and a classification model will be built on the training set. Then, the class prediction will be performed on the testing set and then the results will be evaluated to check the efficiency of the classifier model. Fig. 1 shows a graphical representation of the proposed methodology carried out in this research project.



Data Pre-Processing: Data pre-preparing is a significant advance in the information mining method that is utilized in changing crude information into client justifiable data. Real-world data is frequently fragmented, conflicting, and ailing in specific practices or intriguing examples, and is probably going to contain numerous blunders. Data pre-processing can be utilized to determine such issues Han et al., (2008). Data pre-processing can be done to remove noises and to fill the missing values in the data set. For the Cardiac Arrhythmia dataset, the data frame columns with just one value was removed. The mean value was used in the place of a missing value. All the factor variables were converted to numeric type leaving only the class variable. After performing data Pre-processing, the variables were reduced to 261 from 279.

Feature Selection: In biomedical data analysis, a high number of features in data to be broke down is a significant concern. The high number of features may prompt insufficient classification accuracy and it makes the translation of data be troublesome Das and Liu., (1997). Henceforth, decrease the dimension of data is a basic procedure in biomedical data mining. One technique for decrease the dimension is to scan for an ideal subset of features that improves accuracy of classification. The chose features are relied upon to build the performance of the classification algorithm.

Boruta Method: The Boruta feature selection algorithm is a wrapper algorithm based on the random forest classification algorithm Miron et al., (2010). This algorithm decides the importance of a variable and helps to select variables that are only statistically significant. The Boruta algorithm uses Z score as the most prominent measure as it follows an all relevant feature search. More specifically it accounts to the fluctuations in the mean accuracy loss. The variable which has high relevance with the classification and low correlation with other variables is selected as important feature in Boruta algorithm. This makes Boruta well suited for biomedical applications to determine which features are connected to a particular medical condition.

Recursive Partitioning and Regression Trees (RPART): RPART feature selection uses decision trees as the base algorithm for a greedy feature selection technique Terry et al., (2011). This method returns features from the root to the tree down, in order. It calculates the variable importance measure based on the machine learning algorithm for each individual variable as a sum of decrease in impurity. These scores are transformed to percentages starting from 100 and consistently proportional till it reaches its least score and selects 20 most important variables based on these scores.

Classification: Classification is a data mining methodology that assigns data items to target categories or classes Tan et al., (2012). The goal of classification is to accurately predict the target class for each record in the data. It is a supervised learning methodology in which the class labels are already known. The arrhythmia dataset is divided as training and test sets with 70% data in the training set and 30% data in the test set. Classification is a two-step process where; the classifier model first learns from the training set and then applies this classification to the test set. The test set is typically used to evaluate the performance of the model and validate it.

Ensemble Learning: Ensemble learning is the process by which multiple models are generated and combined to solve a particular problem Zhang et al., (2012). Ensemble learning is majorly used to improve the performance of a classification model and reduce the chances of selection of a poor performing one. An ensemble-based system is obtained by combining several classifier models to obtain a single classifier model with improved performance. In this approach several weak learners combine together to form a strong learner which gives a higher accuracy of

classification. Therefore, such systems are also known as multiple classifier systems, or ensemble of classifier algorithms.

Bagging: Bootstrap aggregating, also known as bagging, is a machine learning ensemble algorithm designed to improve the accuracy of machine learning classification. It is a parallel ensemble learning method where base learners are generated in parallel. Bootstrapping is a sampling technique where the samples are chosen with a replacement which makes the re-sampling random. The Aggregating technique is used to combine these individual sampled models. This method helps in reducing variance and avoids overfitting Polikar et al., (2012). Bagging can be applied with any type of classification and regression algorithms.

Boosting: Gradient boosting is based on gradient descent algorithm which is capable of finding optimal solutions to a wide range of problems Ferreira et al., (2012). It is a sequential ensemble method where the learners are generated sequentially. Gradient boosting is a powerful tool for building predictive models. Gradient boosted machines (GBMs) build an ensemble of shallow and weak successive learners with each learning and improving on the previous errors. These learners are then combined to produce a strong learner. This method is used to reduce the bias and variance in supervised learning. A variation of boosting called the Stochastic Gradient Boosting is used to classify the arrhythmia dataset. In this method, at each iteration a subsample of the training data is taken at random (without replacement) from the complete training dataset. The randomly selected subsample is used to fit the base learner.

Evaluation Metrics: Evaluation Metrics are used to find the percentage of correctly classified data instances Gunawardana and Shani. (2009). Accuracy percentage is one such measure used to calculate the correctness of this classifier and is obtained from the confusion matrix. A confusion matrix is a summary of prediction results on a classification problem tested on a new set of data. It is a table that is used to quantify the performance of a classification model on data for which the true values are already known. Accuracy of a classifier determines the ability of the classifier and defines how well the model can guess the class label of a new data record.

AUC (Area Under the Curve) - ROC (Receiver Operating Characteristics) is one of the most important evaluation metrics for checking a classification model's performance with the test data. AUC-ROC is used to measure the degree of measure of separability between classes Hossin and Sulaiman. (2015). The higher the AUC, the better the model is at distinguishing between patients with arrhythmia and with no cardiac arrhythmia (i.e.) normal. It is a plot of the false positive rate shown in the x-axis and the true positive rate shown in the y-axis. It basically plots the false alarm rate of cardiac arrhythmia versus the correct prediction.

RESULTS AND DISCUSSION

Feature Selection: After the data pre-processing feature selection method was applied to identify the most important features for classification. The feature selection methods are applied to both binary classification as well as multiclass classification on the dataset. In the first approach, the Arrhythmia dataset with binary classification is taken into consideration. This classification involves two classes "normal" and "presence of cardiac arrhythmia". Feature selection methods Boruta and RPART were applied to these 261 attributes. From the results, it is observed that, for both the Boruta and RPART methods, "heartrate" was the most important feature as it determines the presence of an arrhythmia. Boruta feature selection algorithm selected 54 important features based on the variable importance, z-score, and contribution to the classification algorithm. RPART feature selection algorithm selected only 20 variables using the Variable Importance Measure.

For the second approach, the Arrhythmia dataset with multiclass specification, various types of cardiac arrhythmia is taken for consideration. This classification involves 15 classes. Feature selection methods were applied to these 261 attributes. From the results, it is observed that, "heartrate" was the most important feature as it determines the presence of arrhythmia in the multiclass specification dataset for both the Boruta and RPART methods. Boruta feature selection algorithm decides the importance of a variable and helps to select variables that are only statistically significant. It selected 80 important features based on the variable importance, z-score, and contribution to the classification algorithm. RPART method selected 20 variables using the Variable Importance Measure. The number of features selected for binary classification and multiclass classification is tabulated in Table 1.

Table 1. No. of Features Selected

Feature Selection Method	No. of Features Selected	
	Binary Classification	Multiclass Classification
Boruta Method	54	80
RPART Method	20	20

Binary Classification: The dataset was split into the training set and the testing set. The training set consisted of 70% of the data which is 301 data records and the testing set consisted of 30% of the data which is 129 data records. The model was built on the training data and the model was tested using the test data. The results were validated using the accuracy obtained from the confusion matrix. AUC is also used to validate the results. Table 2. summarizes the results obtained from bagging and boosting.

Table 2. Classification Accuracy for Binary Classification

Feature Selection Method	Accuracy	AUC
BAGGING		
Boruta Method	85%	0.9163
RPART Method	85%	0.8809
BOOSTIN		
Boruta Method	84%	0.9031
RPART Method	83%	0.9051

The accuracy obtained from the dataset which was derived from the Boruta method and RPART method is the same which is 85%. The AUC result from Boruta method is slightly higher than RPART Method. Hence features selected from the Boruta method can be used for further predictions. Boosting is useful in creating classifier models which overcome the problem of overfitting. The achieved accuracy defines the ability of the classifier to classify the instances in a dataset correctly or as per the standard. Once this kind of standard is reached, the best model is chosen. The Accuracy obtained from the dataset which was derived from the Boruta method (84%) is slightly higher than RPART method (83%). The AUC result from Boruta method is almost the same as the RPART method. Hence features selected from the Boruta method can be used for further predictions. Fig 2. and Fig 3. describes the ROC curve for Bagging algorithm with Boruta and RPART for binary classification.

Figure 2: ROC curve for Bagging using Boruta Method in Binary Classification

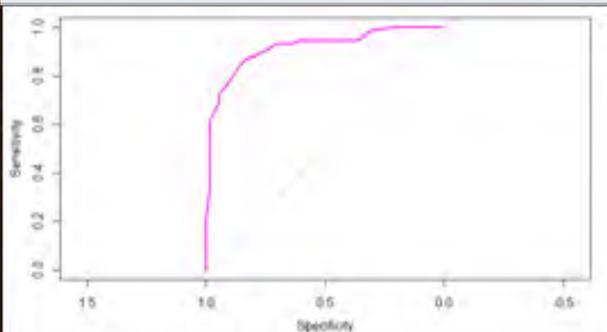
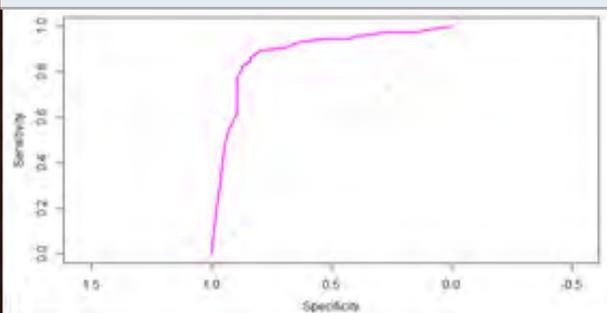


Figure 3: ROC curve for Bagging using RPART Method in Binary Classification



Multiclass Classification: The dataset with multiclass specification was split into the training set and the testing set. The training set consisted of 70% of the data which is 301 data records and the testing set consisted of 30% of the data which is 129 data records. The model was built on the training data and the model was tested using the test data. The results were validated using the accuracy obtained from the confusion matrix. Table 3 summarises the results obtained from bagging and boosting. AUC is also used to validate the results.

Table 3. Multi-Class Classification Results

Feature Selection Method	Accuracy	AUC
BAGGING		
Boruta Method	82%	0.9091
RPART Method	80%	0.7273
BOOSTING		
Boruta Method	85%	1
RPART Method	80%	0.5455

The Accuracy obtained from the dataset which was derived from the Boruta method (82%) is higher than the RPART method (80%). The AUC result from Boruta method is lower compared to the RPART Method. Hence features selected from the Boruta method can be used for further predictions. Once the best model is generated the test data is used to classify and validate the model for its accuracy. The Accuracy obtained from the dataset which was derived from the Boruta method (85%) is slightly higher than the RPART method (80%). The AUC result from Boruta method is much higher than the RPART method. Hence features selected from the Boruta method can be used for further predictions.

The arrhythmia dataset was used to train a model based on the decision tree algorithm to compare its performance against the proposed methodology after performing data pre-processing. The accuracy for detection of arrhythmia was 75% and the classification of the type of arrhythmia present was 73.13%. This proves that the proposed methodology gives much better results. Fig 4. and Fig 5. describes the ROC curve for the Bagging algorithm with Boruta and RPART for multiclass classification. When all attributes were used for classification the accuracies were roughly 75% and when RPART method was used the accuracy was around 80% and when Boruta method was used the accuracy was around 85% which is much better than the previous two methods.

It is determined that “heartrate” is the most important feature selected through both Boruta and RPART feature selection algorithms. The physiological features such as height, age, gender, etc., did not matter and were removed during feature selection. ECG readings such as P wave, QRS complex and T wave and their intervals were also considered as important variables. These physiological features were not important for classification or detection but can be used but medical practitioners for further

diagnosis. It can be observed that the features selected from the Boruta Method provided much better results for Bagging as well as Boosting for both Detection and Classification of Cardiac Arrhythmia.

Figure 4: ROC curve for Bagging using Boruta Method in Multiclass Classification

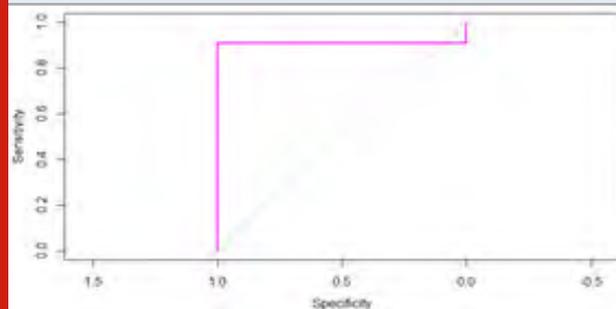
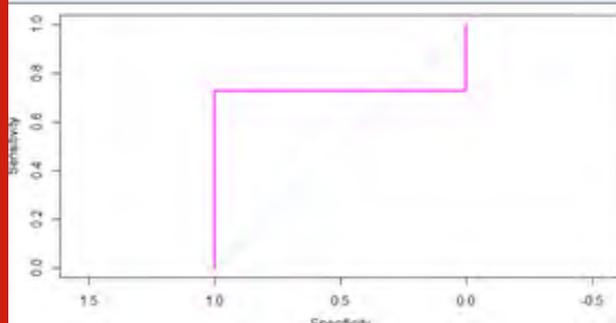


Figure 5: ROC curve for Bagging using RPART Method in Multiclass Classification



This can be due to the fact that Boruta method not only selects the top attributes like the RPART method but also uses all the relevant features from the dataset for classification. Whereas RPART only has the capability to choose the first to 20 attributes. Boruta method also has the same base algorithm as the ensemble methods used, so this is also a contributing factor. Therefore, these models can be used as decision support systems for medical professionals in the diagnosis of Cardiac Arrhythmia as they give good accurate results.

CONCLUSION

Ensemble Learning focuses on the use of supervised machine learning algorithms to analyse various features of the electrocardiogram (ECG) of the patients for the detection and classification of cardiac in the presence of Arrhythmia. Ensemble learning algorithms such as Bagging and Boosting were used for the detection and classification of cardiac arrhythmia. These algorithms used multiple weak learners to train improve the performance of the model. Random forest algorithm was used as the base weak learning algorithm. Since the dataset consisted of a huge number of variables feature selection methods were used.

Boruta method and RPART method were compared and it was concluded that Boruta method gave better results

for classification. The classifier models performed well and produced more than 80% accuracies under different circumstances. While performing classification the type of arrhythmia under the designated 15 types were identified for each data record. It was identified that "heartrate" was the most important feature selected through both the feature selection algorithms and that physiological features such as height, age, gender, etc., did not matter and were removed during feature selection. ECG readings such as P wave, QRS complex and T wave and their intervals were also considered as important variables.

The major challenge faced during this research was the dimensionality of the dataset and choosing the vital ones to improve the classification accuracy was important. In the future, expert opinion from a medical professional could be taken to remove the less important variables so much more accuracy can be obtained. For Detection and Classification of Cardiac Arrhythmia Using Ensemble Learning image processing methods can be implemented directly to ECG images to try and detect the presence of cardiac arrhythmia. Another approach would be to take real time data and time stamping them in order to prevent false alarms.

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IoT Based Food Waste Recycling and Monitoring System

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ABSTRACT

Food waste treatment is an important environmental protect problem. Processing the food waste produces methane gas. If the waste is not treated properly, methane gas being released into the atmosphere and can spread infectious diseases. In India food wastage is happening at every level, from harvesting, transporting, processing, packaging and consuming. It is very important that this system should work in a proper manner for the efficient usage of waste food and also to keep the city clean, safe and healthy. So different kind of work has been done to maintain and manage the food waste treatment. To create a barrier to this problem, we are designing a hardware model to process the food waste. In existing system the toxicity of methane gases will not be monitored. In proposed system, the toxicity of methane gas is measured continuously using the MQ-4 sensor. Since the output of gas sensor is interfaced with ATmega-328 micro controller, it checks the threshold level and the gas is collected continuously in another tank. The waste remains in the tank undergoes separation process. In separation process the waste is separated into solids and liquids. The main objective of this project is to make use of waste food in an efficient way.

KEY WORDS: ATMEGA-328 MICRO CONTROLLER, FOOD WASTE MONITORING, MQ-4 SENSOR.

INTRODUCTION

People continue to lose their lives due to the scarcity of food. Food wastage is one the major reason for this issue. Food wastage is an alarming issue in India. It cripple's a country's economy to an extent that most of us are unaware. The wastage of food can be prevented to certain extent. But it can't be eradicated. In order to make benefits from this issue food waste monitoring system plays a vital role. It is estimated by the UN that nearly 40% of the food produced in India is wasted or lost and this food wasted cost India one lakh crore rupees every

year Dian Novriadhy et al., (2019). About 21 million tonnes of wheat are wasted in India and 50% of all food across the world meets the same fate and never reaches the needy. In fact according to the agriculture ministry, INR 50,000 crores worth of food produced is wasted every year in the country.

Even though the world produces enough food to feed twice the world's present population, food wastage is ironically behind the billions of people who are malnourished. It is very important that the food waste is treated in a proper manner to keep the city clean and healthy Vijaya K Saranga et al., (2019). Food waste treatment system makes the efficient usage of food waste from home, hotels etc. The food waste is treated and used for the benefit of people. So different kind of work has been done to maintain and manage the food waste treatment. This project is to monitor the toxicity of methane gas continuously in the treatment tank. Methane gas is collected continuously in another tank. The waste remains in the tank undergoes further treatment process.

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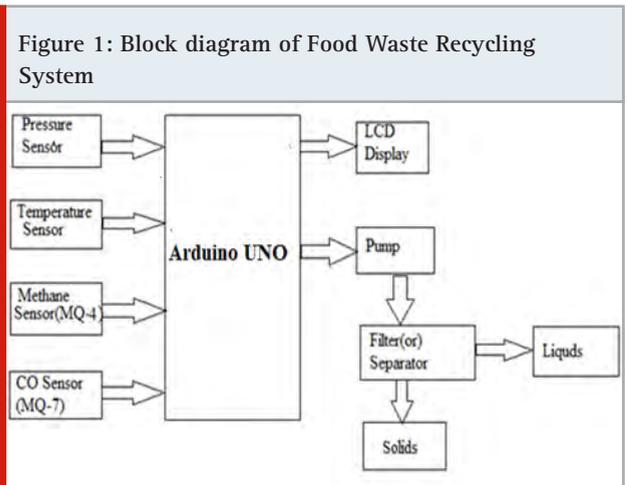


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Bhopal India 2020. All rights reserved.
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Existing method: In Biogas production from food waste via co-digestion and digestion-effects paper, the performance and microbial structure of a digestion (food waste-only) and a co-digestion process (mixture of cow manure and food waste) were studied at mesophilic (37°C) and thermophilic (55°C) temperatures Mirzaman Zamanzadeh and Kine Svensson (2017). If the water level in collector exceeds above the normal range, it causes leakage and affects the environment.

In Biogas production from anaerobic digestion of food waste paper, the development of scientific information with regard to quality and quantity of biogas from anaerobic co-digestion of food waste and municipal wastewater sludge Jeff Kuo and Jason Dow(2011). It also assess the need and performance of onditioning/pre-treatment systems for bio-power generation. It also develops scientific information with regard to impacts on air quality from bio-power generation using this biogas. It does not detect the volume of gas in collector. In A Framework for managing Food waste paper, provides framework for solving the wicked problem of food waste N. Mesiranta and M. Mattila(2008). It does not measure any physical parameters. In Addressing air quality issues for bio power paper, assess the performance by mass and energy balance R. Rushikesh and C. M. R. Sivappagari (2015). It does not displays the toxicity and volume.

Proposed method: To overcome the above drawbacks, the proposed system uses gas, pressure and temperature sensors interface with ATmega-328 micro controller. In this method, gas sensors detects the toxicity of gas in the collector and temperature and pressure sensor is implemented to detect the volume of gas in the collector. The ATmega-328 micro controllerchecks for the specific conditions and if exceeds the specific conditions, the pump gets turn ON and the waste is transferred from collector to separatorand update it in real time through IoT.



Hardware Requirements

Block diagram: The block diagram of Food Waste Recycling System is shown in Figure 1.

Methane gas sensor: The methane gas sensor detects the

concentration of methane gas in the air and output is an analog voltage. The concentration of sensing range is about 300 ppm to 10,000 ppm. The sensitivity of the detector is set by a resistive load between the output pins and ground. The sensor's conductivity increases when the gas concentration gets increases. MQ-4 gas sensor has high sensitivity to methane. The Figure 2.shows the Methane gas sensor.

Figure 2: Methane gas sensor



CO gas sensor: A carbon mono-oxide sensor or MQ-7 sensor is an instrument to measure carbon mono-oxide gas. The most common principles for CO sensors are infrared gas sensors and chemical gas sensors. The CO Gas Sensor measures gaseous carbonmono-oxide in two ranges 0 to 10,000 ppm and 0 to 100,000 ppm. The Figure 3.shows the CO gas sensor.

Figure 3: CO gas sensor



ATmega-328: ATmega-328 is an Advanced Virtual RISC micro-controller. It supports the data up to eight bits. It has the property that is, if the electric supply supplied to the micro-controller is removed, even then it can store the data and can provide results after providing it with the electric supply. Its features are advanced RISC architecture, good performance, low power consumption, real timer counter having separate oscillator, 6 PWM pins, programmable Serial USART, programming lock for software security, throughput up to 20 MIPS etc.The characteristics of ATMEGA-328 are,

- No. of pins: 28
- Operating voltage: 3.3V to 5.5V
- EEPROM memory: 1 KB
- Internal builtin memory: 32 KB
- SRAM memory: 2 KB

Centrifugal pump: Centrifugal pump is used to transport fluids. Transportation is employed by means of conversion of rotational K.E to the hydrodynamic energy of the fluid flow. The fluid's velocity and pressure is increased by the action of impeller and directs it towards the pump outlet. The characteristics of centrifugal pumps are high flow rate capabilities, abrasive solution compatibility and mixing potential. It don't require any valves, or many moving parts and this property allows them to move at high speeds with minimal maintenance.

BMP180: BMP180 is the simplest low-cost sensing solution for measuring barometric pressure and temperature. Because pressure changes with altitude and it can also be used as an altimeter. The sensor is soldered onto a PCB with a 3.3V regulator, level shifter and pull-up resistors.

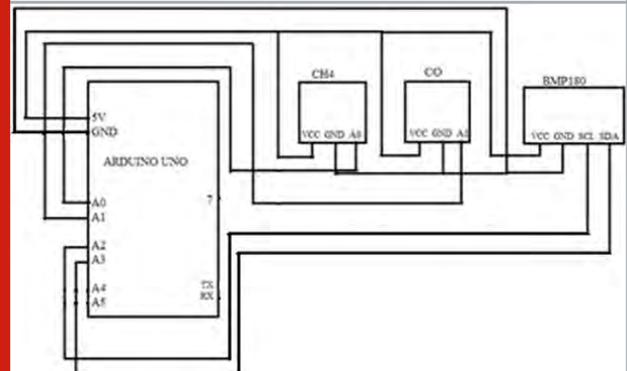
ESP8266 Microcontroller: The ESP8266 microcontroller is a modified architecture 32-bit RISC single-chip microcontroller. The ESP8266 is an 1 MB of built-in flash, allowing for single-chip devices capable of connecting to Wi-Fi. ESP8266 controller program and data are stored in separate physical memory systems that appear in different address spaces, but having the ability to read data items from program memory using special instructions. ESP8266 controller delivers ease of use, high performance, low power consumption and high level of integration.

Internet of Things: The internet of things is a system of interrelated computing devices and machines. It has the ability to transfer data over a network without requiring human intervention. The embedded processors, sensors and communication hardware are used by web-enabled smart devices to collect, send and act on data they acquire from their environments. IoT device connect either with IoT gateway or other edge device where data is sent to the cloud to be analyzed locally and share the sensor data they collect. Further these devices communicate with other related devices and act on the information they get from one another. The devices work without human intervention, although people can interact with the devices for example, to line them up, give them instructions or access the data.

Working Methodology: The Input block consists of gas sensors such as methane sensor(CH4) and carbon monoxide sensor(CO). It also has a BMP180 sensor that senses pressure and temperature. CH4 sensor has 4 pins VCC, GND and a analog pin and a digital pin. The VCC and GND of CH4 is connected to VCC and GND of microcontroller and the analog pin is connected to A0 of microcontroller. The analog pin of CH4 sends the analog values of gas toxicity to the microcontroller. CO sensor has 4 pins VCC, GND and a analog pin and a digital pin.

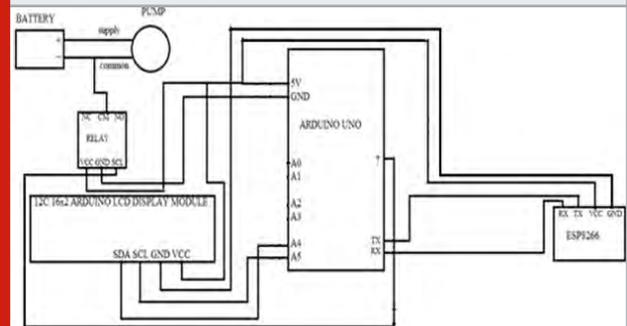
The VCC and GND of CO is connected to VCC and GND of microcontroller and the analog pin is connected to A1 of microcontroller. The analog pin of CO sends the analog values of gas toxicity to the microcontroller. The BMP180 sensor has four pins such as VCC, GND, SCL, SDA. The VCC and GND pins of BMP180 is connected to VCC and GND of microcontroller. The SCL pin connected to A2 is a serial clock pin for I2C interface. SDA connected to A3 is a serial data pin for I2C interface. The Figure 4. shows the circuit diagram of input block.

Figure 4: Circuit diagram of input block



The output block consists of LCD, ESP8266 module, centrifugal pump. The LCD is interfaced with the microcontroller with hw061. The four pins VCC, GND, SCL and SDA connected to VCC, GND, A4 and A5 of microcontroller. The A4 and A5 lines are called Serial Clock (or SCL) and Serial Data (or SDA). The SCL line is the clock signal which synchronizes the data transfer between the devices on the I2C bus and it's generated by the master device. The other line is the SDA line which carries the data. The ESP8266 module sends the data to cloud. The Figure 5. shows the circuit diagram of output block.

Figure 5: Circuit diagram of output block



The pins RX and TX is connected to TX and RX of microcontroller. The centrifugal pump is connected to the microcontroller via relay. It has supply and ground pins. The supply is connected to NC of relay and the GND pin to common terminal of relay. The NC pin of relay is connected to D7 pin which triggers the pump to ON and OFF.

Hardware Setup: The hardware setup of Food Waste Recycling System is given in Figure 6.

Figure 6: Hardware setup of Food Waste Recycling System.



CONCLUSION

Gas measurement using MQ-4 and MQ-7 sensors helps in the real time measurement. This project was developed to monitor the threshold of gas volume by interfacing the pressure, temperature and gas sensors with Atmega328 in order to in order to effectively use the waste food materials to produce biogas. Also level of gases will be regularly recorded using IoT. Further, this project can be extended to monitor and maintain the physical parameters such as pressure, temperature, humidity etc.,

inside gas producing container to yield large amount of gas and the waste remains in the collector can be separated as solid and liquid wastes and treated for making fertilizers.

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Spammer Detection and Fake Consumer Identification on Social Sites Using Content Filter Formula

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ABSTRACT

Casual people group has become an incredibly standard course for web customers to pass on and partner on the web. Customers put a ton of vitality in commended casual associations (e.g., Facebook, Twitter, etc.), getting news, looking at events and posting messages. Unfortunately, this noticeable quality moreover pulls in a great deal of spammers who perpetually reveal dangerous direct (e.g., post messages containing business URLs, following a greater proportion of customers, etc.), provoking unfathomable misinterpreting and trouble on users social activities. Content based channel course of action is proposed for effective spammer area. The fundamental system for the work is: first, amass a dataset from any online site page including clients and their messages. By at that point, develop a named dataset of clients and genuinely depict clients into spammers and non-spammers. A short period of time later, evacuate a lot of highlight from message content and users social lead, and apply into SVM (Support Vector Machines) based spammer revelation estimation. The assessment shows that the proposed strategy can give astonishing execution authentic positive pace of spammers and non-spammers appearing at 99.1% and 99.9% autonomously.

KEY WORDS: CLASSIFICATION, COUNTERFEIT CLIENT RECOGNITION, ONLINE INFORMAL ORGANIZATION, SPAMMER'S ID.

INTRODUCTION

Garbage mail messages typically attempt to create a severa social connections (adherents) so as to abstain from being distinguished the use of spontaneous mail-identification calculations notwithstanding likewise to empower those individuals to quick spread garbage

email by using one-to-numerous verbal trade procedures F. Benevenuto et al., (2010). To get a couple of kind of enormous amount of fans in twitter, spammers for the most part cling to one of a kind technique. That they watch different spammers and even objective exact substantial customers who consistently follow returned again. The vast majority of those real clients can be advertisers of product or even contributions who recall this social decorum to conform to close by again potential customers K. Thomas et al., (2011). They in addition focus on the real clients" fans and follow every one of them trusting they may collect went with back. It capacities come to be very honest to assemble any kind of information from any source round the field by

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methods for utilizing the web. The quickened call for of social sites allows in clients to collect adequate amount of records and information about customers. Gigantic volumes of information on those sites correspondingly attract the side interest identified with artificial clients G. Saptarshi et al., (2011).

Twitter has surprisingly develop to be a web gracefully concerning acquiring continuous information with respect to clients A. Considine (2012). Twitter is an awesome online social network (osn) in which clients can show everything without exception, as news, surveys notwithstanding even their temperaments. Numerous contentions can be set over unmistakable themes, loads of those as legislative issues, present day extramarital issues, and critical occasions C. Malu et al., (2011). At whatever point a man tweets a factor, it is quickly conveyed to his/her fans, allowing them extended the got records at an outstandingly more extensive stage. With the development identified with osns, the need so as to examine and break down clients' practices in online friendly structures has increased. A few the individuals who do actually now not have a great deal data regarding osns can without much of a stretch develop to be deceived by means of fraudsters. By and by there's furthermore a craving to battle and put a control on normally the individuals who use osns just for advertisements in addition to along these lines spam diverse somebody's obligations B. Y. E. Ferrara et al., (2016).

Various investigations gets impacts had been over energized inside the space of tweets spontaneous mail recognition. To comprise of the present country of the-top notch work of art, a few reviews have additionally been done upon counterfeit purchaser ID through twitter. A review identified with current strategies and techniques to find twitter garbage email discovery S. Cresci et al., (2015). The previously mentioned review gives a similar examine including the advanced strategies. In the diverse hand, normally the creators in led an investigation on extraordinary practices affirmed by methods for spammers on tweet informal community. The exploration besides gives a writing evaluation that perceives the nearness of spammers on gatherings informal community.

Regardless of pretty much all the current research, there exists in any case a hole during the overall writing. Accordingly, to overcome any issues, we evaluation the present in the spammer discovery notwithstanding counterfeit individual personality in twitter. In addition, this analyze offers a scientific categorization from the twitter spontaneous mail identification methods and attempts to give a definite depiction identified with most recent improvements in the particular space. The reason including this paper is so you can distinguish remarkable procedures in regards to garbage mail recognition on sheets and to offer a spic and span scientific classification through characterizing those types of procedures into various exercises.

For class, we have chosen 4 method of uncovering spammers which can get supportive in making sense of sham characters of clients. Spam sends can be analyzed dependent on upon: (I) counterfeit substance, (ii) url based absolutely spontaneous mail analysis, (iii) identifying spontaneous mail inside slanting points, and (iv) counterfeit client character. Stand 1 offers an appraisal of present techniques in addition to causes clients to comprehend the specific significance and adequacy with the proposed approaches in incorporation to introducing an evaluation in their objectives and even results. Work area 2 even draws close to unique capacities that happen for use for recognizing garbage email on twitter. We anticipate that this overview will help perusers find different data on spammer identification procedures in a solitary factor.

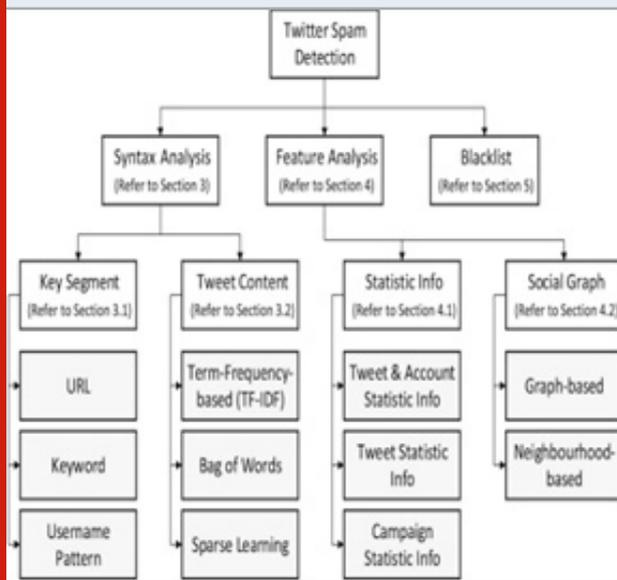
Spammer Detection On Twitter: On this page, we expound a qualification of spammer identification draws near. Fig. 1 shows the specific proposed scientific classification for id of spammers on Forums. The proposed scientific classification will be ordered into four significant classes, in particular, (I) fake substance, (ii) URL organized spam location, (iii) revealing spam in slanting issues, and (iv) counterfeit end client distinguishing proof. Every class related with ID techniques depends in a particular model, methodology, and recognition calculation.

The specific Rst classification (counterfeit substance) incorporates different procedures, as relapse expectation plan, malware alarming framework, in addition to Lfun plot approach. Inside the subsequent classification (URL focused spam identification), the spammer is distinguished in WEB ADDRESS through various machine contemplating calculations. The third gathering (spam in slanting points) is recognized through Bist du? ve Bayes classifier in addition to language model dissimilarity. Ordinarily the last class (counterfeit end client recognizable proof) is established on distinguishing fake clients through half and half methodologies. Twitter spam is "an assortment of denied habits that disregard the Tweet Rules. " Those guidelines incorporate among different issues the kind of conduct Twitter sees as spamming, such since:

- Posting destructive connections (counting connects to phishing or maybe malware locales)
- Aggressive seeking after conduct (mass after in addition to mass un-following for consideration), especially via computerized techniques
- Abusing the @reply or even @mention capacity to review undesirable messages to customers
- Creating numerous records (either physically or utilizing programmed devices)
- Having a few supporters contrasted with ordinarily the quantity of individuals you are following;
- Posting over and over to have the option to inclining themes to consider to catch eye
- Frequently posting copy refreshes
- Publishing joins with disconnected tweets (Twitter).

Twitter really battles spammers by suspending their own special records. Be that as it may, in standard OSN (Online Social Networking) destinations don't recognize and suspend dubious client accounts rapidly. They happen to be not ready to discharge robotized techniques to find and evacuate spam adjusts expecting this may prompt a huge disappointment among clients. In this manner, these individuals hold up until an enough amount of clients report a type of explicit record as a type of spam record to delay it. Be that as it may, genuine clients are reluctant to get second to report spammers. In this way spammers are permitted more hours to spread spam.

Figure 1: Taxonomy of spammer detection/fake user identification on Twitter



Technical Feasibility: Explicit plausibility is done to check the specific achievability, that is, the particular prerequisites of the framework. Any structure caused must to not have an acclaim on the open specific assets. This will incite levels of omnipresence on the accessible specific assets. This will incite levels of reputation being resolved to the customer. The made structure must have an honest basic, as just irrelevant or invalid changes are required for understanding this framework.

- i. Content channel Algorithm
- ii. Online Social Network
- iii Q gram Technique.

Existing System: Existing game plan of spamming account acknowledgment by and large can't perceive exchanged off records from spammer accounts, with only a solitary late assessment by Y. Zhang and J. Lu (2016). features exchanged off records acknowledgment. Existing philosophies incorporate record profile examination and message content assessment (for instance embedded URL examination and message gathering). Regardless, account profile examination isn't generally appropriate for distinguishing bartered accounts, considering the way that their profiles are the principal ordinary customers'

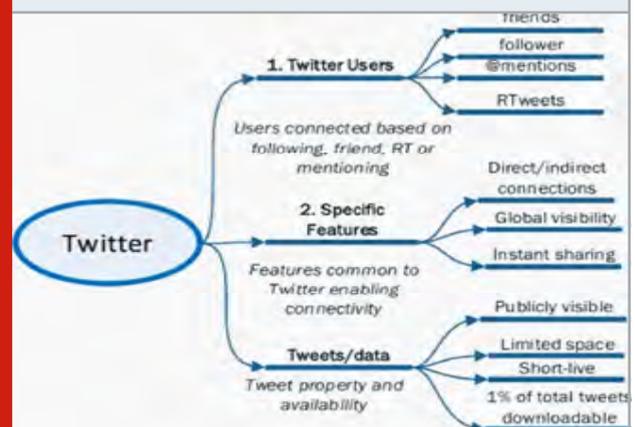
information which is most likely going to remain faultless by spammers.

4.1 Drawbacks of Existing System: Malignant social occasions misuse the settled affiliations and trust associations between the legitimate record owners and their mates, and beneficially suitable spam commercials, phishing joins, or malware, while keeping away from being discouraged by the pro associations. Major OSNs today use IP geo area logging to battle against account compromise. Regardless, this technique is known to encounter the evil impacts of low recognizable proof granularity and high fake positive rate. URL boycotting has the trial of perfect help and update, and message batching familiarizes essential overhead when mistreated with a colossal number of consistent messages.

Proposed System: In proposed framework we introduced a framework for identifying clients' mental Fake client states from clients 'welcomes, refreshes, occasions, status, and so forth just as clients' social communications. Utilizing certifiable internet based life information as the basis. The bury association between client's mental phony client states and their social communication practices. To completely use both substance and social association data of clients' tweets. In proposed a probabilistic language model which consolidates the Content base calculation and Q-gram procedure. Further dissecting this model it distinguishes the Fake clients.

In light of this the negative tweet level of the client is shown in his/her record. Besides, as indicated by the clients anxiety the client is diverted to various connects to deal with the Fake client. On the off chance that the client continues to post or offer negative inputs and remarks, the client will be given three alarms. During the fourth endeavor the client record will consequently be disavowed.

Figure 2: Detection of spam-posting accounts on Twitter



5.1 Benefits of the Proposed System: To approve the adequacy of social conduct profile in identifying account movement abnormality, we apply the social profile of every client to separate snap surges of its particular client from every single other client. Utilizing the Q

techniq it encourages the model to identify fakes(or) spams progressively exact.

5.2 Scope of the Paper: Bogus news ID on interpersonal organizations is an issue that should be investigated as a result of the genuine repercussions of such news at individual just as aggregate level. Another related subject that merits examining is the recognizable proof of gossip sources via web-based networking media.

6. Implementation Work

•OSN System Construction Module: In the principal module, we build up the Online Social Networking (OSN) framework . We develop the framework with the component of Online Social Networking. Where, this module is utilized for new client enlistments and after enrollments the clients can login with their validation. Where after the current clients can send messages to secretly and freely, choices are constructed. Clients can likewise impart post to other people. The client can ready to look through the other client profiles and open posts. In this module clients can likewise acknowledge and send companion demands. With all the fundamental element of Online Social Networking System modules is develop in the underlying module, to demonstrate and assess our framework highlights.

• Building Social Behavior Features: In this module, we build up the framework by building social conduct highlights module. We order client social practices on an OSN into two classes, extroversive practices and introversive practices.

Extroversive practices, for example, transferring photographs and sending messages, bring about obvious engravings to at least one friend clients; introversive practices, for example, perusing other clients’ profiles and looking in message inbox, be that as it may, don’t create perceptible impacts to different clients. Extroversive Behaviors legitimately reflect how a client cooperates with its companions on the web, and in this way they are significant for describing a client’s social practices.

Albeit imperceptible to peer clients, introversive practices make up most of a client’s OSN action; as concentrated in past work the predominant (i.e., over 90%) client conduct on an OSN is perusing. Through introversive exercises clients assemble and devour social data, which encourages them to shape thoughts and suppositions, and in the end, build up social associations and start future social correspondences. Henceforth, introversive personal conduct standards make up a basic piece of a client’s online social conduct attributes.

•Data Collection of User Click streams: In this module we build up the information assortment process utilizing the Click Streams. The clickstreams in our dataset are composed in units of ”meetings”. We indicate the beginning of a meeting when a client begins to visit our OSN in any window or tab of a program; the finish of a meeting is meant when the client shuts all windows or tabs that visit our OSN, or explores away from our OSN

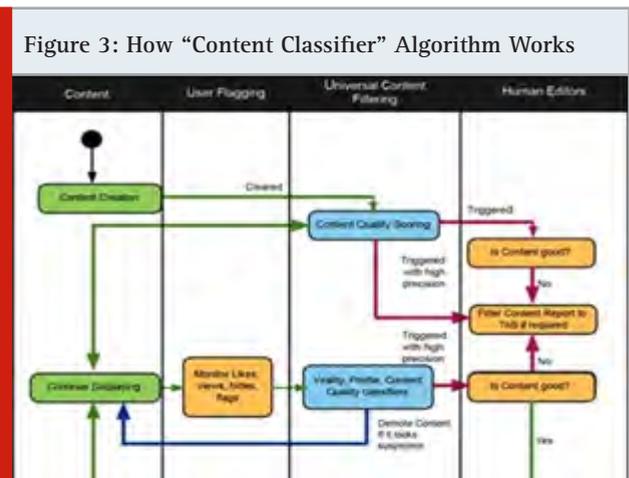
in all windows or tabs of the program. Clickstreams from simultaneously opened tabs/windows are assembled into a solitary meeting, yet are recorded independently (i.e., occasions from one window/tab are not converged with those from another window/tab).

We further procedure each clickstream before performing point by point estimation investigation. We recognize and evacuate clickstreams in the ”inactive” periods—essentially significant time-frame spans in which no client movement is watched, by breaking down the solicitation timestamp and URLs. For instance, clients may leave from their PCs while leaving their programs running. With inert periods expelled, we plot the ”powerful” total clickstream lengths for each taking an interest client. We see that the snap stream lengths follow exponential conveyance. During a three-week time span, the least dynamic client just collects thirty minutes of exercises. We likewise plot the Cumulative Distribution Function (CDF) of single meeting lengths over all clients. It is obvious that the circulation of single meeting length is substantial followed.

• Compromised Account Detection: In this module, we first detail the advancement of a customer social lead profile using our proposed social features. Considering our OSN estimation study, we assess OSN customer norms of lead into a ton of three estimations that identify with the social direct features.The social direct profile of an individual customer would in this way have the option to be worked by solidifying the specific social estimations. By then, we portray the utilization of social lead profiles in isolating customers and distinguishing exchanged off records. The social lead profile depicts various pieces of a customer’s online social norms of direct, and it engages us to quantitatively depict the differentiations in indisputable customer social practices.

In this module, we at first depict how to consider social direct profiles by finding out their differentiation. By then, we look at the usage of social direct profile relationship with perceiving different customers and recognizing exchanged off records. Alongside the self-change, we can apply profile connection with perceive different customers and recognize dealt accounts.

Figure 3: How “Content Classifier” Algorithm Works



Content Filter Algorithm

```

<%page import="java.util.List"%>
<%page import="java.util.ArrayList"%>
<% page contentType="text/html; charset=utf-8" language="java"
import="java.sql.*" errorPage="" %>
<% page import="java.io.*" %>
<% page import="java.sql.*" %>
<% page import="java.util.zip.*" %>
<% page import="java.util.Calendar"%>
<%
String name=session.getAttribute("name").toString();
String email=session.getAttribute("email").toString();
session.setAttribute("name", name);
String mess = session.getAttribute("command").toString();
%>

    <%
        String
imagenam=session.getAttribute("imagenam").toString();
        String
message=session.getAttribute("message").toString();
        String
content=session.getAttribute("content").toString();
        String
image=session.getAttribute("image").toString();
    %>
<%
Connection connection = null;
String connectionURL = "jdbc:mysql://localhost:3306/fb";
ResultSet rs = null;
PreparedStatement psmt = null;
String friends=null;

session.setAttribute("mess",mess);
//out.print(mess);
//out.print(uname);
int xx=0;
String[] str1;
List vvv=new ArrayList();
String word="";String cate="";String vvv="";
Class.forName("com.mysql.jdbc.Driver");
connection = DriverManager.getConnection("jdbc:mysql://localhost/fb",
"root", "root");
PreparedStatement pppp=connection.prepareStatement("select * from
addspam");
ResultSet sss=pppp.executeQuery();
System.out.println("query ");
while(sss.next())
{
    word=sss.getString("word");
    cate=sss.getString("subject");
    str1 = mess.split(" ");
    for(int i=0; i<str1.length; i++)
        {
            if(str1[i].equalsIgnoreCase(word))
            {
                vvv=word;
                xx=1;
                vvv.add(word);
                System.out.println("Working");
            } System.out.println(word);
        }
}
}

```

```

if(xx==0)
{
    out.println("<script type='text/javascript'>");
    out.println("alert(\"No bad words are posted...\");");
    out.println("</script>");
    RequestDispatcher
rd=request.getRequestDispatcher("Home.jsp");
rd.include(request,response);
}
else
{
    int rank = 0;
    out.println("<script type='text/javascript'>");
    out.println("alert(\"You Type Spam Word!\");");
    Class.forName("com.mysql.jdbc.Driver");
    Connection con =
DriverManager.getConnection("jdbc:mysql://localhost/fb", "root",
"root");
    PreparedStatement query=con.prepareStatement("insert into
bad(name,imagenam,message,content,command,image)values('"+name+"',
'"+imagenam+"', '"+message+"', '"+content+"', '"+mess+"', '"+inaget+'
'");");
    query.executeUpdate();
    out.println("</script>");
    PreparedStatement qu = con.prepareStatement("select * from
register where email = '"+email+"' ");");
    ResultSet rs4=qu.executeQuery();
    while(rs4.next())
    {
        rank = rs4.getInt("rank");
        rank = rank+1;
        PreparedStatement
query2=con.prepareStatement("update register set rank ='"+rank+"
where email='"+email+"' ");");
        query2.executeUpdate();
    }
    RequestDispatcher
rd=request.getRequestDispatcher("index.jsp");
rd.include(request,response);
System.out.println("ok");
} %>

```

CONCLUSION

In this paper, we executed an evaluation of procedures utilized for identifying spammers on twitter. Moreover, we also provided scientific classification of twitter garbage mail discovery draws near and sorted them as phony substance identification, url principally based garbage mail location, spam recognition in slanting subjects, and phony individual identification methodologies. We additionally analyzed the offered methodologies principally dependent on various highlights, which incorporates purchaser abilities, content material capacities, diagram capacities, structure highlights, and time highlights. In addition, the systems were additionally looked at in wording in their nitty gritty wants and datasets utilized. It is anticipated that the gave appraisal will help analysts find the data on cutting edge twitter spontaneous mail discovery methods in a united shape. Regardless of the improvement of green and compelling procedures for the spam location and phony individual distinguishing proof on twitter,

there are by and by certain open districts that require significant consideration through the scientists.

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Multimetric Rpl for Heterogeneous Iot Environment

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ABSTRACT

RPL meant for Routing Protocol for Low power lossy network i.e.) for Wireless Sensor Network. These RPL uses Objective function for finding the best way to reach the sink node from the parent node. There are 2 standardized objective function available in the existing system there are objective function Zero (OF-0) and Minimum Rank with Hysteresis - Objective Function (MRH-OF) which uses hop count and expected transmission count as their metrics respectively. In our proposed system we create a new objective function which known as load balanced congestion aware objective function which use hop count, energy consumption and expected transmission count. The simulated results of the proposed objective function (OF) was compared against with the results of the existing objective function and the results shows that by using this objective function we can increase the number of packet received per second and decrease power consumption.

KEY WORDS: ROUTING PROTOCOL, RPL, LOW-POWER AND LOSSY NETWORKS, OBJECTIVE FUNCTION, INTERNET OF THINGS (IOT).

INTRODUCTION

RPL is a routing protocol for routing low power and lossy networks uses Internet protocol version 6 (IPv6), standardized by IETF Winter, Tim, et al., (2012). Wireless Sensor Network (WSN) and Internet of Things (IoT) uses RPL for several applications and planned to be a simple and inter operable networking protocol. The aim of RPL is to provide IPv6 connectivity to a large number of devices that are battery-operated and wireless which uses low power radios for communication and to deliver data over multiple hops Kharrufa, Harith, et al., (2019). The most commonly and widely used open-sources

namely ContikiOS and TinyOS for RPL implementations are ContikiRPL and TinyRPL respectively Kim, Hyung-Sin, et al., (2017) Qasem, Mamoun, et al., (2015). IETF standardize a practical IPv6 routing protocol for low power and lossy networks (LLNs) by charted the routing over LLNs in 2008.

The characteristics of LLN described in Winter, Tim, et al., (2012) comprises of constrained nodes that have limited processing power, energy and memory. A lossy link interconnects these nodes which are usually unstable and support only low data rate. LLN supports not only P2P (Point-to-Point), but in several cases MP2P (Multipoint-to-point) or P2MP (Point-to-Multipoint) Alayed, Walaa, et al. (2018). This describes RPL construct Directed Acyclic Graphs (DAGs) based on routing metrics and constrains that DAG structure efficiently support upstream dominant traffic patterns with resource constrained nodes Sanshi, Shridhar, et al., (2019). Figure 1 describes the control message sequence in the RPL.

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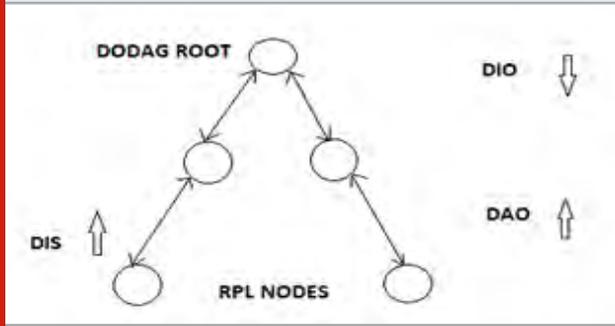
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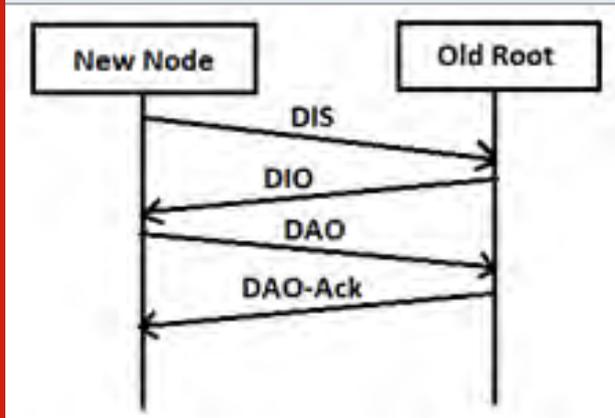
Figure 1: Control messages in RPL



1.1 Rpl Control Messges

- DIS -DODAG Information Solicitation
- DIO -DODAG Information Object
- DAO - Destination Advertisement Object

Figure 2: Flow diagram of control messages in RPL



RPL support bi-directional IPv6 communication between network devices and it construct a topology called destination-oriented directed acyclic graph (DODAG) directed towards LLN border router (LBR) Walaa, et al., (2018). Figure 2 shows the Control messages in RPL. Each participating nodes (n) in RPL broadcast routing metrics and constraints through DIO (DODAG Information Object) messages. After getting DIO messages from neighbors a node choose parent node according to it's OF (objective Function) and routing information such as DODAG ID, RANK etc. After that it forms a routing topology DODAG. RPL node has multiple numbers of parent nodes to achieve its consistent packet delivery through various path in network to root. When DIS (DODAG information solicitation) message is received DIO messages are also transmitted for link layer ACK.

Objective Function: RPL is used to construct a Destination Oriented Direct Acyclic Graph (DODAG) in DVR (distance vector routing) based protocol for low power and lossy networks (RPL) within RPL instance. The Objective Function (OF) uses many metrics to construct the DODAG based on algorithm Mamoun, et al., (2016). Basically the OF describe how the RPL nodes choose the best route by optimize the routing metrics that are

used to form the routes between parent and child. RPL instance also used the objective function to select the number of routers used within the DODAG Version, to serve as parents/feasible successors. OF can operate in a single or combined way. IETF standardized the following Objective Functions as i. Objective Function- Zero (OF0) and ii. Minimum Rank with Hysteresis -Objective Function (MRH-OF).

1.2 Objective Function Zero: Objective Function zero uses hop count (i.e. rank) metric. Hop Count defines hops between source and its neighbor towards root. According to the rank values, nodes choose their best parent. From a list of candidate nodes the node that provides the least rank is considered as the best parent. Node rank metrics is calculated as follows,

$$SR = PR + Rank\ increase \quad (1)$$

Where,

$$Rank\ increase = credit + MinHopRankIncrease \quad (2)$$

$$Credit = Available\ energy / Initial\ energy \quad (3)$$

$$SR - Self-rank; PR - Parent\ rank \quad (4)$$

$$CR = PR + Rank\ decrease \quad (5)$$

Where,

$$Rank\ decrease = Energy\ Consumption + MinHopRankIncrease \quad (6)$$

Where,

$$Energy\ Consumption = (packets\ sent \times required\ energy)$$

$$+ (ideal\ time \times ideal\ require\ energy) \quad (7)$$

$$CR - Child\ Rank; PR - Parent\ rank \quad (8)$$

1.3 Minimum Rank With Hysteresis Objective Fuction: MRH-OF uses ETX (Expected transmission Count) to select the routing path to the parent node. ETX can be calculated using the following formula,

$$ETX = 1/D_f * D_r \quad (9)$$

Where D_f - Forward delivery ratio, i.e.) measured probability that a packet is received by the neighbor and D_r - Reverse delivery ratio (i.e.) probability that an acknowledgment packet is successfully received. The successfully transmit and acknowledge of a packet on a wireless link is known as the ETX metric. The minimum-ETX is a distance between a node and the DAG root is the path that requires the less number of packet transmissions per packet delivery to the DAG root. Thus, minimum-ETX paths are also the most energy-efficient paths in the network to root. If there exists a possibility for a best routing path to have more nodes, thus making its ETX value much greater than that of a single routing hop. The major limitation of MRH-OF is that these hops

will make congestion for the whole network and makes unbalance and leads to high packet loss and more energy consumption.

2. Single Metric Algorithm: The existing mechanism in RPL defines a DVR protocol adapted to more network types by the application of specific Objective Functions for choosing the best routing path. In RPL Objective functions (OFs) defines a node selects best route within RPL instances based on information objects available. RPL protocol builds DAG based on selected routing metrics and constraints, as collections of DODAGs instances. Each instance has a specific Objective Function. Hence objective function helps to find which DODAG version should join the RPL instance running on a device, which uses OF. The OF also selects number of routers within a DODAG version to serve as a parent node and compute Rank for the device. The constraints that are attain from existing is that RPL DODAG Configuration option and the RPL DIO base container are used by the OF0. OF0 encodes hops and a highest of 255 hops, the default parameter settings allow to encode a min of 28 (worst) and 2-octet Rank of 256.

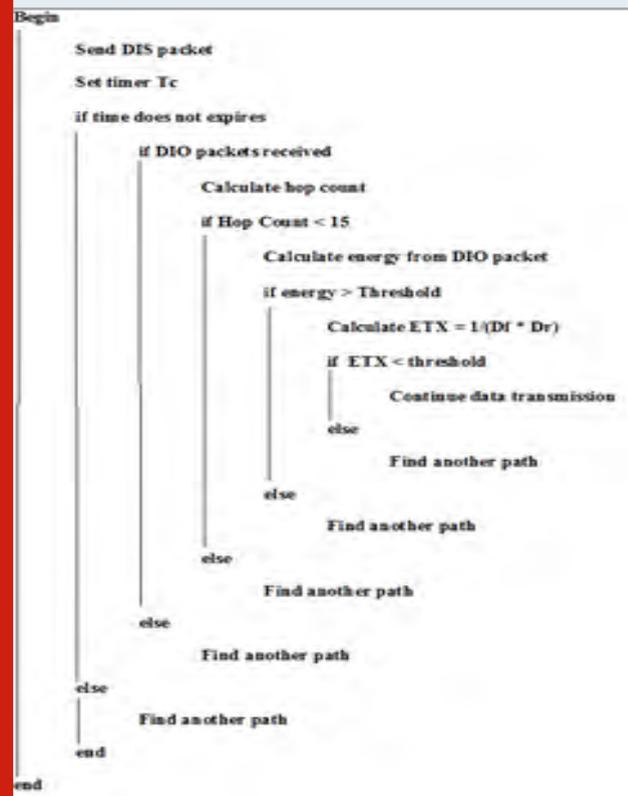
The aim of the OF0 is to join a DODAG Version with a node which has good connectivity to a specific set or a group of nodes/ to a larger routing infrastructure despite there is no guarantee that the path will be optimized according to a specific metric. The purpose of OF0, and DODAG root gives connectivity. OF0 choose the preferred path by using minimum hop count. Load balancing is one the issue of objective function zero, because it is not considered in its core, as each node routes through the preferred parent in its upward traffic without any attempt to broadcast among the existing nodes in the preferred parent set. MRHOF works with Expected Transmission Count (ETX) metrics and this MRHOF objective function find the paths with the smallest path cost while preventing unnecessary churn in the network, by using 2 mechanisms.

First by identifying path with Rank minimum and Second it change to that min Rank path only if its path cost is shorter than the present path at least by a given threshold. The Objective Function OF0 and MRHOF of RPL related to end to end delay, fast configuration, loop-free topology and self-healing. However, the 2 objective functions have the limitations such as load balancing or parent selection within congestion in the RPL and buffer overflow. The existing objective function considers only one metric and it has the limitation of packet loss during transmission.

3 Proposed Algorithm: We proposed a combined three metrics algorithm to select the best preferred path to transfer the packets from source to destination. The three metrics are i. Hop Count - metric (HC) ii. Expected Transmission Count- metric (ETX) iii. Node Energy metric (NE). The main objective of this algorithm is to avoid data loss, delay and congestion occurs during transmission. We used three metrics based on priority, ETX is gives as first priority, hop count metric is given as second priority

and the node energy metric is given as last priority. Hop count metric is used to calculate the number of nodes between the child and root node (i.e. Rank calculation). From a list of candidate nodes the node that provides the least rank is considered as the best parent. The node energy metric is used to calculate each node's energy so as to select the routing path to reach the root node.

Figure 1: Algorithm: Parent selection



4 Results Of The Proposed System: The parameters such as power, delay and number of packets received are calculated from the data obtained by simulating the multimetric RPL for various topologies as tree, grid and elliptical topologies by increasing the number of nodes. These parameters are analyzed as Singlemetric Vs. Multi-metric respectively.

Figure 4: Powercomparison graph of tree topology

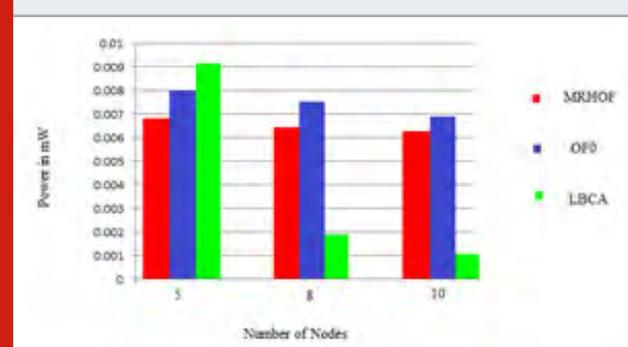


Figure 4 we can conclude by saying that by using multimetric for tree topology the power consumption

is low if number of nodes is high compared to single-metrics.

Figure 5: Powercomparison graph of grid topology

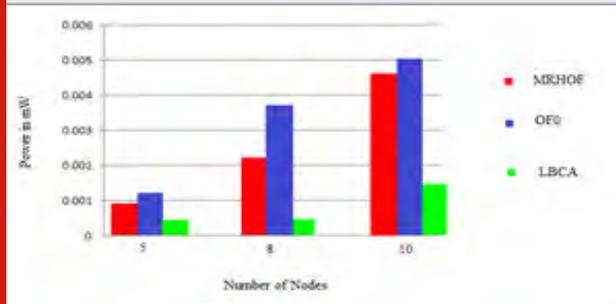


Figure 5 we can conclude by saying that by using multimetric for grid topology the power consumption is very low for all number nodes compared to single-metrics.

Figure 6: Powercomparison graph of elliptical topology

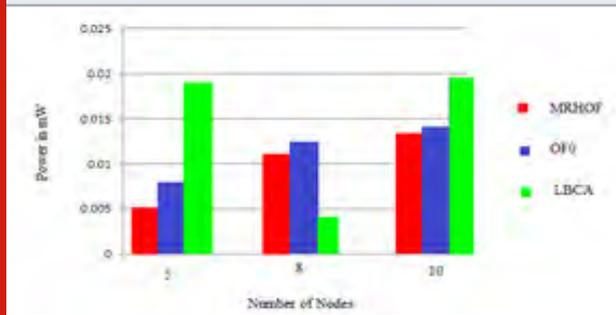


Figure 6 we can conclude by saying that by using multimetric for elliptical topology the power consumption is very high compared to single-metrics

Figure 7: Number of packets received in tree topology

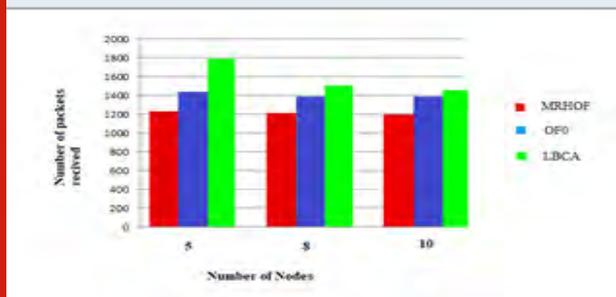


Figure 7 we can conclude by saying that by using multimetric for tree topology that the number of packets received is high compared to single-metrics.

Figure 8 we can conclude by saying that by using multimetric for grid topology that the number of packets received is high compared to single-metrics.

Figure 9 we can conclude by saying that by using multimetric for elliptical topology that the number of packets received is high compared to single-metrics.

Figure 8: Number of packets received in grid topology

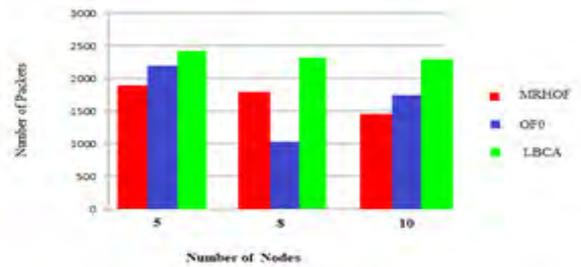


Figure 9: Number of packets received of elliptical topology

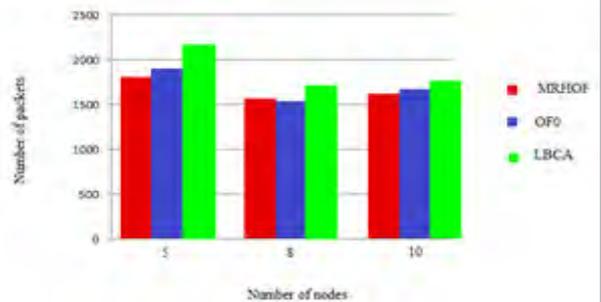
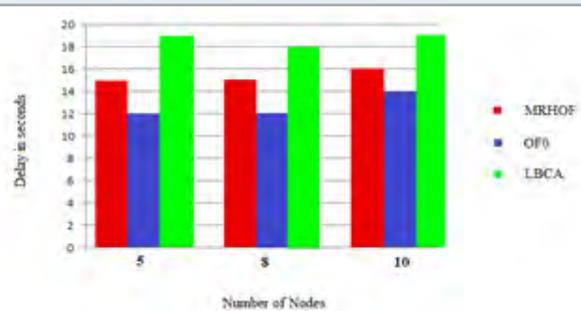


Figure 10 we can conclude by saying that by using multimetric for tree topology the delay of about 1 to 3 seconds compared to single-metrics

Figure 10: Delay graph of tree topology



CONCLUSION

In our paper we present a new Load Balanced congestion Aware objective function (LBCA-OF) to improve packet delivery ratio and reduce power consumption by taking into the Hop count, Expected Transmission Count, Energy. Based on our experiment using the coja simulator for various number of nodes we compare the performance of our proposed LBCA objective function with the existing objective function and the results of our proposed objective function is the number of packets delivered is very high for all the topology under elliptical, grid and tree as compared to single metric objective function.

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Detection of Leaf Disease Using Deep Learning A Deep Learning Based for Automated Detection.

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ABSTRACT

This paper presents leaf disease analysis using image processing techniques used in the agricultural sector for automated vision system. Automatic leaf disease detection analysis in agriculture is important for monitoring large crop fields and thus automatically detects symptoms of leaf disease as soon as they appear on plant leaves. The proposed decision-making system uses the characterisation of image content and supervised Neural network type classifier. For this type of decision analysis, image processing techniques involve pre-processing, extraction of features and the stage of classification. An input image will be resized at Processing, and region of interest will be selected if required. For network training and classification, the color and texture features are extracted from an input here. Color characteristics such as mean, standard deviation of HSV color space and texture characteristics such as energy, contrast, homogeneity and correlation have been extracted in order to be utilised for further image processing. The system will be used for automatically classifying the test images to determine the characteristics of the leaf and helps in determining the disease. Automatic classifier NN for this approach will be used for classification based on learning with some training samples of that certain category. Tangent sigmoid function is used as a kernel function in this network. Lastly, the simulated result shows that the used network classifier provides minimal error during training and significantly larger classification accuracy.

KEY WORDS: IMAGE PROCESSING, NEURAL NETWORK, KERNEL FUNCTION.

INTRODUCTION

This paper presents feature analysis of the disease characteristics of the leaf using image-processing techniques for automated vision system used in the agricultural field. Generally, diseases in leaf or plant are determined using various processes of biological

methods which would take manual work and consume time. Plant researchers and botanist predominantly needs to characterise the leaf in order to analyse its nature. So, all of these are still being done by biological tests and subsequent long methods that follow it. Thus, this paper will focus on reducing the manual work and bring high accuracy in determining the disease in a leaf where farming and agriculture is the main limelight of this implementation. In agricultural research, automatic feature detection of leaf disease characteristics is essential for monitoring large areas of crop lands. Leaf diseases are identified by the deep-learning approach using the feature extracted. Extraction of the image feature is an important part of the paper. The extracted feature will

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help to identify the diseases. Thus through this research we will support the farmer directly. Farmer can offer potentially better and reliable efficiency by using the automated agricultural

inspection. With the aid of this technique, the specific good crop quality can be used. The Agriculture's primary need to predict which crop is contaminated. It is a recognition system based on Deep Learning that will help in the Indian Economy. We are indirectly contributing to the improvement of crop quality with the aid of this work.

II. Related Works: Various automated detection and recognition from digital images have been explored during the last few months. However just a few have contributed to the improvement of the disease detection in leaves. Some of these works have been mentioned below.

M. Riedmiller (2015) describes classification and identification techniques which can be used for diagnosis of plant leaf disease. Pre-processing is done before extraction and RGB images are transformed into white and then transformed into a gray-level image to remove the leaf's vein. It then applies basic morphological functions on the image. The image is then transformed to binary data. If binary pixel value is 0, it then gets converted to corresponding RGB value. Lastly, it is identified by using Pearson correlation and Dominant feature set and Naïve Bayesian disease classifier.

M. P. Deisenroth et al., (2016) they had implemented four steps for determination of diseases. It includes collecting images and converting into Gaussian filter and K-means clustering for segmentation process and finally converts RGB to HSV for feature extraction. M. P. Deisenroth and C. E. Rasmussen (2011) had used Image processing techniques to determine disease of jute plants. In this, image is captured and resized to be stored in database and the quality of the image is enhanced and noise removal being done. And finally converts RGB to HSV to extract the needed region and detects the disease in the jute plant. T. Jung and P. Stone. (2010) the proposed technique is to detect the disease of paddy plant by comparing 100 samples of healthy plant with 100 sample of two diseases each which is not enough to detect the disease.

J. A. M. Assael et al., (2015) it helps in detecting unhealthy plant leaves by acquisition of RGB image. In this, the input image gets converted from RGB to HSI and subsequently masks and removes the green pixels and Ostu's method is used to segment the components. Color co-occurrence method is used to extract texture features and Genetic Algorithm is used to classify the disease. The list of all papers and its author and future works had been listed below [Fig 1].

Thus citing some of the pre-existing systems, most of it has major drawbacks which limit it in determining and classifying the diseases of a leaf. These systems have high computational loads and very poor discriminatory power and thus affecting the results and have less accuracy in classification.

III. Proposed Research: Deep learning solutions are under constant evolution and have become incredible part of data science. After the neural networks came into existence, it replaced most algorithms which were in usage. Thus to improve the discriminatory power and better classification, Convolutional Neural Network has been used and implement in this project. In proposed system it have more features and this leaf detection system is based on, Hybrid Spatial features involves color features and texture descriptors and a classifier is used for detection. CNN is used for image classification. As its name suggests, Neural Networks is a deep learning technique whose model is similar to that of a brain structure. It generally consists of a network of learning units called neurons that learn to convert input signals into its corresponding output signals, forming the basis of an automated recognition. The Multilayer Perception of the Neural Network Model is given below [Fig 2].

Figure 2: The Multilayer Perception Neural Network Model

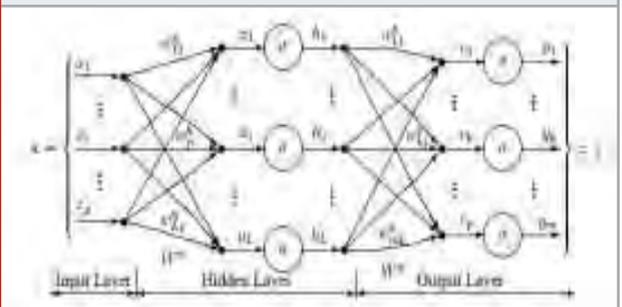


Table 1. Frequency Band with bandwidth

Paper	Methodology	Future Work
[1] Detection and Classification Analysis of Yellow Vein Mosaic Virus Disease in Jute Leaf Using Image Segmentation & Classification	K-means clustering, Basic Morphological Functions, Mahat Distance Classifier, Color Co-Occurrence method	Yes
[2] Deep Classifier Based on Deep Leaf Disease Detection	K-means clustering algorithm with SVM, Color co-occurrence method	Developing continuous or more algorithms by using various classification techniques so as to improve the detection rate of the disease in plants.
[3] Detecting and Classifying Plant Disease Using Image Processing and Machine Learning	Color co-occurrence method, SVM, SVM Classifier	Yes
[4] Plant Disease Analysis Using Histogram Matching, Laplacian, Thresholding's Distance Calculation	Statistical & heuristic algorithms	To improve the existing method detection of yellow vein disease in jute leaf. This method can be used for the detection of disease in various crops. This may help the farmer to identify, control and manage crop in short time span.
[5] Detection of Unhealthy Plant Leaves Using Image Processing and Genetic Algorithm with Arkans	Genetic algorithm, Arkans, Masking for green pixels and color co-occurrence method	Yes

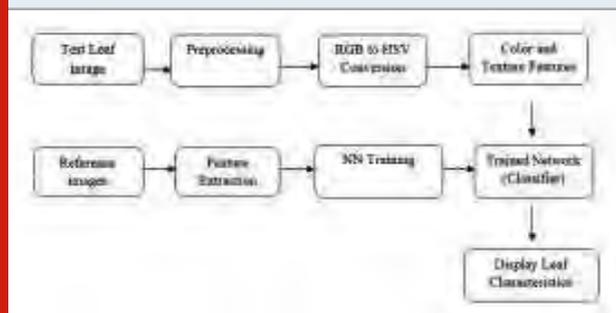
CNN is an advanced artificial neural network which differs from other NNs in terms of the signal flow between neurons. Convolutional Neural Networks (CNNs) work better than other classic neural networks on images and videos because the convolutional layers take advantage of inherent properties of images. It generally treats all of their input vectors equally. And the most basic difference is the usage of Kernel and convolution. CNN uses the processing power available to let the model learn all the values of kernel to achieve model's final target that makes it a simple classification. So, during interference different nodes identifies different color, edges and more

in the early convolutional layers. Meanwhile extending this filtering enables to identify more complex patterns in subsequent convolutional layers. Thus it has low complexity and better feature discrimination and has better classification accuracy.

METHODOLOGY

The proposed system have adopted few important methodologies which have been utilized at fullest to improve the determining ability of the leaf disease which enhances the accuracy and thus providing an exact result which is ultimately needed. The system implements Pre-processing, Color Space Conversion, Color and Texture feature extraction and CNN classifier to produce impeccable results. Pre-processing of images can increase the reliability of an optical inspection considerably. Several filter operations that intensify or decrease certain image details allow for easier or quicker evaluation Conversion of color space is the translation of a color representation from one base to the next. This usually happens when translating an image depicted in one color space into another color space, with the intention of making the translated image appear as close as possible to the original A. Rasmus, et al., (2014). The Proposed System explanation is given below [Fig 3].

Figure 3: The Proposed Method Explanation



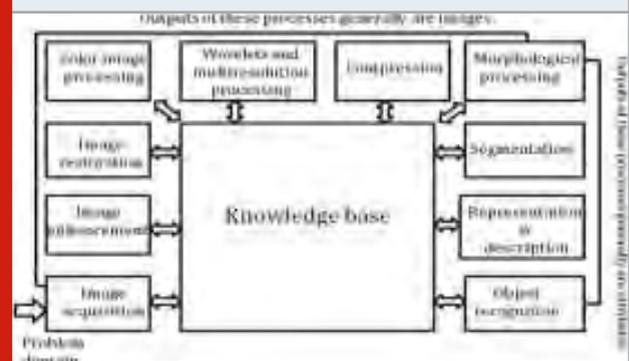
This project uses color and texture extraction features on content-based image retrieval. The extraction feature employed is the extraction feature of the HSV color, the extraction feature of the Gray Level Co-occurrence Matrix (GLCM) texture, and the combination of both features. The input data is converted and convolution operation is executed using a filter / kernel to produce a feature map in case of a CNN. It is a simple mathematical operation that is essential for many image processing operators. These methods were chosen since they give flawless outputs which are very vital.

V. Dataset: This system is having collection of images of various different species of plants across the world. But since this paper is developed considering the agriculture plants and its leaves, this dataset contains larger volume images of crop plants which are very crucial for this project and to furnish faultless output. These dataset are very important because all the input images will be compared with these images after training and hence

dataset had to consist perfect and proper images O. Ronneberger et al., (2015).

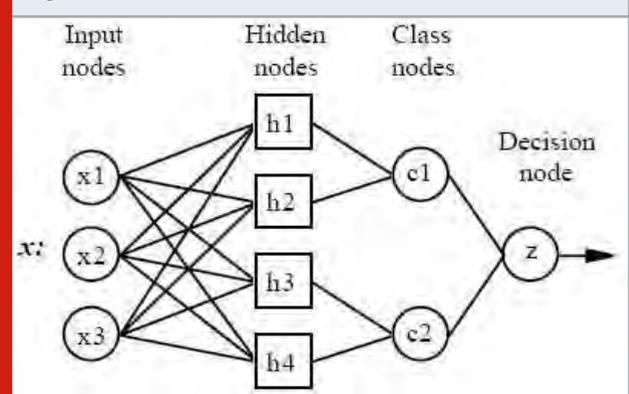
VI. Important Diagrams: This diagram [Fig 4] shows the fundamental steps in Digital Image Processing since this is a pivot methodology being implemented in the proposed system.

Figure 4: Fundamental steps in Digital Image Processing



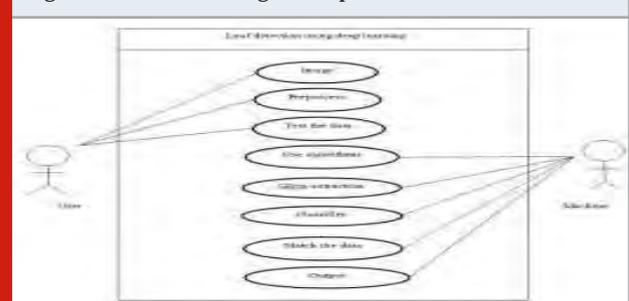
The following diagram [Fig 5] describes the architecture of Neural Network. Convolutional Neural Network have been used in this system for classification of images and this has more discriminatory power.

Figure 5: Architecture of Neural Network



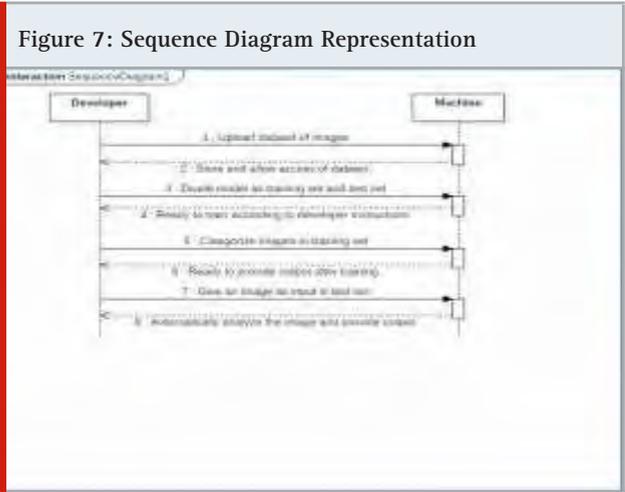
The use case diagram (UML) [Fig 6] is depicted in the following image. This diagram has the main purpose of showing which system functions are performed for which actor. Roles of the actors may be depicted in the system.

Figure 6: Use Case diagram representation



The sequence diagram (UML) [Fig 7] is depicted as below. This shows the interaction between various components of the Project. This is helpful in understanding the working mechanism of the project and the inter operation between them L. v. d. Maaten, et al., (2013).

VII. Output: All the modules mentioned above was implemented successfully and tested with sample inputs and outputs. These modules detects, operates, and functions to its best to achieve the primary motive of this project. This project will bring effective way and best practice to find leaf disease and detects it with advanced processes to enhance the quality of farming and other plant related works. The project is made following best practices of Python, Anaconda software. The overall resultant of this project is presented here with the sample of the output screen which displays the disease of the leaf and also presents a suitable solution to overcome the disease and its spread J. Jacobsen, et al., (2015).



These images [Fig 8,9,10] are the sample output when the input image is being fed and all the processes are carried out give the result after determining the characteristics of the leaf and detects the disease.

```

Figure 8: Sample Output of a Normal Leaf
C:\windows\system32\cmd.exe - python leaf_code.py
9.49787351e-01]
[[21.25769097]] [[33.08090359]]
373.41689881194653
training
3.29297991e-01 3.15431252e+02 9.88777281e-01 1.40515896e+04
8.74385527e-01 3.17943258e+02 3.58909273e+04 2.72323920e+08
3.26346187e+00 2.81994892e-01 1.35564910e+00 -6.32806641e-01
9.75168602e-01]
[[359.3611329]] [[118.45834417]]
4724.2308602762685
training
4.12945987e-01 1.67201244e+02 9.93587642e-01 1.30363303e+04
8.95171553e-01 3.57355374e+02 5.19781199e+04 2.27981427e+08
2.73148889e+00 2.97493415e-01 1.14446962e+00 -6.35875350e-01
9.59886071e-01]
[[179.0160947]] [[114.1183752]]
1389.381711979289
normal leaf
    
```

```

Figure 9: Sample output of a diseased Leaf
C:\windows\system32\cmd.exe - python leaf_code.py
8.31905418e-01 7.20613197e+01 9.60225420e-01 9.13666408e+02
6.58322420e-01 2.68052086e+01 1.57740807e+03 1.36789742e+08
2.55823534e+00 1.10931826e-01 1.35188684e+00 -4.66089224e-01
8.87862250e-01]
[[13.3845649]] [[38.15072413]]
389.462356368961635
training
4.03979420e-01 1.13260563e+02 9.48451228e-01 1.09836112e+03
7.41185438e-01 4.27825678e+01 4.28035591e+03 3.18788149e+08
4.32288881e+00 2.88814131e-01 2.18248483e+00 -4.24292732e-01
9.40787351e-01]
[[21.25769097]] [[33.08090359]]
373.41689881194653
training
3.29297991e-01 3.15431252e+02 9.88777281e-01 1.40515896e+04
8.74385527e-01 3.17943258e+02 3.58909273e+04 2.72323920e+08
3.26346187e+00 2.81994892e-01 1.35564910e+00 -6.32806641e-01
9.75168602e-01]
[[359.3611329]] [[118.45834417]]
4724.2308602762685
training
4.12945987e-01 1.67201244e+02 9.93587642e-01 1.30363303e+04
8.95171553e-01 3.57355374e+02 5.19781199e+04 2.27981427e+08
2.73148889e+00 2.97493415e-01 1.14446962e+00 -6.35875350e-01
9.59886071e-01]
[[179.0160947]] [[114.1183752]]
1389.381711979289
disease: powderymildew
pest: Agri_Pest_A9001_3_Pesticide
    
```

The output of both normal and diseased leaf has been listed here in which the remedy of the disease of a particular plant is also been displayed.

```

Figure 10: Sample output of a diseased Leaf
C:\windows\system32\cmd.exe - python leaf_code.py
8.01905418e-01 7.24610197e+01 9.60225420e-01 9.13666408e+02
6.58322420e-01 2.68052086e+01 1.57740807e+03 1.36789742e+08
2.55823534e+00 1.10931826e-01 1.35188684e+00 -4.66089224e-01
8.87862250e-01]
[[13.3845649]] [[38.15072413]]
389.462356368961635
training
4.03979420e-01 1.13260563e+02 9.48451228e-01 1.09836112e+03
7.41185438e-01 4.27825678e+01 4.28035591e+03 3.18788149e+08
4.32288881e+00 2.88814131e-01 2.18248483e+00 -4.24292732e-01
9.40787351e-01]
[[21.25769097]] [[33.08090359]]
373.41689881194653
training
3.29297991e-01 3.15431252e+02 9.88777281e-01 1.40515896e+04
8.74385527e-01 3.17943258e+02 3.58909273e+04 2.72323920e+08
3.26346187e+00 2.81994892e-01 1.35564910e+00 -6.32806641e-01
9.75168602e-01]
[[359.3611329]] [[118.45834417]]
4724.2308602762685
training
4.12945987e-01 1.67201244e+02 9.93587642e-01 1.30363303e+04
8.95171553e-01 3.57355374e+02 5.19781199e+04 2.27981427e+08
2.73148889e+00 2.97493415e-01 1.14446962e+00 -6.35875350e-01
9.59886071e-01]
[[179.0160947]] [[114.1183752]]
1389.381711979289
disease: powderymildew
pest: Agri_Pest_A9001_3_Pesticide
    
```

CONCLUSION

Life is becoming simpler and easier in all respects with the advancement of Machine learning and Deep learning technology. Automated systems and machine learning are preferred over manual system in today's world. With the rapid increase in the number of computer users over the past decade, they have become a part and parcel of life and the latest and emerging technology is deep learning. Agriculture being the major backbone of the country's economy and primary occupation of rural places, it must be protected and enhanced for safer and better farming to produce incompressible yield. This detection of leaf disease will help the agricultural farming to root out the diseased plant at early stage and protect it from being spread and prevent agricultural loss which is many farmers worry these days and it also helps in knowing the best use of pesticides and medicine for the better growth of crop field.

In future, there may be improvements made with this project. The machine will be updated in such a way that it can detect every leaf disease in all available flora on

the earth resulting in higher volume of diseases being detected and treated for the wellness of the plant. We can further work on large scale image processing which can detect disease of a particular plant in a large field.

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Implementation of Spurious Power Suppression Technique (SPST) Adder for Signal Processing and Communication

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ABSTRACT

Digital Signal Processing(DSP) manipulates different types of signals with the intension of filtering, measuring , or compressing and producing analog signals. Analog signals differ by taking information and translating it into electric pulses of varying amplitude, whereas digital signals information is translated into binary format where each bit of data is represented by two distinguishable amplitudes. Many of the DSP applications include Finite Impulse Response, Speech recognition, Fast Fourier Transform. All these require a efficient multiplier and adder. Hence, there is a strong need for high speed, area and power efficient multipliers for digital signal processing. This paper addresses the design of low power and high speed Spurious Power Suppression Technique (SPST) adder and its implementation in signal and communication applications. SPST adder is implemented in Finite Impulse Response(FIR) filter design and Viterbi Decoder.The designed adder provides a delay reduction about 18 % than the conventional adder and makes it suitable for various applications like Signal Processing, Image Processing and Communication.

KEY WORDS: SPURIOUS POWER SUPPRESSION TECHNIQUE, FIR FILTER, FPGA IMPLEMENTATION, VITERBI DECODER.

INTRODUCTION

Wireless devices are incorporated with many wireless standards. Each and every standard will have its own configuration parameters such as the constraint length and coding rate. This happens to be a major problem in the implementation within a single device. This leads to high cost design and large silicon area requirement. To overcome this problem different wireless standards

of different configuration should be adapted. In signal processing, a finite impulse response (FIR) filter bank is a set of filters that separate an input signal into two or more frequency bands. Filter is a frequency selective network. It passes a band of frequencies while attenuating the others.

Filters are classified as analog and digital depending on nature of inputs and outputs. Digital filters are used extensively in all areas of electronic industry. This is because digital filters have the potential to attain much better signal to noise ratios than analog filters and at each intermediate stage the analog filter adds more noise to the signal, the digital filter perform noiseless mathematical operations at each intermediate step in the transform. Digital Filter can be constructed from 3 fundamental mathematical operations.

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Online Contents Available at: <http://www.bbrc.in/>

Addition or subtraction. Multiplication (normally of a signal by a constant). Time delay. This insists the design of high speed architectures for the applications. A variety of Research models are available for the high speed and low area VLSI architecture for different applications are available in literature. Architecture for Low Power SVM module using SPST Ramya et al., (2015). H. S. Krishnaprasad Puttam, et.al., (2012) implemented a high speed and low power Multiply Accumulate Unit using SPST adder. Different applications using SPST adder were modeled and studied for the power dissipation. (Kuan- hung Chen et.al., (2005). Advanced version of SPST adder using AND detection logic was introduced in Booth multiplier to analyse the performance in terms of area, power and delay (Kuan- hung Chen et.al., (2007).

Jinjin He, Huaping liu et.al., (2012) introduced low power TCM decoder design. Low power Viterbi decoders is designed and implemented (Kong, J.J et.al (2004). High level transformation techniques in filter design have been carried out to achieve low area and high speed. (Gomathi et al., (2020) :Jayapravintha et.al., (2015) The rest of paper is as follows: The detailed description of methods are described in section II. Results of implementation of SPST adder in FIR filter and Viterbi decoder are illustrated in section III followed by conclusion in section IV.

MATERIAL AND METHODS

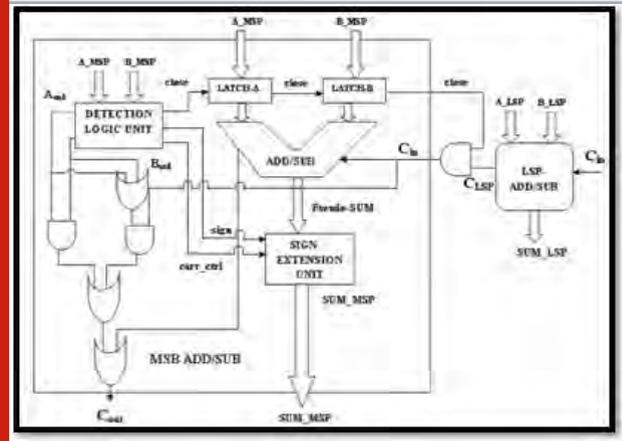
I. Spurious Power Suppression Technique: A wide variety of SPST adder based on the different cases are available in literature. One spurious transition case may be a state in which carry signals transit spuriously that occurs in the Most Significant Part (MSP) though the final result of the MSP are unchanged. Other two A situations of addition of one negative operand another positive operand without and with carry from Least Significant Part (LSP), respectively is treated as other case where spurious transition occurs. Addition of two negative operands without and with carry-in from LSP is another spurious transition case to be handled. Prediction of results in MSP is possible in all the above said cases.

Thus the need for computations in MSP is ignorable and useless. When the results of computations of MSP are unpredictable detection logic circuit can be used to detect the effective data range of arithmetic units, e.g., adders or multipliers. To avoid unnecessary transition of data in the arithmetic units, SPST latches are used. This data control circuit is used whenever the portion of data does not influence the final results. Besides, there is a data asserting control realized by using registers to further filter out the useless spurious signals of arithmetic unit every time when the latched portion is being turned on. This asserting control brings evident power reduction.

SPST Adder Working Methodology: The design of 16-bit adder/subtractor shown in figure 1 is proceeded as follows. The given 16 bit data is separated into MSP and LSP at the place between the 8th bit and the 9th bit. AND gates are used as latches which controls the input

data of the MSP. The input data is held as the same when the MSP is necessary. On the other hand, when the MSP is negligible, the input data of the MSP is made to zero values to avoid glitching power consumption.

Figure 1: Block Diagram of SPST Adder



The 16 bit of data is separated into 8 bit of MSP and 8 bit of LSP. The 8 bit LSP of A [7:0] and 8 bit LSP of B [7:0] are given into the 8 bit adder. These two 8 bit LSP of A [7:0] and B [7:0] is added and the output is designated as SUM_LSP [7:0]. The 8 bit MSP of A [15:0] and 8 bit MSP of B [15:0] is given into the detection logic unit to detect the effective data range of arithmetic units. The detection logic is performed by using the AND gates and it provides the output as Close, Carry and Sign. The 8 bit MSP of A is given into the latch A and 8 bit MSP of B is given into the latch B. The output close of the detection logic unit is given as a clock to the both latch A and latch B.

These two output of the latch A and latch B is get added by the MSP adder. The carry of LSP adder and the close of the detection logic unit were performed by AND operation and these output is given as C_{in} to the MSP adder. The output of the MSP adder is then given to the sign extension unit. Sign- Extension (SE) circuits can be used to compensate the sign signals of the MSP. The sign extension unit is implemented by using simple OR gates, where the three outputs close, carr_ctrl and sign of the detection logic unit is given as input to the sign extension unit. Finally, it provides the SUM_MSP [15:8] as the output. The close and carry of MSP adder is performed by AND operation and C_{lsp} and NOT of close also performed by AND operation. Both of these output is then done by OR operation and generates the output as C_{out} .

III Design of Fir Filter Using Spst Adder: Finite impulse response (FIR) filter is considered one amongst the foremost operations in digital signal processing. A linear time invariant (LTI) FIR filter is one of the basic building blocks common to most DSP systems. The output of an FIR filter is a sequence generated by convolving the sequence of the input samples with N filter coefficients. The filter expression can be described by

$$Y(n) = \sum_{k=0}^{N-1} h(k)x(n-k) \tag{1}$$

Where N is the length of the filter, h(k)denotes the kth coefficient, and x(n-k)denotes the sampled input data at time n-k.

Figure 2: FIR filter Design using SPST Adder

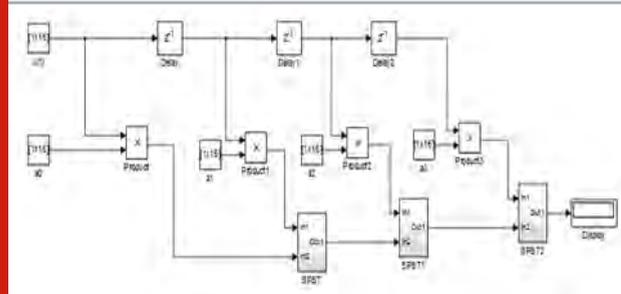


Figure 2 shows a 4 tap FIR filter incorporated using SPST Adder. SPST adder is used in this design to reduce the unwanted addition.

Spst Adder In Viterbi Decoder: Viterbi algorithm is adopted to decode the convolution codes. For the convolution code with large constraint length, the hardware complexity and the power consumption of the Viterbi decoder are very high and this is difficulty in the implementation of Viterbi decoder. The Viterbi algorithm is known to be an efficient method for the realization of maximum likelihood decoding of Convolution codes. Viterbi decoder is the hardware implementation of Viterbi algorithm. The great advantage of Viterbi algorithm is that for a constraint length K, code rate r=k/n, where k is the number of inputs given to the encoder and n is the number of outputs taken from the encoder. The number of operations performed in the decoding of L bits is $L * 2n (k-1)$

The process of convolutional encoding the data is achieved using a cascaded connection of flip flops and associated combinational logic that performs modulo-two addition. The encoder used for analysis is rate 3/4 convolution encoder with the constraint length. When a convolutional encoded symbol is transmitted over the channel, it might get corrupted by noise. To recover the data from such a corrupted symbol, Viterbi decoder is used.

Components of Viterbi Decoder: Viterbi decoder is efficient decoding method and the components are Branch Metric Unit (BMU), Add-Compare-Select Unit (ACSU), Path Metric Unit (PMU) and Survivor Memory Unit (SMU). Viterbi algorithm architecture is commonly used in the decoding of convolution codes. In the presence of very large-scale integration (VLSI) defects, erroneous outputs may occur which degrade the decoding convolutional codes. Each path connecting the output to a convolutional encoder’s input is characterized in terms of its impulse response. It is the response of that path to

a symbol applied to its input, with each flip flop in the encoder initially set to zero.

Figure 3: Block Diagram of Viterbi Decoder

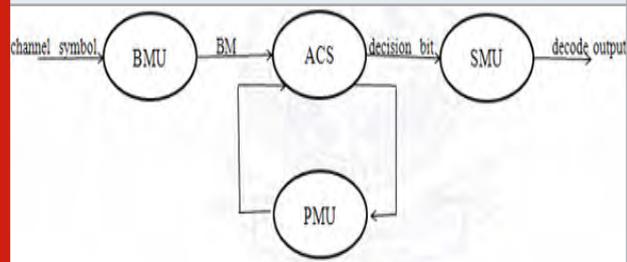


Figure 3 shows a functional block diagram of viterbi decoder in which channel symbol is the input to the branch metric unit. From the survivor memory unit it generate the output as decoded data.

Branch Metric Unit (BMU): It compares the received code symbol with the expected code symbol and counts the number of differing bits.If both the applied inputs are different either (0/1) or (1/0) then the output of the EXOR gate is 1. If both the input is same the output of the EXOR is 0.

Figure 4: Operation of Branch Metric Unit

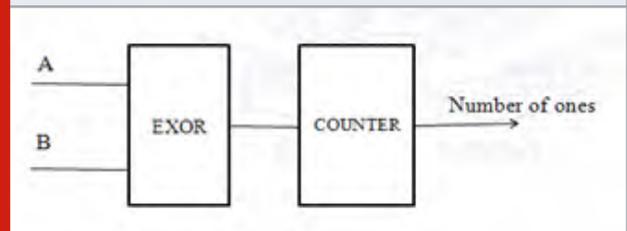


Figure 4 shows the operation of branch metric unit, where A and B are the two inputs of 16 bit. EXOR operation is done for these two inputs and the output obtained is also 16 bit which gives the details of how many bits differ by one. The output of the EXOR block is given input to the counter block to count the number of ones.

Add Compare Select Unit (ACS): Wireless devices are incorporated with many wireless standards. Each and every standard will have its own configuration parameters such as the constraint length and coding rate. Figure 5 shows the block diagram of ACS unit. Output of the Branch metric unit (BMU) is added with the previous path metric and the obtained output is the new path metric for the next branch metric. One adder for the upper path calculation and the other adder for the lower path calculation is provided. The outputs of the two adders are fed to the comparator unit, which compares the path metrics of all the branches.

For example let Add1(A)=
000000000000100,
Add1(B) = 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0

Decoded Result: dec1=0000000000000011,dec2=000000000000010,dec3=0000000000000011,dec4=0000000000000011,dec5=0000000000000001.

Implementation Results: SPST adder designed using Detection logic is implemented in Xilinx and analysed for the metrics in terms of area and delay. Table 1 shows the comparison among the ripple carry adder and the spurious power suppression technique adder.

S.No.	Synthesis particulars	Ripple carry adder	SPST adder
1.	Number of 4 input LUT's (out of 4896)	40	32
2.	Number of slices (out of 2448)	22	18
3.	Maximum combinational delay (in ns)	24.686	10.884

It shows that the delay is reduced in SPST (Spurious Power Suppression Technique) when compared to Ripple Carry Adder. The area tends to reduce in SPST adder which is shown in the number of slices and number of LUTs. Thus SPST adder offers low are and high speed.

CONCLUSION

Two application using SPST adder was discussed in this paper.The functionality of FIR filter and Viterbi Decoder using SPST Adder is verified using ModelSim and Simulink. The designed adder provides a delay reduction about 18 % than the conventional adder The implementation results reveals that SPST adder provides less area and high speed making it suitable for high speed, low power applications.

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Art of Image Augmentation with Cartoon Models

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ABSTRACT

A CNN is used to classify the data when it's placed in different orientations. The CNN is invariant to translation, viewpoint, illumination or size. It can even be a combination of these. Thus by using data augmentation, information can be added to the base data and enhancing the quality of the same. A machine learning network usually needs tremendous amount of data to work with. Practically collecting such huge data may often be costly. To reduce it, the data is augmented before its fed into the network. Augmentation reduces the manual intervention and develops the data. Augmentation can be applied to the data irrespective of the form. Image augmentation is a methodology where the image is manipulated by various augmentation techniques, thereby creating numerous different samples for a single image. In simple words, it creates a diverse set of images from a small set of input image. Among the various techniques available, the most common techniques included here are cropping, flipping, rotation, zoom-out. Once these techniques are applied on the image the respective images are obtained via augmentation methodology. After the augmented images are in hand, one can apply to any network any get the accurate output. Without augmentation, there may be a chance of irrelevant or erroneous output, since only a few data may be fed into the network.

KEY WORDS: CNN, AUGMENTATION, FLIPPING, SHEARING, ROTATION.

INTRODUCTION

Deep learning, being a subset of machine learning works largely on artificial neural networks where the layers are hidden. The learning methods can be supervised, semi-supervised or unsupervised Ding J et al., (2019). When a larger neural network is constructed and trained with enormous data, the performance increases tremendously Han D et al., (2018). And hence this proves to be a way different from other machine learning techniques.

Apparently when the number of data points are minimal, wherein huge data is actually required to work under a neural network the data points are increased subsequently rather than finding similar data. Thus, to rectify the issue augmentation is used. Most of the times, the dataset in hand will be very limited. To get a better ML model, the dataset must be huge, in practical; the collection of data is costly in terms of human resource, computational resources and obviously time consumption. And thus augmentation helps to increase the amount of data samples, giving the most appropriate output. The input being images, the number of images is increased. In case of row/column data, then the number of rows/columns is increased.

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Hunting for new images similar to the data set is not required, when limited data is present. So, when more data is in need, minor alterations to the existing dataset are to be done. Minor changes include flips or translations or rotations. Then the neural network would think these are distinct images anyway. In general, for effective performance of a deep learning a huge dataset is required. But when the dataset is limited, the performance of the learning model is affected and hence augmentation is implied. The data is augmented from the least available data. Also the number of parameters required is proportional to the complexity of the problem. And thus, with more the parameter the lesser the complexity. While training a machine learning model, its parameters are tuned in a way that it maps a particular input (an image) to an output (a label). If the optimization is lossless, it means the parameters are tuned in the right way.

In this paper, image augmentation is concentrated in a way to reach out for maximum outputs with a single image so as to reduce the complexity and improve the accuracy of the output. Given a single image, the model computes to find several images of the same using various techniques on augmentation. Shorten C et al., (2011). By doing so, several images of the same image is produced, since machine learning feeds on huge amount of data.

The various techniques that are involved in augmentation are flipping, rotating, cropping, scaling, resizing, zooming, adding noise, shearing, increasing or decreasing brightness, adjusting hue and so Chan et al., (2011). By undergoing all these techniques, a machine can easily identify the input irrespective of the changes done to it, thereby generating the respective output. Which will not be possible in most of the cases, since it misleads to a wrong output? When augmentation is based on image, there comes image processing, since image is the key source. The library `imgaug` can be used most of times to work with.

Augmentation: Augmentation is a process where the data is augmented before the input is fed into the data model. There exists two ways to do so. (i) Offline augmentation: All the necessary transformations are done before feeding data. Thereby increasing the size of the dataset. But this method can be applied when the data set is relatively small, as the dataset's size would be increased to the number of transactions performed. (ii) Online augmentation: The transformations are performed on a mini-batch, just before feeding to the machine learning model. This method is basically used for larger datasets. Whenever the data is to be fed onto the ML model, the data is transformed into a mini-batch, thereby reducing the explosive increase in size. This method is also known as augmentation on the fly. In this paper, position augmentation is concentrated and the input image used is a Disney image Mulan. The methodology here used is image augmentation.

Techniques: There are various techniques that can be implemented on a data set. The techniques are basically

applied to increase the size and quality of the data, since it helps in finding the exact match, and thus the appropriate output is achieved. There are two major classifications on how it is applied on the data. One is the transformation based on the position and the other is the transformation on color, which is well known as color augmentation.

Figure 1: Input image Mulan (Disney cartoon)



Color Augmentation: The image is either augmented or jittered by changing the pixel value. This done during training and evaluating the data set. The image is centered by subtracting the pixel values Azuma, et al., (2016). Variations to the brightness, contrast, and change in the saturation or hue of the image are done. Changing the brightness of the image, either by increasing the brightness or reducing it to the lowest is one of the augmentation methods. Contrast is the degree between the darkest area and the brightness area of an image. An image in general contains more than one color, thus separating the colors of the image is saturation. Also, an image can be in different shades and hue is the shades of image.

Position Augmentation: In position augmentation, the image's pixel is changed to get a newer image. Few techniques on position transformation are flipping, rotation, shearing, cropping, zoom in, zoom out, scaling. By doing so, an image with newer feature is obtained which makes the model to easily identify the exact output. But before any technique is used, the most important thing to be done is image resizing. Since images from various sources are of different sizes and the images must be of fixed size when it is to be fed into the network. And thus, the images are resized before any data is augmented.

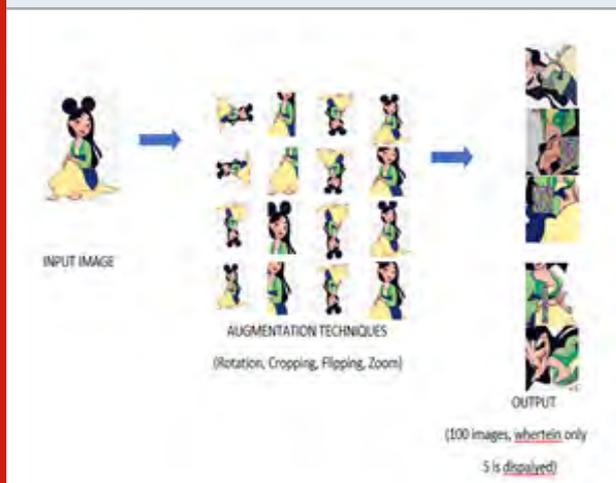
Architecture

Flipping: In general, flipping technique is used to get a trompe-l'oeil effect of the image. It produces the mirrored copy of that image as well

Flipping can either be done horizontally or vertically. By

doing so, a new pattern of the same image is obtained, making it look different from the original image. Here, the original image is fed into the machine, the images are flipped or the mirrored copy is produced. The input image flipped both vertically (img a),(img b), that is along the y-axis and horizontally (img c),(img d) that is along x-axis. By doing so the image produced is mirrored and new images are produced.

FIGURE 2: ARCHITECTURE DIAGRAM WITH THE INPUT IMAGE



Rotation: Image rotation is a routine where it is largely used in applications like matching, alignment, and other image-based algorithms Radford et al., (2011). An image to be rotated in basically the input of an image rotation routine, and the rotation angle is θ . The point from where the image is to be rotated is chosen and fixed, upon which the image is rotated on that angle. Here the angle at which the image is rotated is 90° . $\theta=90^\circ$. The images can also be rotated in any angle needed. The rotation here takes place at 90° , 180° , 270° and 360° . After rotating the input images are represented as follows.

Figure 3: Flipping Vertical (a),(b) and Horizontal flipping(c), (d)

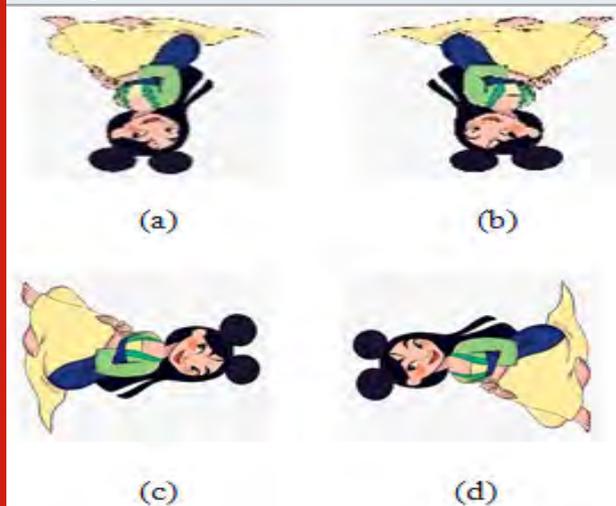
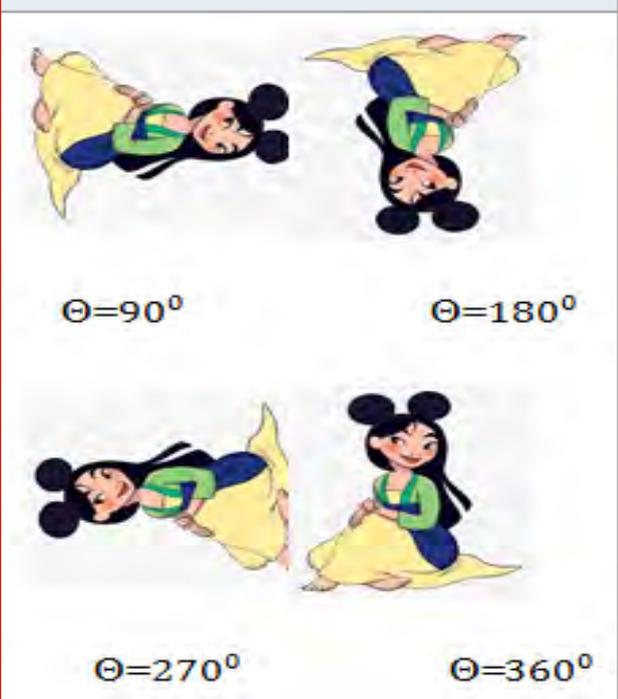


Figure 4: Rotation



Cropping: Cropping an image tends to remove the unwanted areas of the same, mostly the outer areas. In general, the peripheral areas of the image are removed, and hence it improves the framing. The aspect ratio is changed from one to another, where the image is not stretched. This can even be useful when a part of an image is given and the output is needed to be produced.

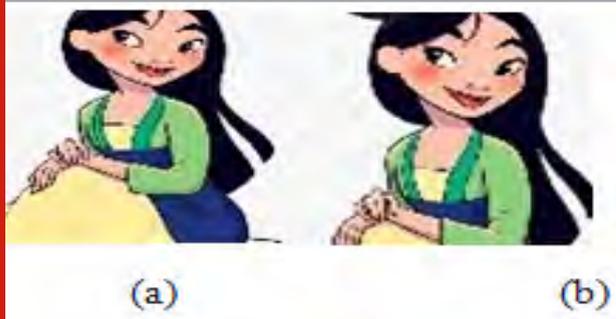
Figure 5: Cropping



Similarly with any aspect ratio an image can be cropped to its desired ratio. Thus certain parts of the image are removed.

Zooming: In this process the image is either zoomed out of zoomed in. in zoom-out the images reaches its maximum level making it enlarged. In zoom-out process certain parts of the image may be removed. Under zoom-in the exact opposite of zoom-out is carried on. The image reaches its diminished state, making it smaller in appearance. In both the cases the image is not destructed. The input when fed into the machine for zoom-out process looks so,

Figure 6: Zooming



Shearing: Distortion of an image in general is shearing. Again it is either horizontally or vertically. Shearing is not the rotation, instead it is shifting one part of the image in a certain path thereby the opposite part moves along, i.e., when a rectangle is sheared it becomes a diamond. When the image is sheared horizontally, the pixels tend to move to a distance horizontally which will increase the vertical distance of the image. This happens vice versa for vertical shearing.

Scaling: Scaling is the process of resizing the image. The image is either scaled down or scaled up. While scaling an image up, it makes it larger. While scaling down its vice-versa.

Scaling produces image without any geometric transformations, without any loss of the data.

Why is augmentation effective?

Having a dataset of two images, i.e. Mulan and Sofia. Now that all the images of Mulan are aligned to the left (i.e., all the similar images of Mulan are facing left) and all the images of Sofia are aligned to the right (i.e., all the similar images of Sofia are facing right). There will not be a problem unless all the images are given according to their alignment.

Figure 7: Image comparison



But what happens when the alignment is changed. Now the input that is fed into the machine will be “the image of Mulan, aligned to the right”. Once the training is over and the input (Mulan) is fed into the neural network, the

result will lead to chaos, since the output produced will be Sofia. But this is obviously wrong. Because machine learning algorithm finds the features that are similar to one another and distinguishes them. In this case the feature was the alignment. To avoid this scenario, huge data of the similar image (input) is to be fed into the model. This makes the system to effortlessly find out the right output, irrespective of the dimension of the input.

And thus, data augmentation comes in hand. With augmentation the input or an image (in this case) is taken and various manipulations such as crop, rotation, zoom, resize, flip, mirror, etc., are done. Once these images/inputs are fed, the model feels easy to find out the respective output, even when a small portion of the input is fed.

Future works: Having worked with four basic image augmentation techniques, this paper can be expanded in various ways by experimenting on other such techniques and a combination of techniques as well. Also, the augmentation methodology is applied whereas numerous algorithms can be applied which takes this paper to the next level.

CONCLUSION

Image augmentation being a methodology is used to increase the input data enormously by various techniques. By doing so, the obtained images are huge since machine learning feeds on huge data; also it is helpful in deriving the consistent and accurate output.

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An Extensive Study on Various Cryptographic Algorithms and its Impact on Cloud Computing Security

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ABSTRACT

Cloud security is regarded as group of controls, procedures, policies, and technologies that must be implemented to protect confidential data, infrastructure, services and applications of cloud computing. Moreover, it consists of effective response to a familiar group of security attacks that manifest differently in the cloud environment. Most of these responses are developed to protect confidential data of cloud clients, cloud's infrastructure and ensure regulatory compliance are deployed, thus making sure that all elements in a cloud computing environment are not prone to attacks. Considering the private cloud, there is no possibilities for the risk factors, data loss or changes and any kind of vulnerabilities. But considering the public cloud, the network topology of the customer gets interacted with the network topology of the cloud that produces certain changes in the security systems. This paper presents a survey study which focuses on the important cryptographic techniques and its impact on cloud computing.

KEY WORDS: CLOUD COMPUTING, CRYPTOGRAPHY, CLOUD STORAGE, DNA CRYPTOGRAPHY, CLOUD SECURITY ALLIANCE, CLOUD CUBE.

INTRODUCTION

1. Pivotal Role of Security in Cloud Computing: Cloud computing security has gained major importance since it is an evolving field of computer security, information security as well as network security. Cloud computing paradigms alter a virtual mechanism for IT resource management and usage. At each stage of the stack, the security level increases and then combined into a

common management framework, thereby providing full protection to delivery cloud service. The reason for rise in cloud attacks that cloud computing has rendered major benefits to various domains, especially in healthcare, It is evident that cloud computing has numerous advantages when deployed to various domain.

However, cloud computing experiences several security problems, in-order to overcome these problems, Cloud Security Alliance known as CSA identified and created policies to handle thirteen domains of challenges in cloud computing in its first edition as well as second edition and in its third version of Security Guidance, it presented fourteen domains. It is advisable for all cloud users to enquiry with the cloud service provider about seven particularized safety issues, namely, privileged user access, regulatory, data location, data segregation,

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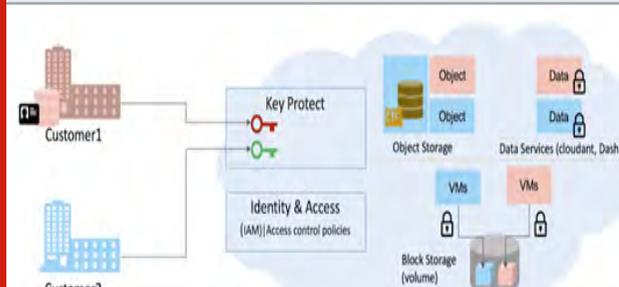
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recovery, investigative support, compliance as well as long-term viability. For instance Forrester Research Inc. has identified and provided privacy practices of important cloud providers in three major fields, namely, as shown in figure 1

Figure 1: Encryption, Privacy and Access Control Policies in Cloud Computing Environment



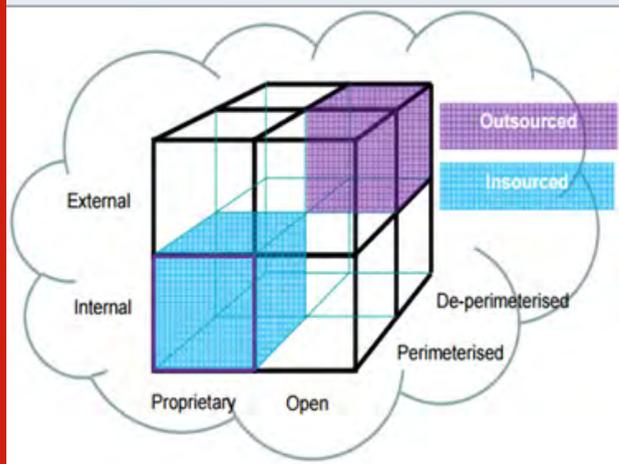
- Security and its privacy,
- Compliance and its policies,
- Legal and its contractual problems.

2. Technical Aspects of Cloud Security Alliance's Guidance and its Architectural framework: This section provides a conceptual framework for Cloud Security Alliance's guidance. The most basic necessities which can provide fundamental security to cloud are:

- Terminology, architectural requirements of cloud services
- Identifying the challenges for securing cloud applications with its services,
- Reference framework which represents the taxonomy of cloud infrastructures, services and architectures.

These elements have a major impact on the cloud's data, network as well as performance of the cloud services. The relationship needed to understand security risks can be developed by employing Jericho Cloud Cube as shown in figure 2.

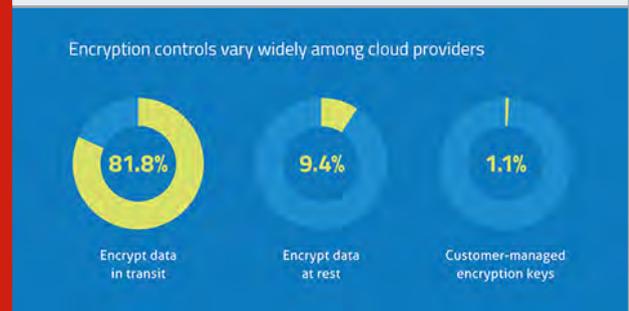
Figure 2: Cloud Cube presents the variations of cloud provider employing four different dimensions



According to Jericho Cloud Cube, Infrastructure as a Service is the located at the upper part which depicts the foundation of other services. By this Cube, the services acquire not only their capabilities, performances but also inherit security problems and its impact of the security attacks. Based on the provider and consumer security responsibilities, differences exist in each of cloud architectural levels. The lower providers are located at the reference stack with its consumers for managing security. This Cloud Cube focuses on the relationships between every security control and its cloud services.

3.Encryption: The sensitive data are being protected by means of encrypting them. This domain focuses in enabling the resources that are protected by the process of encryption and access the data with the scalable key management. In certain circumstances, the encryption-based process in cloud computing could also be adapted.

Figure 3: Percentage of Encryption of data among cloud Providers



3.1 Encrypting data in transit over networks: Usually, the data such as the credit card numbers, private keys and passwords that are passed or communicated through the internet could be encrypted and protected. This could also be possible with the IaaS, PaaS and SaaS.

3.2 Encrypting data at rest: This is the situation in which the data could be encrypted in order to store them in the disc as well as in the live production database. It is recommended for every customer to encrypt their database before sending them to the cloud environment.

3.3 Encrypting data on backup media: The misuse of the stolen or the lost media data could be avoided in this case. Encryption is a necessary thing to be done by the customer, though the cloud service provider tends to do that as shown in figure 3. Format preserving and content aware encryption are the two basic types of encryption widely employed. The key management schemes adopted and supported by the cloud encryption should be robust. The key management issues also face several challenges in recovering the general format of the data, accessing the key store and getting a backup of the original data.

3.4 Security as a Service: Certain tools are being used by the Security as a service (SecaaS) utilizes certain

expertise tools for the third parties to promote security governance, detection and remediation infrastructure. Till now cloud is working to provide the integrity, confidentiality and availability and their focus is Enterprise security. These provisions make the SecaaS vary from the other cloud services. The security is provided directly to the customer's on-premise systems from the cloud environment in the form of software and the cloud-based infrastructure systems. The cost utilized by the cloud-based security systems is very effective when compared to the other locally available services. The following are the most useful techniques preferred by the professionals and the consumers: 1) Intrusion management 2) identity and access management (IAM), 3) web security 4) security assessments 5) encryption 6) security information and event management (SIEM) 7) data loss prevention (DLP) 8) disaster recovery 9) business continuity and 10) network security.

4. Security issues according to SPI (Software as a Service, Platform as a Service and Infrastructure as a Service): According to infrastructure security in the context of SPI service delivery model, the network host and the application level lacks in the security concern. Due to the consequences of compliance management and the customers risk factors, the infrastructure security could be applied for both the PaaS and SaaS as it is more suitable for the IaaS.

4.1 Network level: A major variation among the private and the public cloud should be known when it comes to the network level. Data that goes through the public cloud should be communicated with the internet and hence their integrity and confidentiality should be necessarily concerned. At the year of 2008, security vulnerability affected the Amazon Web Services (AWS) through the usage of HTTP instead of HTTPS without the knowledge of the customer.

4.2 Application level: The security program infrastructure is said to be the critical element of the security application. The current practices with the current application involved in the security programs should be enhanced for implementing them with the cloud services. Millions of users use the e-commerce applications and these sophisticated ones vary with the standard existing single-user applications, but the web applications are the most vulnerable one. For getting an access to the in-cloud applications, browsers could be used and in order to achieve an end-to-end security in cloud infrastructure that comes under the scope of achieving application security. Therefore, it is recommended for the browser users to check the regular updates of the browser and maintain the security of the end user.

The vulnerabilities produced by the web-based applications accounted for almost half of the critical security controls that had been reported by the researchers of SANS. The top main threats had been reported by the OWASP from the year 2007 to the year 2013. The design flaws and the program errors are produced by the cross-site scripting (XSS), insecure

direct object references, broken authentication, SQL injection, malicious file execution, session management and other vulnerabilities promote these factors. The web-based application specially designed for the public cloud servers tend to lack in the security concern and hence it is necessary for these applications to be combined with the Software Development Life Cycle (SDLC) with the internet threat model that could be securely coded, tested and released. Moreover, DoS attacks based on the application level could happen as high-volume web page reloads, protocol-specific requests or XML web services requests sustained by the cloud-based services.

By maximizing the utility bill along with the CPU storage and increasing the network bandwidth, the DoS attacks work that increases the pay of the cloud applications. These attacks are said to be called as the economic denial of sustainability (EDoS). The responsibility secured by the web applications falls into the hands of the consumers and the cloud service delivery (SPI) with the cloud provider and service-level agreement (SLA). The access management along with the user security functions are also responsible by the customers and on the other hand, the service provider should look after their own security application in the SaaS. In this SaaS, the access control feature along with the authentication will be a problem. Several methodologies are adopted by several providers: managing authentication and application access (Salesforce.com, Google) is done by the user interface of the web-based application and the consumers could read as well as write privileges to other customers with the built-in features (Google Apps). Customers should have a strong password in accepting the access to the control mechanism and depending on the user functions and roles; this should be a strong privilege management

PaaS security environment could be segregated into two major layers since they don't support only the developing environment but also maintain customer's own applications. These layers are security of customer application and security of the PaaS platform (runtime engine). When using a public cloud environment, the data could be protected by the vetted encryption algorithm. The confidentiality could be offered by the process of encrypting the data, but it does not support the integrity of data. Therefore, it is necessary to promote the integrity similar to the Hypertext Transfer Protocol Secure (HTTPS), FTP over SSL (FTPS) or Secure Copy Program (SCP). The data transmit will not be simple while encrypting the data. For simple storage with the IaaS cloud services, the encryption is not suitable, but the encryption process could be feasible to be used in the PaaS and SaaS cloud application since it stops that particular data search and indexing. But when data processing is combined with the application then this data should be unencrypted.

5. Cryptography in Cloud Storage: Cloud storage could be classified as Class A and Class B. Class A includes certain cryptographic techniques with the cloud environment but not in the framework of cryptography theory. On the other hand, Class B includes the framework of cryptographic

theory and the cryptographic techniques designed for the cloud storage. In the cryptography theory, Class B is proved to be a secured framework with certain security theories that had been mentioned by Kamara et al., (2010) and Chow et al., (2017). A few Class-A schemes are known today: Kamara et al.'s scheme, Barua et al., (2018) scheme, Kumbhare et al., (2018) scheme, Zarandioon et al., (2017) work scheme etc.

5.1 Cryptographic technique: With the help of certain non-standard cryptographic technique that includes search encryption, attribute encryption etc, a possible architecture for a cryptographic storage device is possible, which is used by enterprise scenarios as well as the customers. This architecture includes three components: 1) Data processor (DP)- Process the data before sending them to the cloud environment 2) Data Verifier (DV)- checks out the falsification of data 3) Token Generator (TG)- promotes tokens enabling the cloud storage provider to determine the segments of the data used by the customers.

5.1.1 Enterprise scenario architecture: This architecture includes an enterprise MegaCorp the owner of the data infrastructure, a cloud storage provider and a business partner. A component had been introduced to extend the architecture, which is known as the credential generator (CG) who is responsible for implementing access control policy and the credentials is issued to the MegaCorp parties. The credential is received from the credential generator and each employee from the MegaCorp and PartnerCorp receives them that can be either their team or role, organization and the data to send to the concerned machine syndicated with their decryption policy (the data could be decrypted only by the particular team members). The data is modified by the data processor as similar to the consumer scenario, before it is conveyed to the cloud. When the data is accessed by the PartnerCorp employee, then the authenticated keyword will be sent to the dedicated machine of the MegaCorp.

5.1.2 Barua et al., (2018) scheme: An access control scheme known as efficient and secure patient-centric access control (ESPAC), is proposed in this paper for their cloud storage with the consideration of patient self-controlled access problem while accessing the privilege to the highly sensitive personal data. This scheme depends on the policy known as the identity-based encryption and ciphertext-policy attribute-based encryption. Based on the roles, several access privileges could be permitted to the user and several attributes could be assigned to them. Certain entities are included in this attributes: 1) Trusted Authority (TA)- The secret key and the public parameters are generated for the ESPAC and individual users could impart differential access rights depending on their roles and attributes 2) Registered users (RU)- Responsible patients, who encrypts sensitive PHI 3) Data access Requester- users of the cloud environment having an access to the specific PHI and 4) Cloud Service Provider.

5.1.3 Kumbhare et al., (2018) scheme: A Cryptonite architecture had been presented in this scheme in order to promote a service on the top of the public cloud environment with the secure data repository design. With the help of this scheme, unauthorized users could not have an access over the data and promotes a secure way of sharing and storing data in the cloud infrastructure. The file names will be masked and the access patterns as well as the user permission will also be masked that promotes auditing capacities with the proved data updates.

5.1.4 Cryptonite architecture: This architecture combines the libraries from the client-side along with the service offered by the secured data repository as well as the cloud storage services in order to hold up the following operations: PUT, GET, DELETE, GRANT, REVOKE, and SEARCH. Pre-processing the plain text files and encryption is possible with the Cryptonite Client Library (CCL) prior to uploading them with the Cryptonite repository service and then decryption is carried out upon the receipt. Cryptonite offers a secure operation by implementing the client library with the local machine of the user. There are three major components Cryptonite Data Repository Service running inside the cloud Virtual Machine (VM): 1) the Secure Index Manager (SIM) 2) the File Manager (FM) and finally 3) Audit Manager (AM). The work of the FM is to retrieve or store the files required by the user by interacting with the cloud storage services and limits the unauthorized access and updates done in the data stored. The AM functions in securing the audit logs while the FM performs in accessing the files that includes a signature of the requested operations' message. The SIM secures the file used by the separate users and locates this index in a Secure Index Storage (SIS) space separately. When the files or the metadata is stored inside the public cloud then Cryptonite Secure Storage (CSS) is used as the storage account. The cloud data services provide a standard authentication mechanism to have admittance to this space that helps in storing the collected binary files.

5.1.5 Zarandioon et al., (2017) work: In this paper, key to cloud (K2C) had been proposed, which is known as the user-centric privacy-preserving cryptographic access control protocol that utilizes the concept of attributed-based signature and encryption technique. With this protocol, the users could secure their data with the untrusted cloud storage and these sensitive data could be managed, stored and shared among the platform.

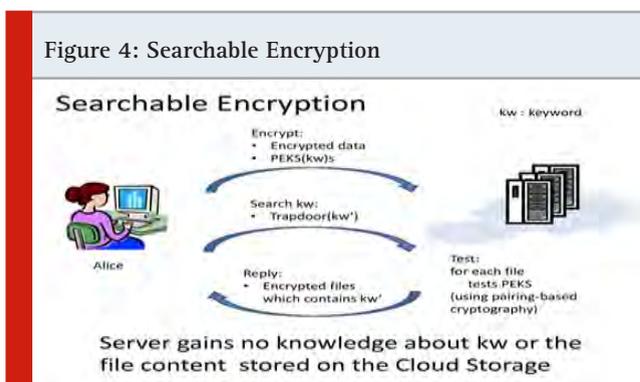
5.1.6 Somorovsky et al., (2012) scheme: This scheme uses extensive markup language (XML) encryption technique for securing the data. The XML key data and the payload could be encrypted and decrypted with the XML encryption engine.

5.1.7 Popa et al., (2017) Scheme: CloudProof, which is said to be a secure cloud storage system is proposed in this paper that guarantees the security in service level agreements (SLAs) of the storage system S. S. Chow et al., (2017). The freshness, write-serializability and detection

of violations could be done by this system and the user could prove the violation occurrence to the third party.

5.1.8 Searchable Encryption: The searchable encryption is widely employed encryption technique in cloud computing, it offers encrypting over a search index to a group of cloud files such a way the confidential data are encrypted, only parties with authentic tokens can access. By employing searchable encryption, the index is encrypted so that encrypted file's pointers can be determined by providing a token for any keyword as well as the contents are hidden as shown in figure 4. With the proper knowledge of the secret key, tokens are produced. While retrieving the cloud files, keywords or any information about the files are not revealed. Most commonly employed searchable encryption types are symmetric, asymmetric, efficient and multi-user symmetric searchable encryption. The important searchable encryption type in cloud is discussed below:

5.1.8.1 Asymmetric searchable encryption: Introduced by Boneh and later aggrandized by Abdalla, followed by further advancements by Boneh et al., (2007) and Park et al., (2017).



5.1.9 Attribute-based Encryption: Introduced by Sahai and Waters., (2005), the Attribute-based encryption is also known as fuzzy identity-based encryption, it involves a group of descriptive attributes such as roles, age, relationship, trust, location. It consists of cryptographic methods which enable the specification of decryption policy linked with a cipher text in which every cloud user is offered with a decryption key along with a group of attributes linked with it. Then the encryption commences under a public key as well as policy. ABE employs tree-based access structure, enabling encryption to specify the selected attributes that can be decrypted. In-order to decrypt the data, the attributes linked with the decryption key should match the policy employed for encryption. The tree-based access structure employs operators, namely, AND, OR and k-of-n, where AND is generally known as n of n as well as OR is known as 1 of n. Key-policy attribute based encryption (KP-ABE) and cipher-policy attribute based encryption are the enhanced versions of Attribute-based encryption

5.1.10 Proofs of Storage: It is regarded as a protocol between the server and a client enabling the cloud user to

check if a cloud server is authentic or not which can store a file. Proofs of storage is based on the homomorphic linear authenticator (HLA) which was introduced by Ateniese [2017] and Juels et al., (2016) and later enhanced by Shacham et al., (2013), Ateniese et al., (2009) and Erway et al., (2018).

According to Proofs of Storage, cloud user should encode the file before storing it on the cloud server and then the cloud user can verify the integrity of the data by executing the proof of storage protocol in the cloud server M. Barua et al., (2018). The main reason for employing proof of storage in cloud is that it provides it can be executed an arbitrary number of times and the amount of information exchanged between the client and the server which effective in space as well as it does not dependent on the size of the data. It can be deployed either privately or publicly verifiable J. Somorovsky et al., (2012).

5.1.11 DNA cryptography: After the advent of DNA cryptography, the computational properties of DNA became a new domain of research interest for cryptographers, especially Dr. Leonard M. Adleman successfully employed DNA to create a solution for Hamiltonian path problem H. Wen et al., (2019). Encryption techniques which employs DNA can be classified into:

- DNA Cryptography;
- DNA Steganography;

The foundations for DNA Cryptography is established on DNA based computations for encryption which consists of symmetric as well as asymmetric DNA cryptography. The reason for wider acceptance of DNA cryptography is that it provides high security and the recent success of DNA Steganography proposed by Carter Bancroft laid the foundation of hiding DNA-encoded message in a genomic DNA sample and further encrypting the DNA sample to a microdot. However, DNA Steganography process does not involve encryption even-though it is regarded as most promising cryptography method. Later, pseudo DNA Cryptography consists of computation simulation as well as arithmetic operations. DNA digital coding technology represents A, C, T, G as 00, 01, 10, 11 and employing Digital DNA the binary values are interchanged with bases which lays the basis of DNA cryptography.

Digital DNA and Pseudo DNA are employed in biological operations employing real DNA technique. Further enhancements of DNA cryptography lead to the development of Polymerase Chain Reaction which is considered as rapid DNA amplification method involving complementary oligonucleotide primers and then coupled with double-standard target DNA strands. A single DNA target molecule can be hyperbolised into 10^6 after 20 cycles in a short span of time. The authors in H. Wen et al., (2019) employed DNA digital coding consisting of 1's as well as 0's. The DNA sequence contains Adenine (A), Thymine (T), Cytosine (C) and Guanine (G). By employing 00 (0), 01 (1), 10 (2), 11(3). A, T, G, C stand for 0, 1, 2, 3, a DNA coding pattern can be generated. The benefits

of employing DNA digital coding in which redundancy of information coding is lessened and its efficiency is aggrandised.

The authors in C. Li et al., (2019) proposed DNA base coded message extracted from DNA digital coding over the message, and then later combined with PCR amplification and primer pair is considered as the key. For effective compression, DNA cryptography is well suited, for instance Bi-serial DNA Encryption Algorithm is a double layer security.

CONCLUSION

Moreover, in the industrialized area, data anonymization, utilization of cloud database control and tokenization are employed to protect the unsecured data. Cloud computing paradigms alter a virtual mechanism for IT resource management and usage. At each stage of the stack, the security level increases and then combined into a common management framework, thereby providing full protection to delivery cloud service. Certain security properties that include integrity, confidentiality and availability could be attained on the strong guarantee basis of cryptography that seems to vary from the physical, legal and access control mechanism, which is determined to be an important aspect of cryptography storage services.

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An Analysis on Deep Learning with its Advancements

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ABSTRACT

Most recently, Deep Learning being a part of wider area of Machine Learning plays a vital role of study from data representations. DL has been rapidly growing in several application domains by means of its different approaches, methods and tools. It is designed with a network of interconnected neuron units resembling the structure and function of bio neuron. Deep learning network has the ability of studying unsupervised from data collection which is not structured or labeled, supervised data containing labels, semi-supervised data which is partially supervised also known as Reinforcement data. Deep learning upgrades the concepts of machine learning to the next successive level. Deep learning algorithms has been constructed with multilayered connections, which makes use of artificial neural networks to study multiple levels related to the different levels of abstraction to solve complicated problems. Expected Outcomes have been shown that deep learning accurates the learning data features compared to traditional machine learning concepts in the various sectors. Deep learning architectures are Deep Neural Networks, Deep Belief Networks, Convolutional Neural Networks, AutoEncoders and so on. Every interconnected layer represents a depth of knowledge. This paper confers a brief study on Deep learning, its categories and its advanced features such as AutoEncoders, Generative Adversarial Networks and its types, Multi-view learning and Multi-task learning.

KEY WORDS: DEEP LEARNING, CATEGORIES OF DL, AUTOENCODERS, GAN, MULTI-VIEW LEARNING, MULTI-TASK LEARNING .

INTRODUCTION

Deep Learning is a method of machine-learning extremely based on its characterization such as an image expressed in different ways as a vector (or) series of edges using certain representations to soothe the tasks simpler Guo et al., (2017). Deep learning behaves as a class of Machine Learning algorithms which uses multiple layers to extract

consecutively higher level features from the distributed input Zhao et al., (2018). Being DL a part of Artificial Intelligence it consists of networks capable of learning unsupervised data or else unstructured or else unlabeled data which is also known as Deep Neural Learning (or) Deep Neural Network.

Pros and Cons of Deep Learning Process:

Pros and Cons of DL:

Pros:

1. DL promotes the complex relationships modeling and its concepts using multiple levels of representation
2. The use of supervised, unsupervised (or) semi-supervised learning features and its nature of

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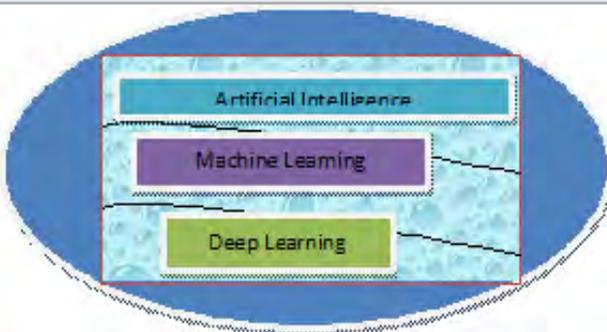
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hierarchy supports to extract the higher levels of abstraction which are defined using the outcome values from its underneath levels.

Figure 1: Model of Deep Learning



Cons:

1. Modules designed in this learning usually contain repetitive connections intervening each pair of nodes which connects the next two layers of the neural network
2. Varied signal point interconnections are generally overlooked.
3. Enormous collection of layers are built on top of each module to extract the pyramid features from the extent bottom to top.

Why Deep Learning Is Favoured?: An advanced growing “Deep Learning” is a sub-field of machine-learning closely related to Artificial Intelligence. It promotes the modeling of difficult relationships and its concepts by using various levels of representations. It supports the following features.

Table 1. Differences between ML and DL

Concepts	Machine Learning	Deep Learning
Working Process	Different types of automated algorithms are used to predict future decisions and model the functions use the data fed to it	Combines data features and its relationships with use of neural networks that transforms the relevant information through the various stages of data processing
Management Process	Numerous algorithms are directed by the analysts to find the varying variables in datasets	After implementation, the algorithms are generally directed to itself for further analysis on data and its relationships
Data dependencies	Data requirement is smaller in size	Data requirement is larger in size
Problem Solving Method	-It breaks down the problem into multiple sub problems until it is solved to obtain the final outcome	It facilitates the direct point-to-point problem solving
Execution time	Less Parameters are used	Too many Parameters are used
Training	The training takes little time i.e, seconds to hours	The training requires more time possibly two weeks
Testing	It requires more time during testing which mainly depends on the amount of data	It requires very little time during testing
Interpretability	It is easier to understand and reasoning the result	It is difficult to understand and reasoning the result
Requirement of Data Points	Few thousand data points are usually used for analysis	Few million data points are allowed to run in program for the analysis
Outcome	It can be a numbered value such as a score or division	It can be any among the values such as a score, an element, text (or) sound

Universal learning approach: Deep Learning also called “Universal learning” since it can be applied to any kind of an application domain.

Strong and Powerful: Various approaches in Deep Learning does not require the design of features instantly, since the features are learned immediately optimum for

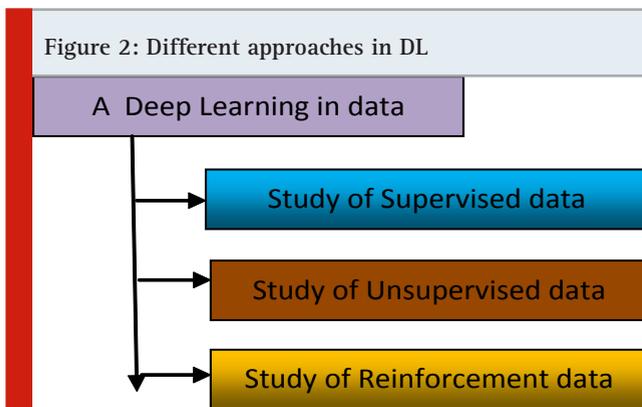
the related tasks at time Chalapathy et al., (2019).

Conception: The deep learning approach similarities can be generated in different applications or else with different datatypes. This type of learning approach is called “Transfer Learning”. Its advantage is useful in case the problem does not support sufficient available data.

Expandability: It is highly expanandable. A research paper published in year 2015 illustrates the network “ResNet” implementation with its concepts described by Microsoft to the networkers designed with 1202 layers which can be often implemented at a super computing scale Jinglin Xu et al., (2019) Also, another initiative made at a superior level which leads a Lawrence Livermore National Laboratory (LCNL) in constructing frameworks to implement thousands of nodes in field of networks.

Machine Learning Vs Deep Learning

Categories of Deep Learning Approaches: Methods stated in both ML and DL are almost similar. The different studies on data are constructed under complicated learning structures which are entirely different.



Supervised Learning: In Deep Learning, there are numerous learning algorithms available to update the weights of DNN. During the training process to represent an efficient function related to task. Supervised learning mainly concentrates on labeled data, where any expert can explain the chosen task performance. The data points added in the list includes an action pairs based on observations which points to the neural webwork models. In supervised learning approach, the environment has a number of inputs and its corresponding outputs as (At,Bt) ~ P. For example : Input -> At

Prediction -> B^t=f(At)
 Loss value-> l (Bt, b^t)

The decision maker has the responsibility to consecutively update the network attributes for the better estimation of the intended outputs. Also, the decision maker should be capable to receive exact answers to the questions raised from different domains which are possible after every successful training.

There are various studies in supervised data learning approaches to show its usefulness in deep learning included with its types

- Deep Neural Networks [DNN]
- Convolutional Neural Networks [CNN]
- Recurrent Neural Networks[RNN]
- Long Short Term Memory [LSTM]
- Gated Recurrent Units [GRU]

Deep Neural Network: This neural network states the numerous layers through which data and its features are to be extracted. Deep Neural Networks contains its own class of Deep Belief Networks (DBN) which is made of multiple layers consisting visual designs recognised as Restricted Boltzmann Machine (RBMs) Qing Zhang et al., (2019). Either all (or) part of the parameters of DBN are smoothen to satisfy the certain criteria. Example: a supervised learning or a clustering loss.

Deep Belief Networks: DBN supports an aspect of random variation and its models which consists of multi layers holding random and hidden variables. The graphical pattern of Restricted Boltzmann Machine (RBM) and DBN are closely related due to framing and assembling a quite number of RBMs which enables the number of hidden layers to train the data more efficiently through RBM for remaining stages. Further, RBM is a well known special styled pattern of a Boltzmann Machine (BM). DBNetworks utilizes the study of unsupervised learning to find numerous layers features used in a feed-forward neural network and properly processed to maximize the discrimination efficiently. Also, DBNs responses better classification results than broadly used learning techniques, outperforming SVM , KNN and a decision tree.

Convolutional Neural Network: This neural network is composed of single (or) multiple convolutional layers by means of subsampling steps and then followed by single (or) multiple with completion of connected layers similar to standard multilayer neural network. The calculation formula for the convolution layer is

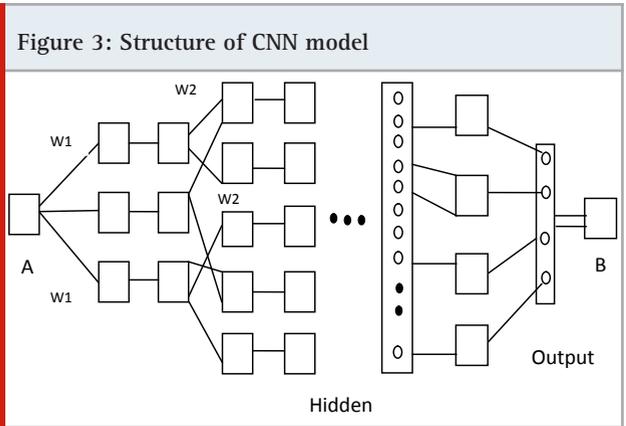
$$X_n = f(\sum_m W^{m,n} X^{m+bn})$$

Where Xn represents the nth feature map
 W^{m,n} represents the convolution kernel
 m means the number of pixel channels
 bn means the offset vector of the corresponding position map

In accordance with the configuration of deep learning, CNN is meant to reduce the data preprocessing steps.

The main sources for CNN to decrease its meshwork training parameters are Local receptivity, Weight Sharing and Pooling. The most highlighting part of CNN is its learning hierarchial features obtained from large collection of untagged values.

Unsupervised Learning: The systems processed with unknown labels known as unsupervised learning systems. In this system, the decision maker studies the internal (or) most vital features to find the relationships not known (or) its structures placed inside the input values. Mostly, unsupervised learning members are good in clustering based on its similarities, non-sequential dimensionality reduction which includes AutoEncoders, Restricted Boltzmann Machines and Generative techniques such as GAN. Additionally, Recurrent Neural Networks like LSTM and RL used in Unsupervised learning systems according to application areas.



Semi-Supervised Learning: The study of data in Semi-Supervised Learning mainly concentrates on a part of labeled datasets often called Reinforcement Learning. In few cases, the semi-supervised learning techniques prefers the use of Deep Reinforcement Learning (DRL) and Generative Adversarial Networks. As like unsupervised learning, RNN includes LSTM and GRU in use of semi-supervised learning too.

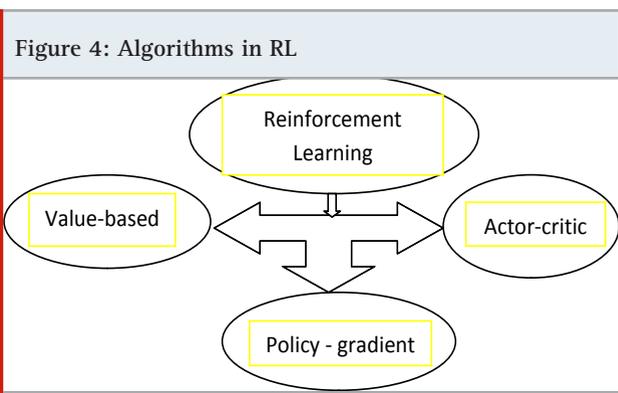
Reinforcement Learning: The learning on reinforcement type of data allows the model to learn and execute the certain tasks through experimental process. This can be well modeled as Markov decision process which is properly illustrated as a record (S, A, P, R) where,

- S->It is an attribute specifies state space
- A->It is an action space of all possible actions applicable in data
- P-> It is a state transition probability model
- R-> It represents the reward function

Pros of RL:

- Unknown labeled datasets are required
- Advanced frameworks can be learned through RL.
- Cons of RL:
- Clustering the data to an optimal policy can be slower in process
- Needs time-consuming simulations (or) expensive training in theoretical data.

Classes of RL: Generally, algorithms framed in Reinforcement learning are classified into into three levels.



Value- based algorithms: These algorithms generally rate the value on function $F(V)$ which constitutes the value hold in a given state. In particular the state transition is known, the desired actions can be chosen by a policy to bring in a state so that the contemplated rewards are enlarged.

Benefit:

- The Optimum Policy is discovered greedily extending the “state-action” value function $R(S, a)$
- Non-Benefit:
- Assurance on the optimality cannot be predicted on the learned policy.

Policy-gradient algorithms: These algorithms cannot evaluate the value function whereas , it can restrict the policy and later update the necessary attributes to extend the awaited incentives. This process can be achieved by creating a reduction function and analyzing its slope in order to the network specification.

Benefit:

- During the period of training, the active network variables are modified in the determined way of the policy-gradient.

Non-Benefit:

- Extensive variance in the calculated policy-gradients.

Actor-critic algorithms: These algorithms are composite methods that integrates the usage of a value function with a limited policy functions, to build a exchange among the drawbacks of the extreme variation of policy grades and the angle of the value depends on its approaches. The reward function used in this algorithm has its following types:

a) Sparse reward function: The decision maker can only accept the perquisite which follows the certain events such as gain (or) loss in its related tasks.

b) Dense reward function: The decision maker will be given a perquisite at every time interval which is derived on the state it is in.

The type of reinforcement learning can be chosen to

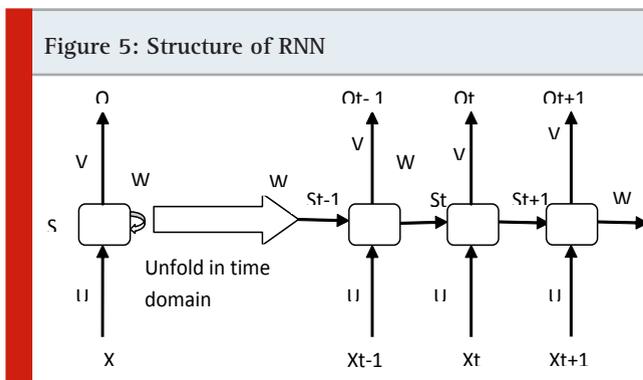
solve the task which depends on the problem scope (or) space.

Examples: annealing, cross-entropy methods and SPSA.

Recurrent Neural Networks: In conventional type of networks, it prefers only complete connectivity between its adjacent layers, whereas nil connection exists between the nodes lies in the same layer. This occurrence may leads to failure of network especially in case of temporal-spatial problems. This drawback can be solved by receiving a feedback from previous state (hidden layer) to the current state.

The basic RNN architecture exhibits: (i) delay line and (ii) unfolded in time domain in series of two time steps.

Long-Short Term Memory: LSTM networks are capable of capturing the features of time series lies in the longer time span. Its network is most special kind of RNN. When considering the hidden layer as the unit of memory, LSTM network can manage with the connection lies in the time series in short as well as long term, which makes it is an extraordinary improvement compared with RNN. Moysset et.al. utilized the benefits of four directional two-dimensional LSTM memories to know the wide-ranging context exists intermediate to various local sectors and decreased tractable parameters within internal divided parameters.



Advanced Features In Deep Learning

Autoencoders: AutoEncoder(AE) is the most extensively manipulated procedures in illustration of unsupervised learning than others. This method is superior in training the mapping function to make sure the reduced reconstruction error lies among programmer layer and data layer Xin Y et al., (2018). Generally, the covered layer has less aspects compared to data layer which assists to find the important features of the data. The network comprises in following two parts namely

Encoder function => $y = fw(x)$

Decoder function => $x' = gw'(y)$ generates a reconstruction.

Types of AutoEncoders:

1. **Under – Complete:** This learning representation

makes the autoencoder to grab the most prominent features of the data, also it can control the proportion of inactive code 'z' lesser than the data 'x' acts as input.

2. **Denosing:** This learning representation can makes the encoder ew and decoder dw' to absolutely hold the form of data generating classification.
3. A denoising autoencoder reduces the following goal

$$L = ||x - dw'(ew(x))||^2$$

Where x' is falsified in form of noise, copy of x .

Generative Adversarial Networks: GAN provides an unsupervised deep learning approach in estimation techniques whereby the two neural networks struggles to yield zero sum bias. In particular, the problems related to image creations, the originator is initiated with Gaussian noise to produce the images and its visibility is determined by the discriminator Tang et al., (2018). GANs have the two different areas in deep learning which comes under the following (i) semi-supervised (2) unsupervised.

Different types of GANs

1. **Deep Convolution GAN (DCGAN):** a semi-supervised learning representation proves the reliable results compared to unsupervised learning.
2. **Information – theoretic GAN (InfoGAN):** a better representation in complete unsupervised learning.
3. **Coupled Generative Adversarial Network (CoGAN):** It is a learned combined distribution of several domain images.
4. **Bidirectional Generative Adversarial Networks (BIGAN):** It is to be learned by mapping the characteristics reverse in process.
5. **Boundary Equilibrium Generative Adversarial Networks (BEGAN):** It is simple but its framework is strong in nature. It is a better training procedure because of its speed and stability.
6. **Wasserstein GAN (WGAN):** This improves the stability of optimization process.

Multi-View Learning: As like the view of different angles, Multi-view Learning plays an important role in enhancing the features discrimination by extracting inputs from various sources. The most important approach followed in learning representation is subspace learning exists among two input domains and its expansion in different views have been studied as a generalized usage of a higher-order correlation Qing Zhang et al., (2019). The learning of Multi-View Discriminant Analysis is used to reduce the number of aspects and its related features multiple views which utilizes the class information. Further, the related methods were designed in the same structure containing multiple views, its supervision and nonlinearity. The learning supports the subspace clustering methods to retrieve the low-dimensional data structures, multi-modal deep autoencoder was suggested to learn common characteristics in a pair's view of nonlinear representations. Also, Deep CCA – Canonical Correlation Analysis is a two-view method

which increases the pair wise association while using neural networks.

Multi-view learning in classification and feature selection: This approach has its benefits in the combination of Multi-view learning with single-class Support Vector Machine (or) multi-class Support Vector Machines, where this method has its limitation to operate two classes of data with two views only. In the event of tracking the objects, the learning order can be directed by various types of features and know their similarities through the coordination of different plans along with entropy criterion.

Multi-Task Learning

- Different tasks in deep learning can be categorized under two groups ,
- Single-Task Learning (STL) also known as “Per-attribute classifier”
- Multi-Task Learning (MTL) also known as “Joint-attribute classifier”

In comparison of Single-Task Learning methods – every attribute is individually estimated by ignoring the correlations exists among the tasks, Multi-Task learning methods performs its learning multiple models to estimate multi-attribute using shared basis relationship. Example: Multi-Task learning networks in estimation of human pose ,prediction of required attributes to the problem, better alignment of face etc.

Multi-Task learning in object detection: In detecting objects, Multi-Task learning role in three stages namely Multi-Task Learning, Multi-scale representation and Conceptual Modeling.

Multi-Task Learning: The attitude of learning the multiple tasks provides a helpful representation for several connectivity tasks from the similar type of inputs, which are integrated on the basis of strongly supervised object division signals and region-based object discovery to fully utilize its features in multistage framework.

Multi-scale representation: It joins the activations processed from several layers along with the links passing output of previous layers as input to the next layers in framework by providing the attributes related information of various geographical designs.

Example; Cai et al., (2018) used the Multi-scale Convolutional Neural Network (MS-CNN) to make ease the variability lies between the various sizes of entities and its receiving fields with several scale – individual output layers.

Contextual Modeling: This type of modeling maximizes the spotting performance by extracting the features from (or) about ROIs (Region of Interests) belongs to the various assisting parts in dealing with obstructions and its intra similarities.

Example: Zhu et al., (2018) suggested SegDeepM to

explore the entity divisions, which mainly decreases the maximum dependent features on incipient candidate layers with the use of Markov random fields.

CONCLUSION

The paper reviews the prime differences between ML and DL, different approaches of DL and its usage along with its advancements such as Auto Encoders, GAN, Multi-view Learning and Multi-Task Learning. This concept can also be enhanced in the study of different data learning according to its originality and applying related patterns and tools to find the relevant outcomes.

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Efficient Road Side Framework Placement using VANET for Reducing Network Delays

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ABSTRACT

The Road Side Unit (RSU) is a transmitter, it is facilitate along with route to us for communication between network surface and vehicles. The RSU is one of the components of VANET (vehicular ad hoc network). In this research paper mainly focused on problem of placement of RSU on road side like highway and also avoids the network delay along with efficient network. For this problem the proposed ERSF (Efficient Road Side Framework) avoid the network delays with help of number linear conceptual model along with optimization network delay and under consideration of network. The ERSF framework has been tested that performance using metrics of Generating Traffic Mobility Patterns (GTMP) by VanetMobiSim. The experimental results comparisons has been shows standard distribution and cost effective reduction is 23% and the network delay is 9% respectively and these results are gives clear definition of efficiency of ERSF solutions.

KEY WORDS: GTMP, RSU, ERSF, VANETMOBISIM, NETWORK DELAYS, ROAD SIDE UNIT.

INTRODUCTION

Now a day the emerging network technology for Ad-Hoc Network is Vehicular Ad Hoc Network (VANET), that is allows the methods of ITS (Intelligent Transportation System) techniques for making an efficient networking systems for between network surface and vehicles in road infrastructure through Vehicular Ad Hoc Network. The

VANET facilitate vehicles interactive with every other network in read unit and get efficient internet on the moving state.

The VANET is a part of Mobile Ad-hoc Networks; these VANET and MANET is self organized, independent and focused for the sharing manner along with self organized authentication Ranjan Senapati B et al., (2020) With help of Dedicated Short Range Communication (DSRC) the VANET has gives wireless link for communication for roaming vehicles Babu Ram and Neelendra Badal (2019) along with the standard of IEEE 802.11a Malhi et al., (2019). In VANET changes sequence is very problem in traffic network, Because of high portability the topology. Besides, long range interaction, the serious issues is inaccessibility of RSU within certain regions which brings about separation and undesirable network late.

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The limit and effectiveness of VANET is unequivocally relies on situation of RSU with the path. One of the very much planned RSU position system can enormously improve the limit along with effectiveness of the system, and simultaneously lessens usage cost. In the RSU designation technique must be contrived with the end goal that it can gather all the traffic information and disperse it progressively over the whole system. The wide scope for VANET has lot of applications going from diversion to street authentications Lin et al., (2017). Wellbeing applications intensely depend on close to constant transmission of crisis information sharing A. Arora et al., (2019). For that kinds of uses need for solid activity communication of between vehicle-to-framework and vehicle-to-vehicle.

The principle reason for existing is to stay away from incidents, stay alive of humans and give obstruction less condition to crisis reaction group. On interstates, VANET should be had transmit ready information sharing utilizing RSU is to facilitate speed up the crisis reaction if there should be an occurrence of an episode. A perfect time for helping for medical facility during accident happening time period is called golden time S. S. Shah et al., (2019), at the point when a mishap occurs, ready messages ought to be engendered to the respect specialists inside portion of the best time Salah, Ket al., (2017). That is manifest limiting transmission late is the way to give crisis reaction with in time. The ERSF manages along with fitting of RSUs on road side. Every vehicle able get to RSUs in various approaches; direct communicate conveyance, happens when the vehicle come in to the RSU transmission scope, and handing-off of multi-bounce, it is happens when the vehicle is exit of the RSU transmission boundary. The proposed ERSF approach performed defining by whole Number Linear Conceptual Model (NLCM) model.

The goal of this technique is to reduce the framework of delay, at the same time as regarding the all out spending plan accessible for the sending. Because of building up the technique has taken both vehicle-to-RSU and vehicle-to-vehicle swapping. Distributions of Vehicle along with versatility designs are produced by utilizing VanetMobiSim Zhang, Z et al., (2011), simulations. During the ERSF is approved in NS2 by arrange reproductions acted. This research paper has been organized as the following phases. Related work and problem statements were placed in phase two. The system models in phase three. In phase four had optimal position placement of RSU. The results of simulations are represented in section five. The results and discussion and conclusion are placed were phases six and seven respectively. The vast majority Shaik, S et al., (2013) of the exploration work finished on RSU situation has concentrated on boosting framework execution regarding throughput or by [10, 13 and 15] and large framework limit.

Not many authors have thought about the issue of limiting idleness. The most part cantered [9] around limiting handover inertness and related system. The analysts [17] considered the issue of how to moderate

the effect of multichannel hand-off clash and keep up high data engendering speed and proposed a hand-off conflict calculation. The displayed and dissected Liu [7] along with Hu, Y., et al. (2017) the postponement of broadcasting an alarm sharing VANET. The issue of limiting [16] transmission late by ideally putting RSU was considered. In any case, the proposed arrangement was centered on limiting deferrals in urban conditions.

2.Related Work: The issue of the minimization situation for had tended to by a few research authors. The author Liu et al investigated the absolute literacy of broadcasting cautions in VANET and road [7]. The authors likewise built up a connection between the minimum number for the RSUs along with the separation secured by vehicles or cars. Nonetheless, the authors didn't produce any RSU sending methodology. Another author has Ahmed and Bouk has taken the RSU position issue and contrived a plan that limits handover length from starts RSU to destination RSU. The model ascertains a variable called Inclusion/Administration situation, were is utilized to decide the while time which an endorser station can get administration from the objective RSU. Limiting handover postponement can be gainful in decreasing system late; however it can't give any bound on the general system inertness.

After that, another one author Cheng has been produced a geometry-based meagre inclusion [10] convention for RSU installation is utilized which taken numerous qualities, for example, the geometry of street systems, traffic examples, and asset confinements. For traditional information, the convention can find the most reasonable inclusion regions. Hereditary and eager has both calculations are utilized to determine the inclusion issue. Be that as it may, that plan doesn't address the issue of limiting network late.

the proposed Zhang, Y et al., (2015). an RSU produced by Chi et al. situation methodology dependent on the traffic stream. The plan limits the quantity of RSU belongs putting RSUs at highways convergences and spots with most elevated vehicle recurrence. The thought is to group street crossing points and discover capacity RSU placed by utilizing Markov bunching calculation. Then again, T. J. Wu gave a similar to Chi et al report that demonstrated that the scheme that is not efficient Bariah, L et al., (2015). The authors have proposed the practical methodology of RSU arrangement that plans to amplify the framework limit. The plan gives great throughput however the system delay accomplished by it is not minimum cost.

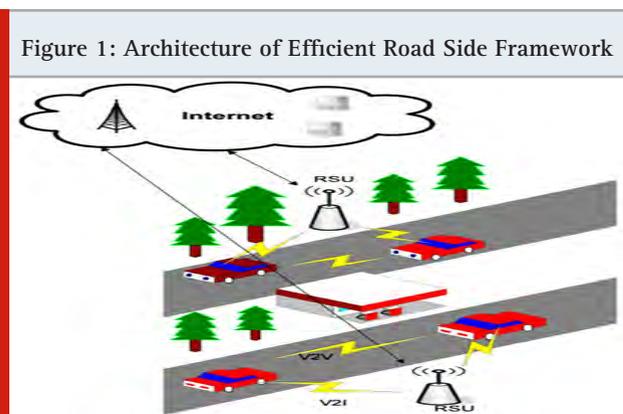
The author displayed the most extreme inclusion with time edge issues Abdelhamid, S et al., (2015) by utilizing a hereditary calculation for taking care of the issue. A total of four certifiable informational indexes were tried and contrasted and an avaricious methodology. Another proposed Bhoi, et al., (2018) Aslam has been delivered two diverse advancement techniques for the sending of a predetermined number of RSUs along with urban territory. A method is called the Inflatable Development

Heuristic technique, the remaining is a diagnostic BIP strategy. The BIP uses branch along with headed methodology for finding an ideal scientific arrangement, while the strategy utilizes swell extension relationships get finding an ideal or close to the ideal arrangement. The two strategies were utilized to tackle the enhancement issue of limiting the normal detailing average.

The new method conspires indicated BEH technique performs superior to BIP strategy as far as computational expense and adaptability. The master represented by Patil et al., (2015) a novel Voronoi arrange based calculation for a powerful portion of RSU's that shapes a Voronoi network as far as the measure of deferral brought about by information bouch has been RSU above So also, the calculation for picturing by Jalooli et al., (2018) the exhibition of message proliferation in VANET, represented Security-Based Separated RSU Position calculation through which message spread postponement can be limited in urban zones.

The calculation for changing by Ruinet al., (2014) for proposed an effect of a multichannel condition called Achievement Likelihood-based Transfer Conflict procedure. The property of stochastic to vehicular conveyance and constant area data of vehicles by by SPRCA were investigated. To investigate the SPRCA performance with stochastic geometry-based approach and determine their properties. No methodology for limiting system delay was proposed by the creators. The nature of administration by Hu, Y., et al. (2017) in VANET the defer limits and start to finish excess were considered as the critical measurements.

3.The Proposed ERSF Approach: The ability and effectiveness for VANET is unequivocally based on the position of RSU with rout. A perfect organized framework RSU position method able to perform upgraded the ability and effectiveness of the network in road side unit, during as well as the minimized installation cost also. The ERSF is handling along with installation positioning of RSU on road side unit surface boundary.



Around able to all things considered a RSU put in a fragment. This ERSF strategy to the effective organization of RSU is as per the following:

- Vehicle versatility designs are created under various situations by utilizing VanetMobiSim to imitate

practical vehicular condition.

- A Number Liner Conceptual model is planned that limits the general inactivity of the traffic network and decreases RSU sending cost also.
- The ERSF has been improvement model is unravelled to get delay RSU situation.
- The proposed model is then approved by recreations performed on the streamlined model in NS2 test system.
- Results comparison of experimental is done between the proposed ERSF situation and WKUDS.

Table 1

$A_l^k = 1 :$	The vehicles are in. fragment l for facilitating by the ERSF in section k. During, suppose $A_l^k = 0$ there no vehicle in fragment l for facilitating by the ERSF in fragment k
St:	There is not an ERSF in fragment l $Sl \in \{0,1\}$.
Ft:	The mean late up on the connectivity through direct access to an ERSF located in segment l.
$F_{k,n-} :$	The mean late belongs with connection since a vehicle inside fragment k to an ERSF inside fragment k through various bouncing in towards the back. Suppose it is in $k > l$.
$F_{k,n+} :$	The mean late belongs with connection since a vehicle inside fragment k to an ERSF inside fragment k through various bouncing in towards the back. Suppose it is in $k < l$.
$L_{th} :$	A integer is representative an positive of capacity of hop count for various level hop segments.
ERSF R:	Consumption minimization cost for one ERSF.
ERSF T:	Total budget for ERSF installation.

The underlying advance of this research paper has been producing a vehicular portability design by utilizing VanetMobiSim simulation. This is a sensible vehicular Harri, J et al., (2014). development follow generator that be utilized for mimicking huge scope transmission traffic networks. In the simulator VanetMobiSim has various situations were produced by picking a road map with 10, 30, 40, 60 and 70 vehicles, separately. The highway comprises of different paths, upstairs road be to vehicular

development for right to left, and though on the lower street traffic is moving from left to right.

The high way like road surface is divided into five fragments; every segmental separation is group equivalent to the communication scope of an ERSF. Each car are roaming with speed between 65 to 125 kilometres by hour. Irregular Outing Originator is utilized for arbitrary age of vehicular models. Subsequent to creating portability design VanetMobiSim gives a yield record that can be utilized as a contribution for simulation NS2. Issue definition is talked about in detail in the following phase.

4. Problem Statement: In this phase, ERSF arrangement issue is planned as a Number Linear Conceptual design. The goal of this issue is to devise a base inertness cost effective ERSF arrangement plot, for example the model decides what number of ERSF s to convey and where to put them so the general system delays be limited at the base conceivable sending cost. Let take that every vehicle able get to the ERSF in 2 distinct manners on a road, for example straight interaction and multi bounce transferring. The accompanying choice factors are characterized to encourage Number Linear Conceptual model detailing:

This problem statement is elaborated as follows:

$$Min \left(\sum_{l=1}^k S_l F_l + \sum_{m=1}^{l-1} A_l^k F_l^{k m^{-1}} + \sum_{k=l+1}^k A_l^k F_l^{k m^{+1}} \right)$$

Where:

$$S_i \in \{0, 1\}, \epsilon \in \{1, 2, 3, \dots, Y\} \tag{I}$$

$$A_i^k = 0 \text{ if } |k-l| > ERSF_{th} \text{ else } A_i^k \in \{0, 1\} \tag{II}$$

$$\sum_{i=0}^k A_i^k \leq 1, k \in \{1, 2, 3, \dots, Y\} \tag{III}$$

$$S_i = 1, \text{ if } \prod_k (1 - Y_i^k) = 0, \epsilon \in \{1, 2, 3, \dots, Y\} \tag{IV}$$

$$\sum_{l=1}^k S_l ERSF_k \leq ERSF_{\tau} \tag{V}$$

The main goal is to limit the whole of deferrals coming about because of both direct associations and multi jump associations. The main term $(\sum_{k=1}^k S_k F_k)$ represents the general postponements because of direct associations as it were. The Equation II and III of the goal speak to the absolute postponements in reverse multi bounce associations and forward multi jump associations, individually. Prototype I demonstrates that at most one ERSF is able sent in a fragment. Prototype II authorizes the jump check limit (for example ERSF_{th}) refer to vehicle to vehicle correspondence.

That needs to guarantee palatable execution in multi bounce handing off associations. As indicated by Prototype III, every multi jump association can be served

by all things considered one ERSF at a given moment. Prototype IV demonstrates that there must be a ERSF sent in section 'k' if any were vehicles in some other fragment will be served by the ERSF in that portion. Nonetheless, that is doesn't confine the situation of ERSF in some other section for which the condition isn't valid. Prototype V determines the absolute spending plan for this ERSF organization.

5. Maximization Data Rate Achievement: The maximization data rate achievement is solved by Shannon Capacity Theorem for connection path, here data rate is (R) and bandwidth is (BW):

$$R = BW \log_2 (1 + SECR) \tag{VI}$$

Were, the SGR be Signal Error Clearance Ratio (SECR) for the receiver.

Here the ESRF have two situations to regard: strait connection data transfer and multi hop data transfer. The strait connection data transfer, one vehicle is in connection area circle of a ESRF, and consequently an immediate correspondence connection able be set up between vehicle and ESRF. Because of the Public Area Method with irrelevant background commotion, the sign force at the collector is following by

$$T_e = \frac{G_t}{H^2} \tag{VII}$$

Where G_t and H² are data transfer power and the data transfer power receiver, and the H is the strait connection length for both data transmitter and data transfer receiver. Suppose, In the event that there is a vehicle in the obstruction scope of the beneficiary, the quality of clamour signal at the recipient because of the single impedance source can be given as follows:

$$T'_e = \frac{G'_t}{H'^2} \tag{VIII}$$

Where r'_t and r'_e are the transmitter intensity of obstruction source and the impedance signal force at the collector separately, and H' is the most brief separation between the meddling vehicle and the recipient. In the event that there are V meddling vehicles inside the impedance scope of the collector, the all out obstruction experienced by the recipient is the joined impact of all the impedance data. Most pessimistic scenario, every one of these signs will join usefully at the beneficiary and the complete obstruction able it is shown as follows:

$$T'_{total} = \sum_{k=1}^V \frac{G'_t k}{H'^2 k} \tag{IX}$$

After that the SECR at the destination able to be refer by

$$SECR = \frac{G_r}{G_{total}} \tag{X}$$

$$SECR = \frac{G_t}{H^2} \times \sum_{k=1}^V \frac{G'_t k}{H'^2 k}$$

The maximization data rate achievement able to defined by the combination of equations XI and X:

$$\tau = X \log_2 \left(1 + \frac{G_t}{H^2} x \sum_{k=1}^V \frac{H_i'^2}{G_{t_i}'} \right) \quad (XI)$$

The fruitful correspondence connects, it was vital that SECR is more prominent than limit esteem (C). Let's see $\beta(y)$ will the likelihood closeness capacity of the vehicle area distribution and \emptyset be the obstruction scopes of the collector, at that point the likelihood of precisely one vehicle in the impedance go is shows by

$$G_{\emptyset} = \int_{\emptyset} \beta(y) dx \quad (XII)$$

After that mean integer of vehicles inside the \emptyset is shown by

$$D_{\emptyset} = DA_{\emptyset} \quad (XIII)$$

Where, D is the complete integer of vehicles the framework. Let $\emptyset y, u$ will the likelihood of a fruitful transmission [20] between the transmitter y and the beneficiary u, at that point $\emptyset y, u$ can be controlled by the accompanying scientific connection. For a multi jump hand-off, the exchange rate relies on fruitful foundation of the association. Along these lines, s relies on the likelihood of fruitful broadcast. The normal estimation of s can be controlled by joining equation XII.

6. Mean Value of Dissemination Delay: The mean value achievable late is easy to compute for example it can send any integer of SECRs to such an extent that every dynamic vehicle has an immediate connection with a SECR. Right now, joins are immediate and there is no multi bounce association, and along these lines the all out system spread deferral is the base. It is for V associations it very well may be given by the accompanying condition:

$$F_{min} = \sum_{j=1}^V T_i G_i \quad (IX)$$

Be that as it may, this hopeful situation isn't constantly conceivable. The normal engendering deferral of a multi bounce interface relies on the normal integer of transfers and the normal separation between nearby handing off vehicles or motors. Allows first taking the instance of a one hop connect. Right now, proliferation delay relies just on the normal separation between imparting vehicles in nearby portions. Between vehicles dividing on a highway able to be which demonstrated by an exponential dispersion with average proliferation separation between two vehicles equivalent to $1/\Psi$. In ERSF have expected the transmission scope of a vehicle (D) will equivalent to the fragment distance. From D is a lot littler than the sign engendering speed (S), subsequently the average separation between vehicles x and y in neighboring fragmentation can be overall assuming to fragmentation length $1/\Psi = D$. The engendering delay can be communicated via the following mathematical formation.

$$S = \frac{D}{S} x_{a,b}(\infty) \quad (X)$$

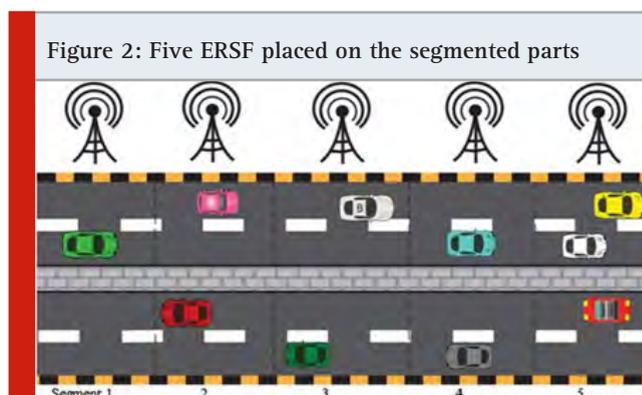
Where the $x_{(a,b)}$ is represented probability for achieved communication.

The intrigue is to decide the normal number of bounces in a transfer procedure. The Vehicles sequence moving Wang, X. (2014) a free homogenous state of process along with sequence f vehicle force { along the highway. The assuming number of bounces (A(b)) has given for circulation able to be explore by the accompanying with mathematical equations.

$$A(b) = \sum_{m=0}^{i-j-K} (1-i)^m [1+A(m)] \forall 0 \leq i \leq j \leq K-1 \text{ and } A(D) = 0 \quad (XI)$$

Where D is the communication range of concern vehicle and S is the length between vehicles and communication unit. Along these lines, the total proliferation delay for multi bounce connection can be found by consolidating mathematical equations X and XI.

7. Simulation Experiments: To validate the results of the proposed ERSF methodology through simulation process, here take the some highway map like one appeared in figure 1, where the highway comprises of different roads and the elements of path are 1500 meters of length by 200 meters of widths. The highway is segregated by five parts. The 200 meters length is segregated by equal meters for each part of ERSF. Different re-enactment situations were made along with vehicle conveyance of 10 to 60 vehicles are sequence moving along the interstate with the speed in the scope of 60–120 km for every hour on a read like highway. The cars are moving in two distinct ways: right to left and left to right. Has been utilized the simulation to create mobility design to represents the exact sharing on the road side surface.



The vehicle quantity does not consistently for sharing; along with populace congested is not good for equal distributions. The normal transmission late among vehicle and ERSF is taken via NS2 because of being the way that a vehicle able to create both roads and multi bounce associations. The communication scope of every ERSF and vehicle to be 350 meter along with

the obstruction run is 600 meters; it was yield about five parts. Every vehicle able to connect near ERSF of a related for with the closest ERSF for this either towards or backwards ways. The significant re-enactment metrics are appeared in the following table. Because of every one of the reproduction situation, here performed fifty runs with SECR, equal sharing and model plans, and the normal outcomes are accounted for here. For illustrate

Table1. Metrics of simulations

Parameter	Value
Road Side Area	1500 meters length, 200 meters width
Number of Cars	10, 20, 30, 40, 50, 60, 70
Speed	60-120 km/h
Count of SCER	1, 2, 3, 4, 5
Direction	Right to Left and Left to Right
SCER transmission scope	350 m
SCER interference scope	600 m
vehicle transmission scope	350 m
Vehicle interference scope	600 m
Type	Wireless channel
Network interface type	Wireless
Time for simulation	510 sec.

Figure 3: Two ERSF placed with reference of SECR and DSF

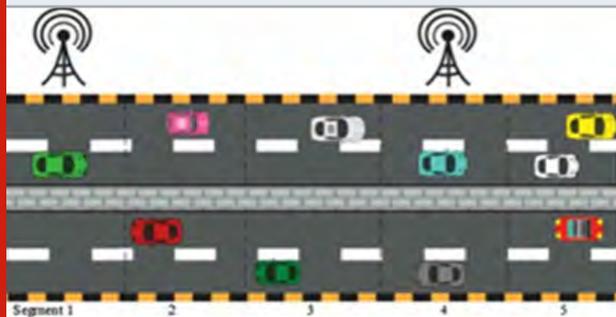
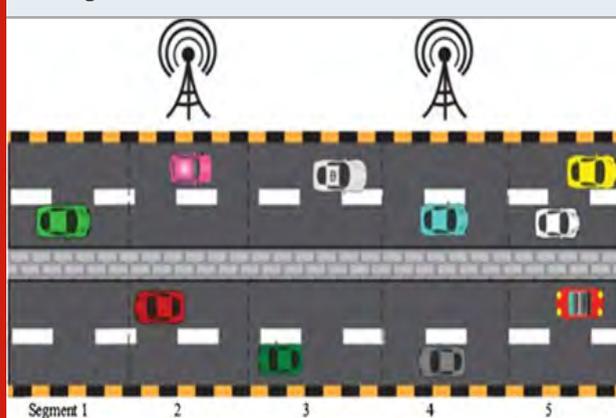


Figure 4: Two ERSF placed with reference of equal sharing.



RESULTS AND DISCUSSION

The proposed ERSF solutions are comparing with CES and UD, along with assess the mean value of network delay and validate the average delay for every installation methodology. Maximize network limitation is main objective of CSE. The budget minimization is controlled belongs to cumulative of RSU. In figures four and five are demonstrate for the results of DMP1 refers scheme with DMP and RSU, in the same manner DMP2 is refers with DMP and used two RSU. The figure six and seven also represented the similar figure four and five for the DMP 10 has been taken 10 vehicles measurement.

Figure 5: Different quantity of communication of delay of Average

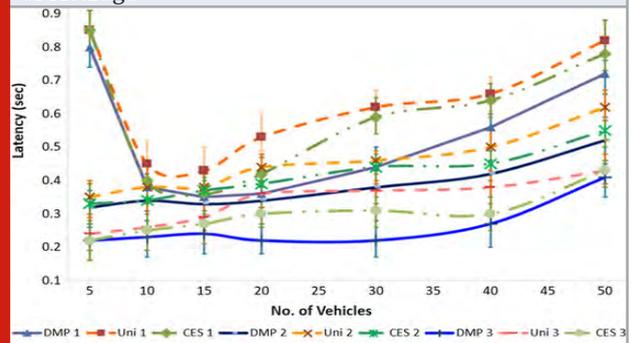


Figure 6: Various quantity communication of average throughput

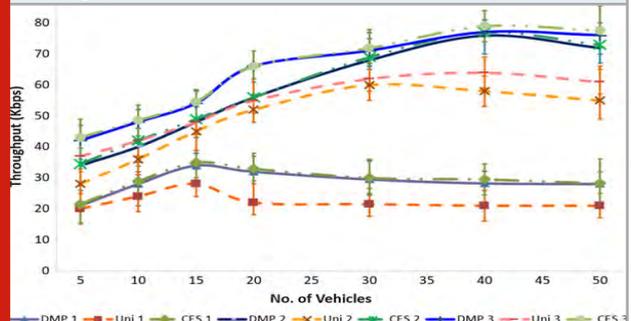


Figure 7: Various quantities ERSF of average delay

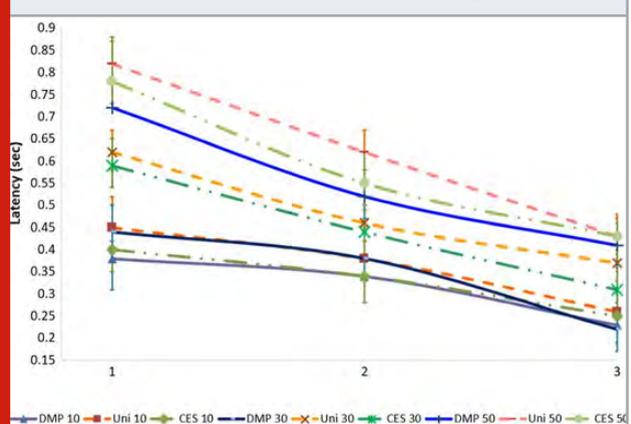
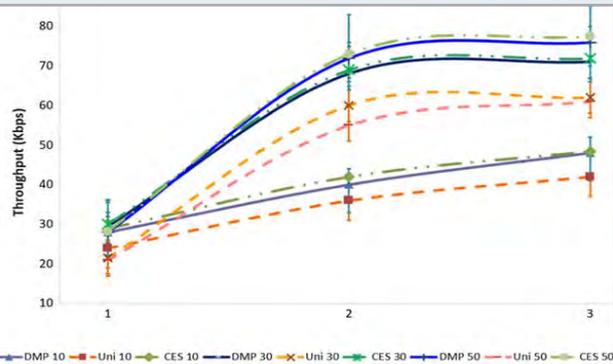


Figure 8: Various quantities ERSF of average throughput



The DMP was fitted in ERSF fragments neighbour surface of hue vehicle quantity. The figure 5 demonstrated about the ERSF has been taken average of delay and population of various traffics of CES. It was clearly shown the ERSF has produced efficient performance in the all kind of aspects using metrics. The throughput average metrics results are represented clearly in figure 6 plot. The proposed ERSF is yielding the 20 % of reduction average and 9% of uniform placement delay and CES also. The delay is the high latency because it should not take the mobility topology was gathering ERSF.

The ERSF has fragments where vehicles remain the maximum, during DMP will in general send proposed framework in portions with most elevated vehicle deluge. In this way, DMP gives connection chances to maximum vehicles per segment time along these lines it can accomplish the most minimal deferral for all aspects. The plot of the picture demonstrates the average of latency for methods of the number for the proposed method segment for situations of start with 5 and end with 70 for each step have increased 5 vehicles it has been represented by Figure 7.

The average latency is high for 1 ERSF along with 5 vehicles or car, for that 1 ERSF for the strait to connection and not many vehicles to set up multi bounce connections, every vehicle needs to hold up a significant measure of at the time it can set up an association and send its information packets are has been sent. The circumstance improves by expanding the quantity of proposed and the quantity of cars, these metrics increment the chance to set up either immediate or multi jump associations.

The relating average of the throughput is demonstrated by figure 8. True to form, the base throughput is acquired for the instance of 1 proposed and 5 car. The presentation improves extensively with an expanding number of ERSF. It is clear, DMP beats Uniform Circulation in everyone has 33% of improvement. In any case, the throughput gave by the existing is on normal 2% all the more for throughput gave by the DMP system. The average from Uniform dispersion doesn't take vehicle versatility designs while conveying proposed. In this manner, ERSF permits vehicles to communicate high information

because of a more prominent association lifetime along these lines, it can give efficient throughput.

CONCLUSION

In this research paper has been represented about case of ERSF exploitation methodology to the VANET taken for the highway or road side, which is every vehicle able to get access with ERSF in various paths: strait connection and multi jumping. The two RSU equal sharing models are has been compared namely Uniform Distribution (UD) and another one is Delay Minimization Problem (DMP). The NS2 experimental results are demonstrated efficient performance comparably existing systems. The DMP scheme recommends to the efficient ERSF sending system by carry in shows the complete minimized budget have an extent that the average delay of the system is limited. These able to exceptionally helpful in the opportune delivery of aware if there should be an occurrence of an episode, and furthermore gives upgrades in the total throughput of the system.

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Investigation on enabling Intelligence through Deep Learning and Computer Vision-based Internet of Things (IoT) systems in a Classroom Environment

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ABSTRACT

Some of the recent researches in Higher Education is making its way to figure out how things can be done more efficiently and smartly. They are making their foot-mark in adopting new technologies inside the college educational settings, while it's yet in the development stage. Some of the technological advancements have already been adopted and made compulsory for the proper functioning of the educational system. Besides, maintaining a stable functioning in the college community, to cope up with the increased demand for new technological adaptation in the Higher Educational society, technological terminologies and the recent trends such as the Internet of Things (IoT) and Artificial Intelligence (AI) is considered to reach the goal and seems to be the possible solution. Classroom Assets or knowledge on the historical patterns in the classroom data which prevails in a traditional classroom can be collected via an IoT system that uses sensors to generate a huge volume of data and that assets could be used to make decisions on the interpretations to satisfy our needs. According to a report, the total number of IoT devices worldwide will be approximately 75 billion worldwide. But then the transformation from the theoretical conceptualization to the implementation is yet in its budding stage. Deep Learning as a whole is a subset of AI and Machine Learning, which will help the educational sector to make better decisions at the right time. Deep Learning along with Computer Vision is another trend set to possibly apply AI in every use case specifically for monitoring and investigating and analytic systems. Hence, to fill the gap between the two ends, Higher Educational Classrooms and the Technological Growth, we have made an investigation to figure out the possible applications of IoT and Deep Learning in the Classroom environment. An amalgam of Computer Vision (CV), IoT, and Deep Learning in the Educational Classrooms can promisingly give rise to smart, intelligent classrooms thus improving the staff and the student experiences by positively uplifting the educational perceptions.

KEY WORDS: INTERNET OF THINGS, IOT APPLICATIONS, COMPUTER VISION, DEEP LEARNING, ARTIFICIAL INTELLIGENCE, HIGHER EDUCATION, EMBEDDED NEURAL NETWORKS.

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INTRODUCTION

Higher educational classrooms are nowadays adding various educational technologies in their educational space. Though the transformation is trending in all the educational community, they are not fully adopted based on the study of various works in developing a complete solution for their industry-ready implementation. The main reasons behind the incompleteness are due to challenges such as Cost, availability, support, reliability, Space etc. To fill the diverse gaps, there is a need and demand for better and efficient solutions. Thus, IoT acts as a mediator between the actual and the digital world scenario. Automation is everywhere in our daily lives starting from remote-controlled toys to robots or machine controls. The main essence lies in the part of mixing intelligence into those microprocessor or microcontroller systems.

So integrating AI in the IoT systems is another subset of trending jargon that is explored by many researchers. So integrating Deep Learning in an IoT system can be a smart and promising guide for future generations to work with. As said by Mark Weiser in article from (Gul.S.Asif et.al 2017), "The deepest technologies are the ones that fade away", i.e., computational processing will be invisible whereas the information processing will overwhelm surrounding us.

Research in the integration of IoT in Higher Educational Institutions for scenarios such as Administration, classrooms, teaching, and learning or other college departments are being explored. In this study, the Classroom setup or the scenario is taken into consideration for investigation of possibilities of enabling the intelligence in the classroom environment via the IoT platform. Classroom data that can be generated through sensors are then processed and analyzed to make decisions for better educational experiences in the long run for their benefits. Classroom plays an important role since it helps us to gather data on most of the scenarios described above such as Teaching/Learning, Classroom administration, etc. and also the student communities are gathered as a whole inside the classroom environment.

As a whole, IoT based systems in a classroom setup will make the daily activities held in a fast and efficient manner in terms of their priorities and schedules. The classroom data collection can not only provide automation or smartness but also efficient operation by frequent monitoring of the routine activities and finding patterns in the classroom generated data. The context of smartness can be defined as auto quick delivery but the intelligence can be termed as auto computed content delivery i.e., it will help the consumers by providing seriously demanded results using some computations. The supreme goal of IoT is to make things connected at any time, or in any place, with anything and also with anyone using any path or any services (Patel K.K. et. al 2016).

On the objective to integrate IoT based systems to behave intelligently based on the model or algorithms invested on the computing machines inside the classroom environment

Table 1. A glimpse of the trending sensors for the Classroom Environment

Sensors		Functionality
1.	Humidity sensor	To test air moisture
2.	PIR Sensor	To test the user availability
3.	Proximity sensor	To check the distance from reach
4.	Gas sensor	To check the measures of various gases
5.	ESP Smoke sensor	To check the level of smoke
6.	Sound/Noise level sensor	To check the noise level in the indoor environment
7.	Temperature sensor	To check the temperature of the room
8.	Camera sensor	To visualize the environment
9.	Button sensor	To activate anything on button press
10.	Humidity sensor	To test air moisture
11.	Air quality sensor	To check the quality of the air
12.	Light sensor	To switch on the light
13.	Ultrasonic sensor	Based on sonic waves to test motion detection
14.	Magnetic switch	To magnetically on or off when any magnet is nearby
15.	RFID reader	To capture information on the tags embedded in any object
16.	GPS indoor positioning	Works with indoor GPS repeater system to track any person or object indoors
17.	RTC	To track the current date and time
18.	Power controlled sockets	To remotely control the power turning it on or off when required
19.	Potentiometer/ Rotary switch	To control the resistance flow and output current
20.	Displays/ Capacity touchscreen	Used in interactive displays
21.	Fingerprint sensor	Authenticate the fingerprint of any person
22.	Heartbeat pulse	Worn in fingers or earlobes to detect heartbeats
23.	Relay switch	To switch on or off the electrical circuit flow
24.	Photoresis-tors	To react to light intensity values
25.	Dust detector	An optical air quality checking sensor for any dust particles

A glimpse of the trending sensors for the Classroom Environment:

In this study, various types of sensors and their variants have been explored to figure out which of the sensors will be best suitable to be adopted in a classroom set up in the Table[1] and Table [2]). Based on the above study, it is possible to use multiple sensors connected through the use of microcontrollers such as Arduino, Raspberry Pi, Galileo, Beaglebone, etc as in. This paper has been organized as follows: Section I. which gives a background study on various sensors that can be implemented inside the classroom environment. Section II. purely focuses on the Architecture of IoT and Deep Computer Vision Systems inside the Classroom in the figure below (Figure 1.).

Table 2. Some important sensors images for a Classroom Environment as from the article from Smartsiant team at Smartsiant.com



Section III. investigates the major area of interest considered for the literature study. Section IV. Opportunities and Challenged for integrating Deep Learning for Computer Vision Section V. describes the data collection, classification, and review analysis of the literary works Section VI. explores the analysis of existing literature works for Deep Learning with IoT and CV inside the Classroom environment. Sections VII. Limitations of this literary works. Section VIII. shows the discussions and findings from the papers surveyed, Section IX. finally gives the conclusion.

Major Area of Interest

Major Topics of Interest: The significant topics that are investigated in this study include

Computer Vision Technology: Our vision is capable of storing all the visual data as long as it is in an active state. Likewise, how a machine can perceive any visual data is termed under “Computer Vision”. Computer Vision, in short, CV captures and then it will store them, thus using those visual assets, we can derive meaningful insights to make interesting decisions. Generally, our surrounding environment includes various visual signals or signs (cues). In the context of Higher Education Classrooms, physical cues generated can be Administrative activities, Student Classroom Activities, Student Engagement, Teaching Activities, Academic Performance Activities, Monitoring and Maintenance Activities, etc. Computer Vision is a collection of interdisciplinary fields such as AI, WR/VR/Robotics, etc.

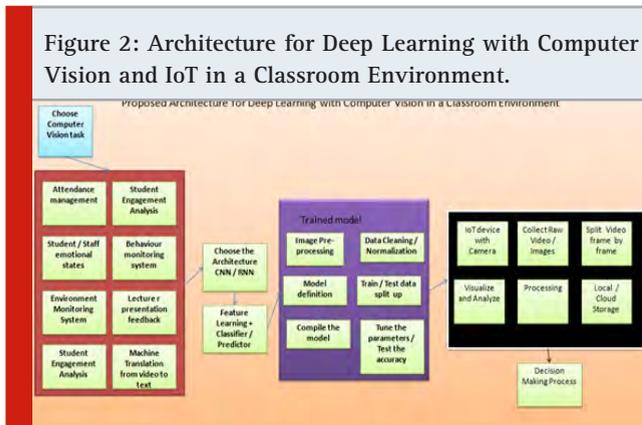
Table 3. Possibility of Multiple sensors to trigger Cameras inside the classroom

Sensors	Triggering events
PIR sensor	To find the occupancy data, if yes, start the camera module
Ultrasonic Sensor	Usually combined with PIR sensor, to detect distance using sonic waves and trigger the camera to on or off
Fingerprint sensor	For double authentication, along with face verification, to identify any person
Photoresistor	To react with light intensity values and adjust the camera on/off

Figure 1. Applications of IOT Technology and Computer Vision in Higher Education as from my previous article (Lakshaga et.al July,2019)



Architecture for Deep Learning With Computer Vision and IoT in a Classroom Environment: But, due to limited time constraints, this study focuses mainly on integration IoT and Computer Vision through Image recognition that enables intelligence in a Classroom environment via Deep Learning Approach.



IOT Technology: Kevin Aston for Britain coined “IoT-Internet of Things”, would have been aware of the transformation of the so-called IoT Era thus rise to the people of IoT Generations. According to Mark Weiser [Gul. S. et. al 2017], “The deepest technologies are the ones that fade away”, i.e., computational processing will be invisible whereas the information processing will overwhelm surrounding us. In this context, we focus on implementing IoT technology in HEI classrooms. The goal of IoT is to help things connect, communicate with anyone at any place from anywhere (Patel. K. K. et. al 2016). As said in (Nithin Shukla et. al 2018), Automatic machines can lessen the manpower workforce also providing perfection.

Recent developments for IoT based Vision systems were also surveyed. It is possible to integrate multiple or different sensors in the classroom connected through the IoT device making the classroom smarter and hence, the same smartness can be indulged by using those sensors triggering the connected cameras for an intelligent classroom implementation thus, making better actionable insights based on the interpretations. These potential technologies can be made ready through its implementation. In this study, Raspberry Pi and Arduino will be taken into consideration, where the sensors are connected to a microcontroller and then communicating those classroom sensor data to the internet to make decisions.

Deep Learning for Visual IOT: Enabling intelligence through Deep Learning in HEI classrooms can make a lead to automated intelligence where partial automation get transformed into intelligence system defining the below two propaganda:

Automation: To create methods/systems where manually operation dive into a machine-driven system. Automatic machines can reduce manpower work along with perfection (Nithin Shukla et. Al 2018).

Intelligence: Using an AI system for finding a solution where a problem requires human-level understanding. Successful implementation of an intelligence system relies on using any special software or hardware for task accomplishment automatically without any human intervention. Automation with intelligence will result in a more efficient, operational system that can make decisions based on the valuable insights gained by the system without human instructions. Thus IoT based Smart systems can evolve into intelligent decision-making systems.

Deep Learning for IoT - Challenges and Opportunities: Challenges of Deep Learning for IoT: As mentioned in (Ma. X. Yao et. al 2019), it is essential to address some important challenges that arise while implementing deep learning with IoT technologies

i.Data collection: Since the data is the fuel for the efficient functioning of the neural network, the data collection or the raw input has generated from the sensors. There is a need for a data collection module or paradigm for its practical application.

ii.Model Training: When we try to train a model on a specific task, and with increased no of hidden layers, the model becomes deeper resulting in a gradient vanishment problem, hence an alternative solution is to increase the number of data inputs and reduce the size of parameters and also dropout is yet another alternative solution.

iii.Hardware Limitation: Most of the embedded devices due to the memory footprint and power constraints tends to be a challenging task. Hence, an alternative is to lessen the model complexity and reducing the performance, with few learning tasks that can be performed at the end devices.

System Design: When dealing with embedded devices, more attention can be emphasized on a cloud-edge system where data be shared across the edge devices to reduce the latency caused by limited storage capacity, a robust cloud-edge learning system has to be implemented Opportunities or ways to integrate Deep Learning with Visual.

IoT: All the existing survey articles related to deep learning for IoT applications has shown its focus only on the limited number of fields, thus more number of fields are yet to be studied, hence to ensure that it is the right time to explore the existing research articles on applications of Deep Learning for IoT in Educational Sector using Embedded Neural networks. As mentioned by (Tang J. et. al 2017), the author has considered using two different ways to possibly make deep learning for IoT devices.

i.Offloading workload to the cloud: Most of the IoT devices prefer dumping most of the workloads in the cloud environment. But that is not a feasible solution since it demands a high-quality connection and not a better option for any real-time processing tasks.

ii.Migrating DL to IoT devices: There was an alternative to load the neural network model to the IoT devices but then it was not a viable solution because Tensorflow - an

open-source deep-learning library is finding it difficult due to its dependency on any third-party or proprietary libraries.

Table 4. Shows the relative summary on applications IoT based Pattern recognition solutions in a Classroom Environment as in my previous published article (Lakshaga et. al , July 2019)

Author	Year	Concept	Algorithm	Application
Romy Ferzli et. al	2011	Android-based educational tool (Mobi4Ed) is to study the Image/Image Processing algorithms with Google Nexus and Intel Xeon CPU and Windows Server 2008 R2 running OpenCV with Visual C++.	Haar face-detection algorithm	Image Recognition, Mobile Cloud Computing
Ajantha Devi et. al	2014	Camera-based assistive device	Marker-based image recognition	Image Processing,
Aryuanto Soetedjo et. al	2014	Detecting laser spot with OpenCV Library through the webcam on Raspberry Pi	Laser spot detection algorithm, the Color threshold	Image Processing
Geraldine et. al	2015	Real-time finger gesture recognition	Color markers OCR with image capturing techniques	Image Processing
Shyam Narayan Patel et al	2015	Remote-controlled wheelchair with eye movement for disabled persons based on image processing techniques and motion detection and object tracking on Open CV library installed on Raspberry Pi.	Haar Cascade Algorithm, Hough transform method, Gaussian Blur filter	Image Processing
Varsha E. Dahiphale et. al	2015	Real-time driver vigilance system with CV and automatic alarm systems	Haar Cascade classifiers, Frontal face detection system, Viola-Jones Face detection	Image Processing
Qifan Dong et. al	2015	Detect fall alarm and abnormal inactivity of the elderly people using CV and Image processing techniques and SMS alert or mail through TCP/IP protocol	Gaussian Mixture Model, TCP/IP	Image Processing
Hassna BENSAG et. al	2015	Embedded agent for Cardiac MRI images with Java Agent Development (JADE) platform for multi-agent system construction.	C-means method of Classification	Image Processing
Marko Viitanen et. al	2015	A multi-camera based remote surveillance system using raspivyuv. Image is compressed and broadcasted over the Internet with WebSocket	WebSocket, High-Efficiency Kvazaar HEVC encoder (HEVC), Better Portable Graphics (BPG)	Image Processing

		Protocol through node.js with the client receiving images in full-duplex communication without polling.		
P.V.Vinod Kumar et. al	2015	QR codes Pi with image processing techniques and UVC Camera driver and Open CV library on TFT_LCD display.	Halftone mask	Image Processing
Enis Bilgin et. al	2016	Road signs recognition system with Pi and capture images processing algorithms on Ubuntu MATE with GPIO pins interaction with the Camera module. k-NN.	k-Nearest Neighbor, OpenCV Contour and Edge detection, Optical Character Recognition, feature classification, and geometric space.	Image Processing
Jyoti Yadav et. al	2016	Wifi based photography using hand gestures with Open CV.	Color markers	Wearable technology Image Processing.
Shaik Riyaz Hussain et. al	2016	2D game using Python Tkinter, Accelerometer, and Hand Gesture controlled camera using SimpleCV library and image processing techniques, LM358 converts the analog value to digital, thus pi uses those values to control the game through the display.	Secure Shell (SSH) protocol	Image Processing
Dhanuja lakshmi et. al	2017	Fire pattern recognition with heat signature and alter message is send through MMS	RGB filter cieLAB filter	Image Processing, Pattern recognition.
Aditi.S. et.al	2018	Pi Book reader with an image to text and text to speech conversion with Open CV	Optical Character Recognition	Gesture Speech Recognition, Feature Extraction.
Kiran Kumar et. al	2018	Face recognition system with OpenCV for attendance recording using Java, MYSQL.	Principal Component Analysis, Haar Cascade Algorithm	Image Processing, Feature Extraction.
Lubasi Kakwete Musambo et. al	2018	Facial authentication using Object detection method, Open CV, and QR codes.	Frontal face biometric algorithm, Haar Classifier	Object detection, Image recognition.

iii. Building inference from scratch: The author in [25], has a two minded option to go with existing inference engines or building those inference engines from scratch, that depends on the complexity of the problem, if the model is less complicated, it can be built from scratch else an existing engine can be more efficient to be imported in the IoT Devices. It is more often a non-complex model that will be needed in embedded inference tasks so, it is finalized to build an inference engine from scratch, but then manually building from scratch may be a tedious job. hence, a perfect solution is to use a DL model compiler to optimize a model into an executable code

on an end platform utilizing vector quantization and model pruning, etc.

iv. Multitasking: Most of the current IoT devices are tend to perform single tasks since lack of minimum storage and processing power. But, in the future using efficient message-passing protocol gives an IoT device the capability to perform multiple tasks

Data Collection, Classification and Review Analysis

Data collection: This study explores the literary works on the objective of finding out the possible applications

of IoT and Computer Vision Technology with the Deep Learning technology that influences the higher education classrooms. Google Scholar, IEEE Xplore are the two major websites for the papers on journals and conference proceedings, etc. using some phrases such as “Deep Learning for Computer Vision in Higher Education”, IoT and Computer Vision for Higher Education. The papers considered include both the quantitative and qualitative data for its applications worldwide. For the sake of this study, the papers collected resulted in finding more number of papers related to possible applications of IoT and Computer Vision in Higher Education, but there are very limited papers related to the integration of Deep Learning with IoT based Computer Vision Systems in Higher Education. From the results, it is quite clear that since a considerable number of papers are available for each of the phrases mentioned above, it can be taken as classic research works in this area of study.

Data classification: This paper could act as a kick-starter for the researchers who are interested in implementing Deep Learning technology with an IoT based Computer Vision technology as a whole. There are many papers available in the above-mentioned fields. However, for this review work and also due to constrained time limit, only around 104 papers related to the above mentioned

technologies were explored which were collected from Google Scholar, IEEE Xplore, Academic papers, Journals, Conference proceedings, etc. Articles are classified on the criteria of quantitative and qualitative data. Quantitatively, all the articles were organized to find out the total number of articles per category based on their publication years, qualitatively, the key concept/ key terms from every article have been particularly provided in the paragraphs and table below

Review Analysis: From the tabulated content below, it is clear there is a huge set of applications that are residing in the educational sector to make an efficient educational transformation with the help from these trending new technologies. In the first tabular column emphasizing on the reference from [Table.4], we could find out that how there exist the applications of IoT technology to be useful in a Classroom setup with the combination of IoT and Computer Vision technology. In the next column, it is evident how this IoT based CV system combination is made more advanced and intelligent with the concept of DL technologies to create an intelligent classroom. Thus based on both the tables, it is said to be representative for a typical consideration of possibly using these concepts to enable intelligence in a classroom environment positively from references list [Table.5].

Table 5. Shows the relative summary of applications of DL based IoT solutions in a Classroom Environment

Author	Year	Concept	Criteria	DL Based Classroom Environment
Jian Han Lim	2017	Integrating IoT and machine learning techniques inside the classroom to monitor the student's behaviors and subsequently their performance in the class with 3 modules such as face recognition, motion analysis, and behavior understanding	Face recognition	Yes
Sujit Kumar Gupta et. al	2019	To detect students affective state using 4 different moods to analyze their classroom engagement score, teaching and learning rate, got an accuracy of 90% on classifying their moods	Max_Margin Face Detection technique	Yes
Bui Ngoc Anh et. al	2019	An automatic monitoring system that monitors and captures the students as well as teachers behavior inside the classroom and takes decision accordingly by collecting videos of 1800 frames from 6 videos containing 10-20 students	MTCNN, SMOTE, Gaze estimation, Position estimation	Yes

Yelin Kim et. al	2018	MOCHA (MOBILE Cloud Hybrid Architecture) Real-time deep learning-based emotion recognition system for improving the presenter's quality using their non-verbal gestures and face expressions and the body language	MLA, Audiovisual features, Restricted Boltzmann Machines	Yes
Yiqi Tew et.al	2017	Using IoT to sense to environmental conditional inside the classroom and also the student activities by integrating several microcontroller boards at every corner of the classroom to improve education quality	Raspberry pi v3 B+, Asus, Beagle board, Huawei, Odroid, Amazon Cloud Services,	Yes
Oscar Karnlaim et.al	2018	Method to collect image datasets from a classroom environment that can benefit any automatic student attendance management system based on 2 quantitative and 2 qualitative analysis on the classifier	Face detection, OpenCV, Haar-Cascade	Yes
Setia Budi et. al	2018	Create a mobile app for taking students' attendance to identify their faces automatically and make their attendance records.	IBATS	Yes
Tata Sutabri et. al	2019	Web-based student attendance management system integrated with MySQL and XAMPP using CNN for detecting faces and k_NN classifier to classify detected faces correctly	Dlib, CNN	Yes
Li-Shing-Huang et. al	2019	Smart Classroom Architecture by embedding IoT with AI like SCADA for Context-aware system and web application such as Flask and MariaDB and IP NAT gateway to address its diverse applications from lecture quality to user responses at Ming-Chang University using Raspberry Pi	SCADA, RFID, Gateway	Yes
Adrian Caruana Martin	2019	Overview of various educational technology integration in the education paradigm to address future research directions	CNN	Yes
Ashwin T.S et. al	2019	To detect student affective state inside the classroom and the e-learning environment on spontaneous and posed states using CNN to extract the features and got an accuracy of 83% and also 76% leading to		

		detection and then classification respectively	CNN	Yes
Robin Cosbey	2019	Automatic activity annotators inside the classroom for self-report generation by the instructors based on the recordings with single-voice, multiple-voice, no-voice, and others and find out how much is spent for each task	CNN	Yes
Pinaki Ranjan Sarkar	2018	To take student attendance by using face detection and face recognition techniques for the classroom data on state-of-the-art techniques and achieved 98.67% in LFW and 100% in classroom data	LFW	Yes
T.S Ashwin et. al	2019	Student engagement analysis of the students inside the classroom using CNN on unobtrusive student's non-verbal cues in a group of 350 students inside a classroom and got an accuracy of 71% and annotation based on Gold standard study than the analysis with Cohen Kappa.	CNN	Yes
Yiqi Tew et.al	2017	Using IoT to sense to environmental conditional inside the classroom and also the student activities by integrating several microcontroller boards at every corner of the classroom to improve education quality	Raspberry pi v3 B+, Asus, Beagle board, Huawei, Odroid, Amazon Cloud Services,	Yes
Oscar Karnlaim et.al	2018	Method to collect image datasets from a classroom environment that can benefit any automatic student attendance management system based on 2 quantitative and 2 qualitative analysis on the classifier	Face detection, OpenCV, Haar-Cascade	Yes
Alberto Pacheco et. al	2018	Osmotic computing architecture model for an IoT based smart classroom is used to test deep learning models for person detection by a comparative study with cloud, fog microserver, and mobile edge computing device against some limitations with real-time responses with IoT applications.	DNN inference model, Osmotic computing	Yes

Review Results

Quantitative Results: From the 34 articles selected on “Applications of deep learning for IoT based Classroom Environment”, Most of the papers were related to Face detection and Face recognition for its application on Attendance Management System. Other papers were related to other domains such as Emotion recognition, Osmotic computing, Student classroom engagement, and learning rate identification. In general, a keyword search on “Deep Learning for IoT applications in the classroom environment” gave the following results as in Figure.2). Out of all the articles, papers were from 2017 to 2020, with the highest paper works collected from the publication year 2019 were the most number of works on Deep Learning in Classroom Environment. There are very few papers related to IoT based Classroom setup on integration with Fog/Edge Computing, Robotics, Simulation Environments, Osmotic Computing, Sensor data analytics, etc.

Qualitative Results: The articles reviews are a diverse range of topics and categories which are related to IoT, Deep Learning, and Computer Vision in Classroom Environment. The keywords from the articles are as follows: Deep Learning, Convolution Neural Network(CNN), Artificial Neural Network (ANN), Face Detection, Face Recognition, Multitask Convolutional Neural Network (MTCNN), Edge Computing, Internet of Things, Osmotic Computing, Labelled Faces in the Wild (LFW), Extreme Machine Learning Classifier, Flask, MariaDB, k_NN Classifier, Google Alexa, OpenCV, SimpleCV, Gesture Recognition, Principal Component Analysis, Frontal Face classifier, Haar Classifier, Dlib, Optical Character Recognition, LAK(Learning Analytics and Knowledge), Educational Data Mining.

Limitations: Due to the unnatural time limit, merely 50 articles were considered for the review work. Articles available in Non-English languages are omitted from the study. Since, the exploration was made from IEEE, Google Scholar, Conferences, and Journals, few of the Academic databases were excluded from the study.

Discussion and Findings: By reviewing the results on the research of IoT and Computer Vision in a Classroom Environment can be visible from the past 9 years until the present. Influence of IoT in Classroom Environment is driving educational background into a smart and intelligent educational environment. As we have seen various works related to Visual IoT for its application in a classroom environment. Different literature works were collected and reviewed separately for applications of IoT in Classroom Environment and also its application-specific to Deep Learning for Computer Vision Technology.

From this study, it reveals that peculiar examples are available for this educational background, and considering these scenarios as an example, choosing a problem definition to build DL and IoT based systems have a promising scope of building new educational infrastructures. Thus, we can explore and build more

projects, products, and systems by integrating two or more scenarios to form a highly potential classroom system. It is just a start in deriving new invaluable sights through a deeper analysis of these scenarios. Thus, final proof-ready IoT based systems can help compose more efficient, operational, and intelligent classroom infrastructure using only less number of papers on Deep Learning for IoT based Classroom setup. Thus, it will enhance the performances of the classroom settings in the near future.

CONCLUSION

Due to new technological advancements that rapidly pose a demand at the era of Artificial Intelligence to possibly integrate them into all diverse fields, hence the Educational sector is not exceptional. To make it possible, IoT is the perfect solution to take a deep dive into integrating IoT with Deep Learning in the Classroom Environment. The major difference lies in how and what we use to efficiently build such a solution. To understand the surrounding world, we need to perceive what we see likely the same rule applies to machines that need to understand the environment visually. In this investigation, we have come across major 5-6 use cases that apply to a traditional classroom environment using Visual IoT. Articles were taken from the past 3 years. Since these papers were taken from research databases and academic journals it forms a good and valuable proof on the usage of Deep Learning with IoT and Computer Vision in a Classroom environment, resulting in a promising educational transformation.

In this review paper, further, we have discussed various applications of IoT and Computer Vision technology specifically on Pattern Recognition principles such as Face Recognition, Object detection, Gesture recognition, and Robotics, etc. They were mainly focusing on the behavioral analysis and activity recognition of the instructors as well as the students inside the classroom. Thus, it can be concluded that future classrooms will become an IoT connected environment for both the staff and the students working in an intelligent manner through the use of Deep Learning technologies.

We surprisingly came across few domains such as Educational Data Mining (EDM), Learning Analytics and Knowledge (LAK), Osmotic Computing, Fog, and EdgeComputing emphasizing enabling the intelligence in a Classroom environment with the amalgam of IoT and Deep Learning and Computer Vision Technology. This explorative study reveals that these state-of-the-art technologies can help the developers, researchers, and scientists work on new directions to enable intelligence in a Classroom Environment. These highlighted applications help in forming an intelligent classroom infrastructure as a starting guide for the researchers interested in intelligent IoT based CV system deployment. The future of IoT concept with Deep Learning seems to be more promising as more connected things will communicate with less human intervention transforming a paradigm

shift for the higher education environment which tends to survive.

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Covid-19: A IoT Drone Design for Prevent and Monitor Community Spread

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ABSTRACT

Coronavirus is the latest virus not detected in humans until which the coronavirus disease or COVID-19 is caused by it. The disease was first discovered in December 2019 in China, and by now has spread around the world. The virus will easily move from person to person allowing it rapidly spread. A few of the normal, readily recognizable symptoms of COVID-19 is fever. Since the virus epidemic, in public places thermal screening using infrared thermometers is used to test the body temperature to identify the indicated infection among crowd. This early detection is still obviously missing because it spends too much time checking each person's body temperature as well as the most important thing is that the infectious close contact could result in spreading it to the person doing the screening process or from the somebody in charge of showing to the persons being checked. This research paper goal is device design capable of automatically detecting the corona virus affected peoples from the thermal picture and face detection with fewer human encounters using smart IoT-based Drone with Mounted Thermal and Face Imaging Systems. The thermal imaging camera system is built into the drone and coupled with IoT technologies to monitor the scanning process in order to get the data in real time. Furthermore, this proposed device is Equipped with facial recognition technology, it can also view personal details from the pedestrian that can automatically take temperatures from the pedestrians. This proposed system has high healthcare system specifications and will hopefully help deter broader dissemination of corona virus.

KEY WORDS: COVID-19, IOT, FACE IDENTIFICATION, DIAGNOSTIC, PREDICTIVE, DRONE..

INTRODUCTION

While battling and transmittable viruses as a result of infections continue to be a difficult and long challenge, major efforts and significant advancements in healthcare. Unavoidable diseases pose a major risk to persons

responsible for one-fourth of all global health and losses [1, 2]. It's of corona viridian which may have neurological which breathing disorders [3]. Corona viruses (CoV) are huge positive isolated pathogens with RNA that cause significant respiratory and lung diseases in individuals and animals. Four special hominoid corona viruses (hCoV) protect citizens against the global role of the population in circulation. The Covid -19 encapsulated people with positive single-isolated large RNA infections, but also with widespread animal effects. However, the emergence of the novel corona virus (SARS-CoV-2) in China as it travels across the world is forcing the global health community to take up a new transferable disease (COVID-19) position [4].

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The common infection symptoms are including respiratory symptoms along with dry cough, fever, wheezing, and shortness of tests to breathing. The disease may cause pneumonia, extreme acute breathing distress, and impairment of renal failure in the more serious cases, which can go through. The standard guidelines are implemented for preventing an epidemic of infection: daily arm clean every nose and mouth through sneezing and coughing, frying meat and high immunity level food. Hold a safe expanse from close contact with someone with symptoms of lung illness such as coughing and sneezing.

Many people are becoming aware of the propagation of this pathogen because there are symptoms of Covid-19 colds and high temperature is quite similar to fever near fever [5]. Often these signs are mild, and gradually begin. That's why a lot of people use a temperature monitoring device to deter the transmission of corona virus; it monitors body temperature in certain places with millions of citizens. With this issue an infrared thermometer device is still commonly used to measure people's process temperature for the body. And, because of safety, using an infrared thermometer gun isn't really effective. It has to be done by, with many people in officer line [5]. The move could affect corona virus transmission from infectious illness to health care officers. This is why it needs an alternate platform. Instead, it is slowly important to easily and accurately classify corona viruses.

The healthcare IoT is a new concept disclosing facilities and patient evidence related to places that are very remote. For medicine the IoT technology is now in the precursor phase, which has a range of systems such as smart machines, mobile devices, big data, medical information network and etc. The IoT methodology is characterized; remote patient management, remote control and safety tracking are sensor-based tools for hand wash management and integrated RFID [6 - 8] methods.

This research aims at developing a device that has the potential to automatically identify corona viruses from a high temperature of humanoid encounters using IoT-based drone systems. In fact, the current concept has the ability to use Virtual Reality or VR so that the live video perusing procedure is controlled by the VR screen and facial recognition to use identify the infected and household quarantine individuals, which will be practical with reduce human contact. The rest of this paper consists of four phases: in phase 1 Proposed Design: includes an architectural and methodological definition. In phase 2 Findings and discussion: to show the experimental effects of the approach suggested. In phase 3 Conclusion: a brief debate on the outcomes.

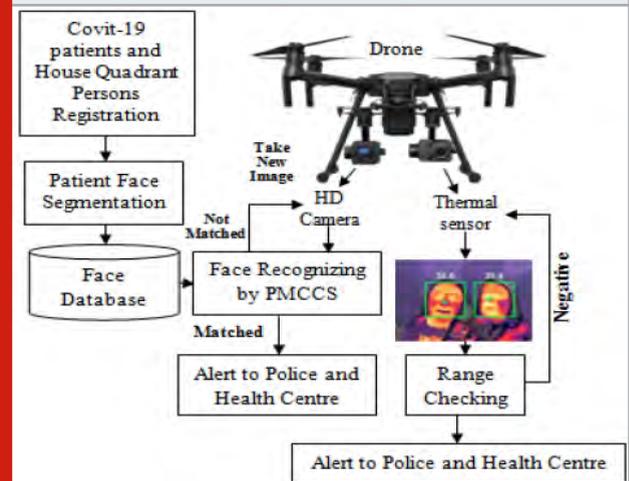
Related Work: Circumstances of pneumonia affected by the freshly recognized β -corona virus in Wuhan, China, occurred in December 2019. This corona virus was first recognized by the WHO as the 2019-novel Corona virus (2019-nCoV) on 12 January 2020. The disease has been

formally introduced by the WHO as Corona virus Disease 2019 (COVID-19) and the International Group of CSG to name the new corona virus SARS-CoV-2, all published on 2020, February , 11.

On 7 January 2020, Chinese scientists are swift to extract from a patient the genome of a SARS-CoV-2[9]. A total of 79,968 COVID-19 cases have been established as of 1 March 2020, including 2873 deaths [10] in main island China. Researchers have described that the specific reproductive sum (R0) [11] of SARS-CoV-2 is roughly 2.2 or more [12] (1.4 to 6.5) , and pneumonia population clusters[13] contribute to the outbreaks of COVID-1 in humans. The 19 crisis is slowly mounting. The global COVID-19 epidemic figures as of May 02, 2020 were 3181642 [14], with 224301 deaths in 215 countries, hijackings and territories. It is extremely worrying that no treatment or vaccine has been confirmed yet. The outbreak of COVID19 on March 11, 2020, was elevated [15], [16] and [17] by the World Health Organization (WHO) from an disease to an epidemic, as the nation is searching with permanent medical care to cope with increased fear.

The risk of infection from the mode is isolated from an infected individual through significant nasal drops until a strong vaccine is approved by WHO as being the healthiest way to reduce the feast of the virus following a rigorous day-to-day schedule of scientific examination under varying evaluation metrics. The fact explains it as a global concern monitoring the transmission of the virus. The innovative concept [18] has the potential to use Virtual Reality or VR so that VR can track the live video scanning process which is a device for practical and far less human contact.

Figure1: PMCCS Architecture



Methodology: The PMCCS design has a double cameras which are a High Definition Face Segmentation Camera for photographing people's faces and then another Thermal camera which is used to figure out the body temperature spectrum of the human and dual cameras are equipped with in a drone device. There are a total of five phases to the HDCFS contained. The beginning

phase is the identification of contaminated corona virus and isolated individuals facing images both mask and with no face mask. Furthermore, the identified faces with the address and phone numbers are stored in the facial segmentation database. The drone takes photographs that roam outside against the shutdown, and then the photographs taken are compared by the PMCCS system with identified people's faces and if faces fits, their images along with address and contact information are automatically directed to laws and health officers. The section has three phases for alert to police and health department, second thermal scanning with heat, and finally range screening. The first step scans all people whomever running outside continuously, and detects their body heat.

The stage second is monitoring each temperature of the body and the final stage is due to the fact that the body temperature is above range reminding police and health officials directly with their images with location and landmark.

3.1 Face Segmentation: The main goal of this process of HDCFS is to better track the impacted and suspected isolated populations of Covid- 19 that wander or have contact with others. It has 3 primary subsystems which are the registration of patients; The photograph was captured by drone and reveals person faces.

Algorithm1: HDCFS Registration

```
Reg ← Registration
Last ← Last document
Seg_Photo ← Segmented Image
Convert XML to Seg_Photo
Seg_Photo ← XML, Seg_Photo end while
```

The first component was managing corona virus-infected and isolated data about individuals such as patient name, age, photo, location and phone number, such details is saved in the database.

Before the read-only, the identification of each user and their process ID from that document, so the second section is the segmented face from a photo and which is translated into XML layout so that the faces can be easily recognized rather than matching eye-to-image identity.

Algorithm2: Face Identified system

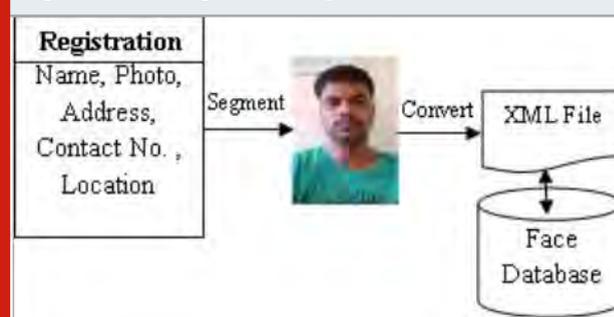
```
for i ← Seg_Photo do
  Change i to ph_jpg
  c_phto ← ph_jpg
  Dr_image ← from drone
  Match c_phto ← Dr_image
  if accepted
    Alert to health care and police
  else Not Accepted
  go to new image
end if end for
```

The second process is the method of identifying faces. The drone camera was automatically shot pictures that roam outside of humans. After the reading, all images get

from the database one by one and convert image format. Compared then faces to database. Assume the face is fit, automatically forwarded their name, address and telephone number to healthcare officers in the police.

3.2 Body Temperature Acquisition: The key goal of the TSBHI process is to classify the individuals infected by corona virus using a body heat metric with the assistance of a thermal scan tool. This procedure is completely diverse from the HDCFS procedure, since this course can classify unknown individuals infected by corona virus, while the HDCFS process will only classify the identified populations.

Figure 2: Face segmentation process



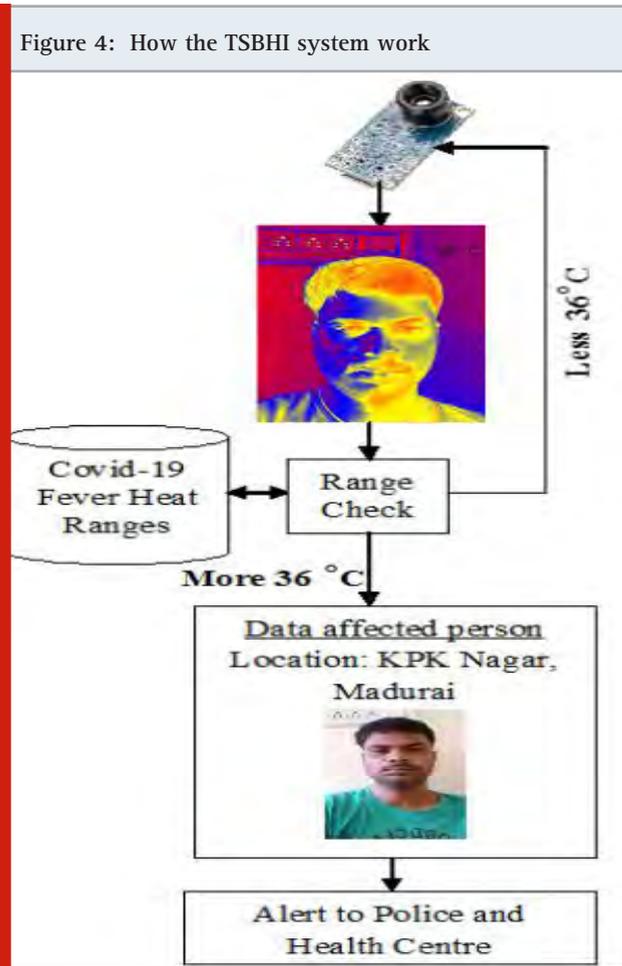
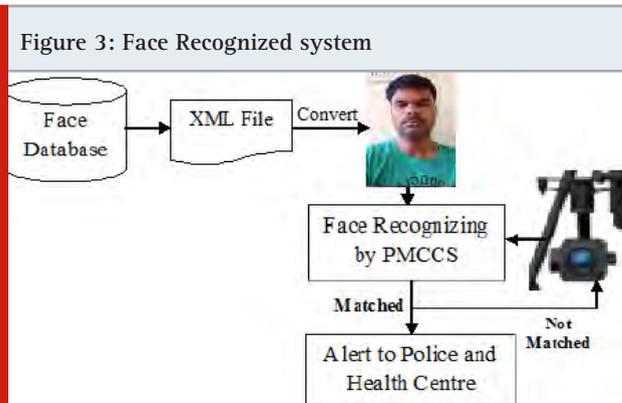
Algorithm3: Temperature Acquisition

1. temperature class1, class2 and class3
2. HTp ← Temperature data from drone
3. Temp_class ← HTp
4. if HTp ← class1
5. range ← "No Issue"
6. else if HTp ← class2
7. range ← "Medium"
8. else
9. range ← "High"
10. end if
11. if range is "High"
12. Alert to police and healthcare with location and photo
13. else
14. go to new image
15. end if

The GHO has explained to all countries regarding the COVID-19 symptom metric, whoever metric is a COVID-19 diagnostic heat test for fever. The heat metric of the body has three phases that are less than 38°C, is stage 1, the equivalent of 38°C is stage 2 and greater than 38°C is a condition that is as risky as possible. All three phases are preserved for further testing processes in an image library.

If all human quantities are contrasted with heat levels, assume body hotness in less than 38°C. Is considered "natural" state, and body heat is 38°C. As considered "ordinary" state, and body heat is greater than 38°C. As considered "positive" situation. The TSBHI system prepared the photo and location of that person along with

the landmarks to the police and health-care authorities. And use this information they can quickly recognize and instantly separate a person with the Covid-19 symptoms. Assume the temperature range of the body is less than 38°C, the thermal camera can begin to take new images.



EXPERIMENTAL

RESULTS AND DISCUSSIONS

The suggested technique is the basic concept to avoid and track the spread of the Covid-19 population in India using successful techniques such as HDCFS and

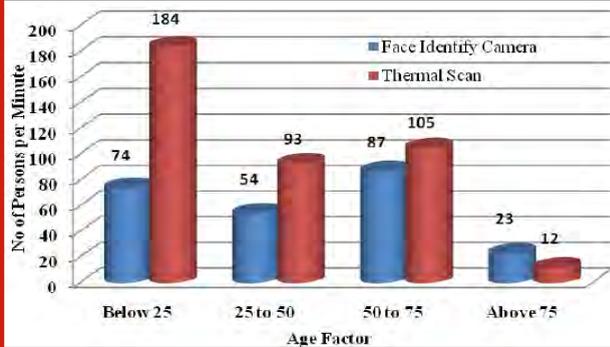
TSBHI. The drone was continuously flew 20 minutes at Madurai Simmakal site, capturing 632 individual faces taken concurrently from both cameras In one minute, and analyzing them very rapidly.

In the Table 1 and fig 5, display the sum of photographs taken each small using Face recognize camera and Camera of various age groups. According to the table reports face recognition camera has analyzed 74 photos one minute of 25 age group, 54 photos for the 25 to 50 age category, 87 photos for the 50 to 75 age category and 23 photos for people over 75. The thermal camera treated 184 photos from one minute for the under- 25 age category, 93 objects for the 25-50 age category, 105 photos for the 50-75 age category and 12 images for those over 75.

Table 1. Age wise Comparisons of cameras image analysis

Age Groups	Human Face recognition	Temperature findings
< 25	74	184
25 <= 50	54	93
50 <= 75	87	105
> 75	23	12
Total	238	394

Figure 5: Age wise Comparisons



From in this study, the thermal camera is rapidly processing images comparably facing a recognition camera since the FR camera requires several processing steps on each image, which is why it takes a long time because the ThR camera has little operation, which is why this camera cycle is done very quickly. We have been considering some sample identification and body warmth details for review purposes. The suggested drone concept has been given very successful results based on the analyzed evidence. The calculations of the effect are given in table2 below.

The table2 displays the effects of the face recognition analysis and the measurement of COVID-19 body temperature symptoms within one little span. The suggested HDCFS program found among the 238 pictures showing results in Figure 5, 60 faces matched of Covid-

19 impaired people who walk loosely in the streets. In the one-minute period the TSBHI test observed 61 positive cases between 394 people; this finding was shown in fig . 6. The findings and results above are listed, and best approaches to deter the dissemination of the COVID-19 population. The suggested PMCCS platform will analyze a limit of 632 cases per minute for IoT-based drone technology. And even identifying whomever having COVID-19 and symptomatic persons rapidly and reliably in people using Face identification and thermal body temperature examination method.

Table 2. Performance Measure of proposed System

Age Groups	Human Face recognition		Temperature findings	
	Match	Not Match	Positive	Negative
< 25	17	57	21	163
25 <= 50	12	42	10	83
50 <= 75	23	64	27	78
> 75	8	15	3	9

Figure 6: Comparison of face segmented matches

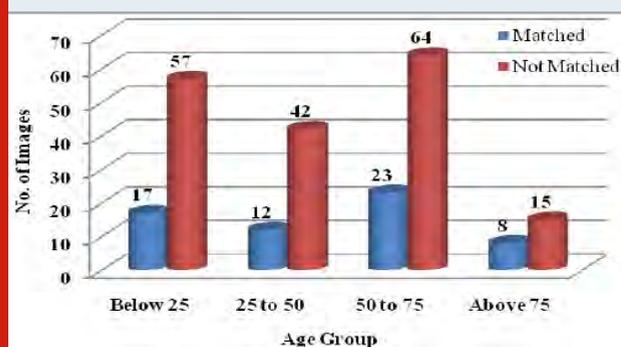
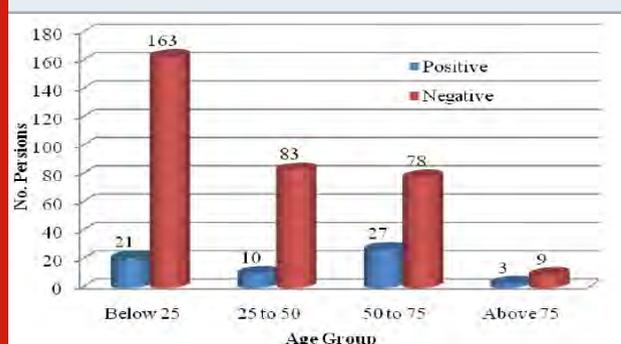


Figure 7: Positive and negative finding comparisons.



CONCLUSION

A COVID-19 protection and surveillance program was established using a new revolutionary PMCCS platform with double cameras for the drone. The proposed method can resist reorganization and measure the temperature of

the human body from the ground. Drone can direct data to PMCCS for formwork. The biggest new problem in the world today is the proliferation of COVID-19, which has given us a lot of publicity and recognition. The FRP system has recognized that coronavirus and isolated colonies are spreading outside. Early detection and identification of coronavirus symptoms is the safest way to spread coronavirus in the population. Since body hotness is one of the public symptoms, a TSBHI monitoring system that automatically measures the thermal image of a person's temperature is required. Therefore, it may take some time to try to avoid the screening process with facial recognition and diagnosis, and human interactions are less likely to spread the coronavirus. It can be concluded that COVID-19 detection, monitoring and tracking methods provide preventive and surveillance technology that is exceptional, confident and capable of meeting the needs of healthcare schemes.

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A mixed Approach of Deep Learning and Machine Learning Techniques for Improving Accuracy in Stock Analysis and Prediction

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ABSTRACT

Market prediction has been an area of interest to both investors and analysts for many years due to its unpredictable, dynamic and constantly changing existence, making accurate forecasts difficult to make. This research introduces an approach that uses machine learning to forecast stock market trends. One of the most critical activities of currency trade is world stock exchange. Securities exchange forecast is a proof of attempting to agree on the potential estimate of money-related traded device on a budgetary trade. This project clarifies the prediction of an inventory using machine learning. Many stock brokers make use of the advanced and big or time scheduling inquiry when creating stock expectations. This Proposed work uses the Linear Regression Machine Learning (ML) algorithm to drawn up from the knowledge and experience of the available stock and then utilizes the information collected to reliably forecast. Recurrent Neural Network, artificial intelligent is used to forecast stock expense for big and small capitalizations in various markets and to use the expense daily and intervals frequently updated. These methods are utilized to conjecture whether the cost of a stock later on will be higher than its cost on a given day, in light of recorded information while giving a top to bottom comprehension of the models being utilized. Thus, the mixed approach of deep learning and machine learning acquires better results with yahoo finance datasets when compared with existing algorithms.

KEY WORDS: MACHINE LEARNING, STOCK PREDICTION, DEEP LEARNING .

INTRODUCTION

Prediction in the marketing stock is the act of trying to work out the long-term values of a corporation trade in securities or other financial instruments on a bourse. Successful prediction of future price of a stock could

yield considerable benefit. The hypothesis of productive markets means that stock prices represent all current available knowledge and that any price changes that appear not to be supported are inherently unpredictable. Many people disagree with and have innumerable approaches and technologies that presumably will allow them to get information about future prices. Stock market prediction is the act of trying to determine the future movement of a company's stock on past the proposed approach towards prediction of stock market trends using machine learning model.

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Problem Statement: The existing techniques of predicting the stock prices are mostly based on the methods like Efficient market hypothesis, Intrinsic value, Fundamental analysis.

- These techniques predict the stock price of a company based on its value and past performance.
- These techniques won't be able to tell about the exact stock price of a company which will affect the profitability of the investors.

The methodologies of prediction fall into three broad categories that may overlap. They are as follows:

- Essential analysis,
- Technical analysis,
- Technological methods.

I. Essential Analysis: Key analysts are known to help the client over the stock. We also assess a company's past success based on its account's consistency. Certain value measures are created to assist the simple analyst in determining inventory quality, for example, P: E. Warren Buffet is perhaps the most well-known among critical analysts. What basic market analysis it undertakes to consider is to determine the real valuation of the stock, then related to consumer prices and to check whether or not the stock is undervalued on the consumer. A variety of approaches with similar values complete the checking of actuality. The aim is to make all the possible profits of a company earning jointly. Their actual value for these future profits even has to be reduced. This idea is consistent with the belief that a company has everything to do with income and zilch. Unlike tech analyses, basic analysis is believed to be more a long-term strategy.

Fundamental / Basic Analysis Fundamental analysis (Abarbanel et.al., 1997) may be due to the inventory for calculating the acceleration of asset prices. It uses a "financial analysis" technique to do the same. The data to be considered shall include, for analysis, the annual financial statements and corporate reports, records, health records of the corporation, future prospects, comparisons between industry, the market environment and changes in government policies etc. In order to develop its importance and play a role in the company's portfolio, Simple research analyses the financial statements. Financial statements indicate revenue, but revenue due to the balance sheets. This form of awareness allows investors to gain insight into the financial structure of the stock company.

The record shows the equity of the owner and the assets because of liabilities. Resources are assets held by the organization that will also achieve potential profits. It's still made up of buildings because the currency. Liabilities mainly include loans and therefore some other liabilities. liabilities Cash raised through the issuance of stocks to investors means owners' equity. Balance sheets show the investor how the business collects its revenue. Report of profits do the same job; it reveals the company's revenue and expenditures. This should be taken into account because of the expense of running a company.

Net revenues are calculated based on the income variation and thus on the costs; this is often mainly the company's income. The sales figures demonstrate how the firm uses its cash for profit and investment. The investor can use these facts and figures to decide whether they are feasible for a particular company to adopt a position on the securities market. Additionally, measures such as price / earnings ratio, price / book value, leverage, capital gain, current ratio and margin of net profit should be used for further theoretical analysis.

The P / E formula may be included in an organization's evaluation. The interest, according to the share price, is determined by the actual share price, earned by sales. The price / earnings ratio can be measured as the market share / earnings per share. It comes with other limitations as is the case when comparing the P / E ratios of different firms, something that is part of the method calculation. The price to book ratio of an enterprise when it is compared with its book price ratio. The P / B ratio is indicated by a division of its current closing price and book value by share.

$$P/B \text{ Ratio} = \frac{\text{Stock Price}}{\text{Total Assets} - \text{Intangible Assets and Liabilities}}$$

The debt ratio can be used to evaluate the leverage of a company. The debt equity ratio is the percentage of the total liabilities of a company and the equity of its owners. It shows the debt, the company uses the equity of the shareholder to fund its assets.

$$\text{Debt-Enquity Ratio} = \frac{\text{Total Liabilities}}{\text{Shareholders' Equity}}$$

The stock return tests the income of the company by giving the shareholder interest the amount of profit it generates.

$$\text{Return on Equity} = \frac{\text{Net Income}}{\text{Shareholders' Equity}}$$

The current ratio, also known as the liquidity ratio, is a measure of the company's ability to pay long-term and short-term debt. This capacity is calculated in relation to its liabilities in relation to the total assets of the company.

$$\text{Current Ratio} = \frac{\text{Current Assets}}{\text{Current Liabilities}}$$

The net profit margin is money that exists until the gross benefit is deducted from all debt, fees, tax and dividends.

$$\text{Net Profit Margin} = \frac{\text{Total Revenue} - \text{Total Expenses}}{\text{Total Revenue}}$$
 (or)
$$\text{Net Profit Margin} = \frac{\text{Net Profit}}{\text{Total Revenue}}$$

II. Technical Analysis: On the contrary, the technical analysis could be a research on stock prices in the bond in order to generate profit or investment decisions (YingziZhu et al., 2009). The analysis would also provide information. If extended to the stock market,

the theoretical research predicts the course of long-term equity prices assisted its historical evidence. A thorough analysis of the previous stock price movements will enable investors to predict the longer-term stock price movements. However, again, this forecast may not be 100 percent accurate, but a little as in the weather forecast; it gives investors an overview of what the stock's value is likely to be. The technical analysis includes a strong impact on the decision of the investor whether he can or can safely hold the stock. The product can be bought if it is small and can be traded at its height. The technical analysis uses the value charts, studies price patterns and uses certain formulas to introduce stock prices for a long term. Technical analytical indicators can be classified according to the way they present data as well as the type of market conditions that best suit them for analysis into different types.

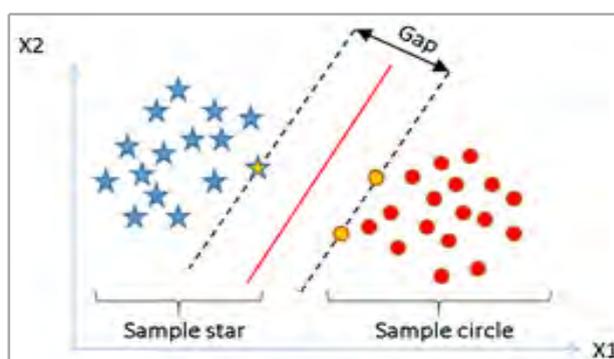
- **Trend indicators:** Trend indicators are, as the name implies, the most used to define and validate market patterns. They also help to recognize those points that signify the conclusion of a pattern or a new one.
- **Indicators of momentum:** These indicators are most helpful for the detection of certain trade changes which can meet trending and trend-free conditions on the market in which the bulk of time is spent. These may be broken further, based on a null or a neural nucleus. They are also called oscillators.
- **Volatility Indicators:** These indicators help measure price movement variations, limited to a period of time and also compared with price movements history.
- **Sentiment and strength indicators:** These indicators are used to give an idea of how a trader is responding to or thinking about a price activity together with price-based indicators.
- **Stock market indicators:** These indicators demonstrate readings particularly relevant to inventory trading and provide key insights into possible price shifts depending on traders' actions and opinions. 2.3.3 Sentiment Analysis People used to take advice earlier when the Internet was not present.

III. Technological Analysis: Financial exchange expectations are tested and speculators are muddled. Many researchers have detected future developments on the market. Web-based life details has a better impact in the financial trade today than any other time. Specific estimates of requirements for the output of a sample are dissected in this work. The expectations model is based on a month-to - month forecast and a day-to-day estimate of the costs of the next day. This model measures the market's open estimate the next day. Conclusion Research should separate and delete concepts of any person in a web-based existence. It is important to overcome the relation of the assumptions and the stock value. A relative study of the three calculations is completed: multiple linear regression, the vector support machine, and the artificial neural network. A notion test with the best measuring calculation anticipates the stock value.

MATERIAL AND METHODS

Existing Algorithm:

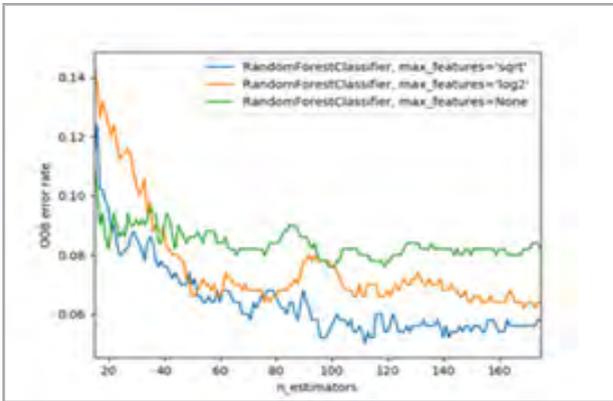
1. Support Vector Machine (SVM): SVM is a racist classifier, formally defined by hyper-isolating aircraft. The calculation, which at the end of the day is called preparation of information, produces an ideal hyper plane which arranges new models. In Bi-dimensional space, a hyper-plane consists of a line-up which separates a plane in two sections. SVMs are administered machine learning in artificial intelligence with related learning calculations which break up information used in grouping and reciprocal inquiries. With plenty of expected models, with each set as having one position for one of two classifications, an SVM calculation constructs a model which gives new instructions for the one or the other classification, rendering them simple classifiers combined without probabilistic effects. A model in SVM is a space-focused depiction, as mapped so that different classifications are separated by an unequivocal gap, as huge as predicted. Then the new models are drawn to the equivalent room, and it is expected that they will still have a position depending on either of the planes.



2. Random Forest Algorithm: Irregular woodlands or arbitrary choice backwoods are an outfit learning technique for structures, recurrences and various responsibilities which operate through building an enormous no. of choice trees at the duration of preparation and bringing out the class which is the class system or value intention of the trees themselves. Imperfection preference backwoods correct for the inclination of the trees to overfit to their range of preparation. The key of Arbitrary Computation choice of Tin Kam Ho's made of deep south using the abnormal form of subspace, which is a strategy for Ho's attempt to update the "stochastic separation" approach to deal with the structure suggested under Eugene Kleinberg. Leo Bierman and Adele Cutler created an extension of the calculation, who enrolled "Arbitrary Forests" as mark.

3. Maximum Entropy: Most applications for natural language processing become more effective when graded using an alternative strategy of maximal entropy. Nigam et al. have established that, although it is not always the case, Naïve Bayes is out-categorized in normal texts.

The estimation of P (c|d) form is



$$PME(c) = 1 Z(d)(i), cFi, c (d, c))$$

Here, Z(d) refers to the standardization function, Fi, c refers to the features / classroom role the feature(fi) and class(c), refined as, Fi, c (d, c) = {1, ni(d)>0 and c = c'0. Example, certain function by class might appear to Fire-Start if the bigram "still hate" and also the files hypothesized feel is found to be non-positive. An important observation is that the Maxent does not presume any relationship between the features, unlike the Naïve Bayes classifier, and therefore we may expect better results in the event that conditional hypotheses are not achieved.

The λi corresponds to the parameters of function weight. Upon accurate examination of Small and medium concepts, it shows a big γi, cmeant that fi is registered as predictor class c. To maximize the generated dissemination relativity, the parameter values are set in such a way, extent to constraint, that weres are calculated for the c/fi function in accordance with the model and match the expected value in relation to the training data.

I. Proposed Algorithm: A recurrent neural system (RNN) is a class of deep neural network where hubs structure a concerted diagram together with a transitory arrangement. This enables it to show special, transient activity. As with propping up neural future technologies, repetitive neural systems can use their primal transition to process data source bundling. For example, this makes them material for errands, unsegmented, related recognition of penmanship or acknowledgement of discourse. The word "intermittent neural network" is unpredictably used to refer to two different groups of systems with a similar general structure, one with a restricted incentive and the other with a broad push.

The two structures groups display distinct transient behavior. A constrained move intermittent program is a structured system non-cyclical diagram that you should unroll and replaced with one neural system that watch out feeds further, while never stopping repetitive, the incentive process is a cyclical correlate chart that cannot uncouple yourself. All restricted motorization and vast

intermittent drive processes can set aside an additional system, and they can be competent controlled directly through the neural technology. Another system or chart can also replace the capacity, if that joins delays in duration or has criticism seasons or circles. These controlled states are referred to as gated or gated memory, Recurrent neural network (RNN) and intermittent gated units.

Objectives of Proposed System

- To Improve accuracy in predicting about the exact stock price of a company which will affect the profitability of the investors.
- Determining the future value of a company's stock
- To estimate other stocks in similar emerging markets and mature markets.
- To analyze multivariate time series data and import raw dataset directly.

Profit can be maximized even when the corporate stock market has lower value. Stock analysis and prediction using Machine Learning techniques helps to estimate the future price of a company stock. Using the estimate made using the Stock prediction the investors can invest wisely and make good profit. Stock analysis and prediction tells the investors which company to look out for which has a high probability of making profit in the near future.

Figure 1: Data Flow Diagram

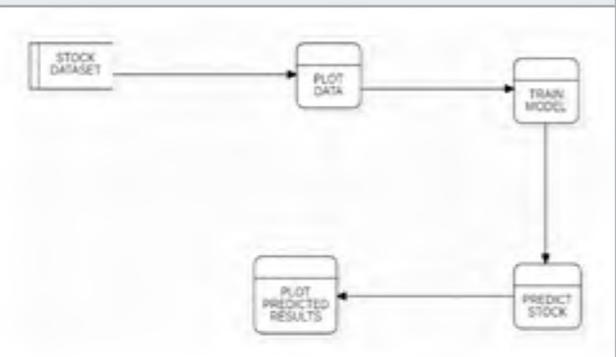
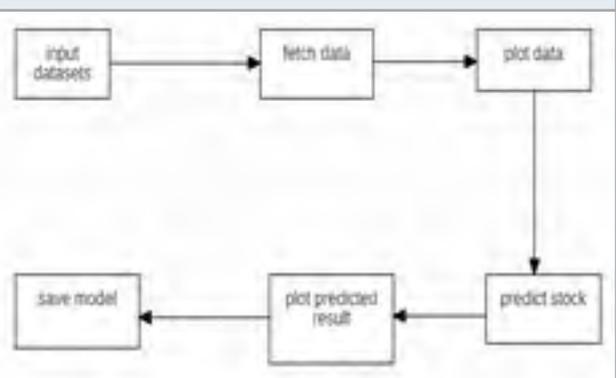


Figure 2: Flow graph of Proposed work



In fig 2: Flow graph of Proposed work, the input datasets are imported and features are fetched. Plotting data and Predicting stock are the next tasks. Finally predicting results and save the model.

The Proposed Methodology

The Proposed method includes,

(i) Preprocessing: The unstructured data are preprocessed into structured data. Preprocessing raw data will enhance the quality of data to promote the extraction of meaningful insights from the data.

Steps in Data Preprocessing in Machine Learning

1. Acquire the dataset: yahoo_finance is the datasets used for analysis.

2.Import all the crucial libraries

- NumPy is used for scientific computation,
- Matplotlib is used for plotting graphs,
- Pandas is used for loading and manipulating our datasets

3.Importing Datasets: Import dataset for Preprocessing

4. Identifying and handling the missing values: To handle missing values for normalizing the data.

5.Splitting the dataset: Splitting the dataset for training and testing data.

6.Feature Scaling: Feature scaling is a method used to normalize the range of independent variables or features of data.

(ii) Feature Extraction: The features like starting price and final price of a stock and the highest and lowest prices for a certain day exchange rate, industrial production, money supply and closing prices are being extracted from the processed data.

(iii) Stock analysis and Prediction: Machine Learning algorithm combined with deep learning technique is used in proposed system to analysis and predict stock. The work focuses on the use of linear Regression machine learning algorithm and RNN deep learning model to improve accuracy in prediction. Factors considered are open, close, low, high and volume.

(iv) Comparison with Existing algorithms: The Proposed algorithm is compared with existing algorithms like Support Vector Machine, Random Forest and Maximum Entropy. The Proposed System achieves better accuracy when compared to all existing algorithms. Datasets collected from yahoo finance is used for comparative analysis.

II. Experiment and Result: The datasets for this trial was gathered from Yahoo fund site. Python, PyCharm IDE, Microsoft Excel are utilized to play out the examination. An Intel i5 3.2GHz Personal Computer and 8 GB memory is fitted with the CPU for research.

- Yahoo finance datasets are used for implementation work.
- The Open column in the dataset is the starting price
- Close column in the dataset is the final price of a

stock on a particular trading day.

- The High and Low columns represent the highest and lowest prices for a certain day.

Figure 3: Yahoo finance Dataset

	A	B	C	D	E	F
1	Date	High	Low	Open	Close	Volume
2	06-29-2017	25	17.54	19	23.89	18766300
3	06-30-2017	30.42	23.3	25.79	23.83	17387100
4	07-01-2017	25.92	20.27	25	21.96	8218800
5	07-02-2017	23.1	18.71	23	19.2	5139800
6	07-03-2017	20	15.83	20	16.11	6866900
7	07-04-2017	16.63	14.98	16.4	15.8	6921700
8	07-05-2017	17.52	15.57	16.14	17.46	7711400
9	07-06-2017	17.9	16.55	17.58	17.4	4050600
10	07-07-2017	18.07	17	17.95	17.05	2202500
11	07-08-2017	18.64	16.9	17.39	18.14	2680100
12	07-09-2017	20.15	17.76	17.94	19.88	8195200
13	07-10-2017	21.5	19	19.94	19.89	3739800
14	07-11-2017	21.3	20.05	20.7	20.64	2621300
15	07-12-2017	22.25	20.92	21.37	21.91	2486500
16	07-13-2017	21.85	20.05	21.85	20.3	1825300
17	07-14-2017	20.9	19.5	20.66	20.22	1252500
18	07-15-2017	21.25	20.37	20.5	21	957800
19	07-16-2017	21.56	21.06	21.19	21.29	653600
20	07-17-2017	21.5	20.3	21.5	20.95	922200

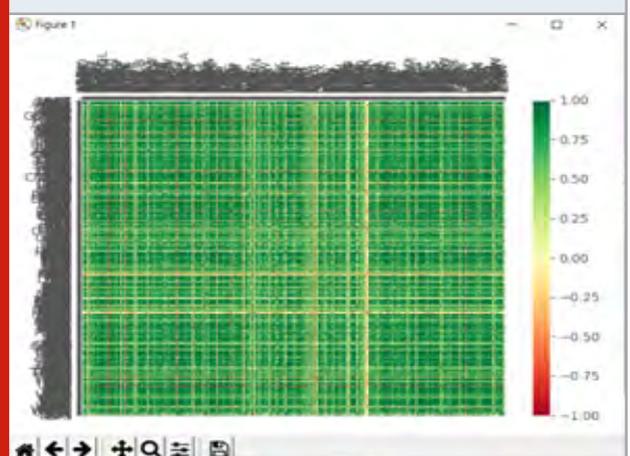
Figure 4: Results obtained by yahoo Finance datasets

```

C:\Stock-Analysis-and-Prediction-master\python_50k\on.py
      WPI      AET      ABBV      AHD      AIG      ...      IYK      YUM      ZBH      ZION      ZTS
WPI      1.00000      0.96040      0.92952      0.79706      0.97859      ...      0.933674      0.960306      0.896304      0.857182      0.891679
AET      0.96040      1.00000      0.92952      0.820329      0.97044      ...      0.956142      0.970533      0.836770      0.354212      0.955720
ABV      0.92952      0.92952      1.00000      0.88787      0.95990      ...      0.945623      0.933536      0.723734      0.897342      0.940009
AHD      0.79706      0.820329      0.88787      1.00000      0.863405      ...      0.905045      0.771525      0.670670      0.126700      0.908577
AIG      0.97859      0.97044      0.95990      0.863405      1.00000      ...      0.967066      0.970402      0.845171      0.300720      0.970790
[5 rows x 505 columns]

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Figure 4a

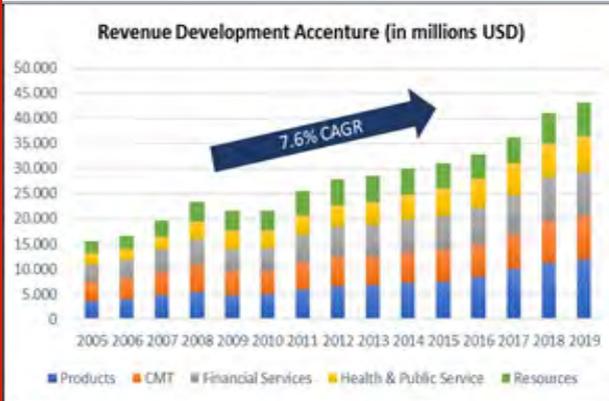


In fig 4. Results s obtained by yahoo Finance datasets are shown. when compared to existing algorithms, the proposed method achieves higher accuracies in the above datasets. Comparison graphs. The Comparison graphs based on the results obtained in the proposed work is explained as follows.

Figure 5a: Comparison graph for the results obtained by yahoo Finance datasets



Figure 5b: Comparison graph for the results obtained by yahoo Finance datasets



In fig.5(a) and fig.5(b), comparison graphs are depicted. comparison graphs year wise gives more information about the analysis of stock in a particular company.

CONCLUSION

This examination intends to anticipate the bearing of financial exchange inclines later on. This undertaking performs prescient investigation in the present patterns on the financial exchange. This is vital to the brokers thusly investigation can impact the basic leadership concerning purchasing or selling an instrument in a positive way. This task proposes a model which is utilized to give a dependable forecast of securities exchange patterns dependent on recorded information. Based on the outcomes acquired, unmistakably the model displayed striking execution in anticipating the course of the stock file.

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Portable Rtl-Sdr Based Frequency Analyzer

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ABSTRACT

The specialized super heterodyne Spectrum analyzers in general measure and display unevaluated data unprocessed signal information. It measures the desired range of signals, converting them to a much lower frequency of logarithmic level representation. This low cost portable potent test equipment analyse the frequency content of input signals up to 5 kHz. The device analyzes large measurements range, without knowing the phase relationships among the sinusoidal components. Frequency spectrum owns important information that spills over into adjacent channels and evaluating interference, distortion, harmonics, bandwidth and other spectral components, which are not easily detectable in time-domain waveforms .This test model RTL SDR- dongle based low cost Spectrum analyzer measures EMI, EMC and harmonics using a simple LED driver circuitry for all standard test equipment. It achieves desired electromagnetic compatibility. Various characteristic measurements including gain, frequency, bandwidth and amplitude of signals are measured and same is implemented using Matlab 2019 Version. Multiples of fundamental order Harmonic frequencies are deducted using an efficient filter.

KEY WORDS: SPECTRUM ANALYZER, HARMONICS, LED DRIVER, SOFTWARE DEFINED RADIO, EMI AND EMC.

INTRODUCTION

The E Probe and H Probe design is done to receive the signals from the RTL-SDR that is used to simulate the spectrum analysis as it is capable of only receiving. Then the Antenna design is done for transmitting and it is interfaced along with the PC. Harmonic distortion meter is an instrument that measures phase position or harmonic distortion or simply has been designed for measuring the quality of AC supply. Harmonic distortion is a common problem in data processing equipment, power systems

and adjustable speed drives. They are mainly used to determine when the original frequency transmitted is split into multiple frequencies in communication applications.

A common concern in LED lighting has been keeping THD (Total Harmonic Distortion) below 10%. Power sources act as non-linear loads and draw a distorted waveform that contains harmonics. These harmonics can cause interference within the working of other electronic systems. Therefore it's important to live the whole effect of such harmonics. Total Harmonic Distortion gives us the data(isolated) design supported on TPS92314 configured for seven LEDs in serial with 3.1 V forward voltage and 0.7 A rated current running from 150 – 265-V AC input. I followed below points to realize a THD of 8.7 % to try 240-V ac.

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The full compliance test in a certificated lab is expensive with costs ranging from \$1,000 to \$3,000 per day). Even if you have your own internal full compliance lab, the time to perform compliance test is significant. Failure of these tests can mean some level of costly and time consuming design if rework is required. It is best to do as much pre-compliance verification as practical to reduce the risk of a failure during compliance testing.

Related Work: (Lawrence Goeller et al., 2014) proposed a way to improve the ease and flexibility of communications within and between the services. Generally military forces used dozens of different radios most of which could only communicate with other radios of same type. This paper offers of not only interoperating with all existing radios, but also allowing those legacy radios to communicate with each other. (Vijendra Singh Tomar et al., 2015) proposed a low cost Software Defined Radio using Raspberry Pi for Disaster Affected Regions. This approach solves the problem of inter-operability by implementing a large part of radio functionality in software rather than hardware. By doing so, the hardware complexity is reduced and the system can be easily upgraded by software modifications and gets adapted to any frequencies conveniently.

(Byeong Geuk Kang et al., 2015) presented a common mode EMI reduction technique of a fly back converter using a wire shield. The capacitance model of the fly back transformer is used to determine the values of the wire shield turns and compensation capacitor minimizing the noise voltage. (D. N. Grujia et al., 2017) have revolutionised the wireless innovations using SDR. IOT is growing in terms of requirements and it hinders the start-ups and small companies to innovate and disturb the IOT market. This approach allows everyone to enter markets reserved for big players and they can be used in RF measurements as well. (Devarpita Sinha et al., 2015) presented a detailed analysis of the Software Defined Radio hardware and its operation mainly focusing on the analog front end and digital front end. It explains detailed study on the benefits of SDR.

(F.Almoualem et al.,2017) proposed resilient wireless communication architecture based on Moving Target Defence and Software Defined Radios. There is an important need to make the wireless communications secure and strong enough to attacks and faults. Due to open access they can be easily accessed by cyber criminals. This approach achieves its resilient operations by randomly changing its runtime characteristics to make it extremely difficult to succeed in launching attacks. (H.Mohamed et al.,2019) the detection of partial discharge using low cost RTL-SDR model for wideband spectrum. In this paper, RTL-SDR based spectrum analyzer has been proposed in order to provide potentially low cost solution for partial detection and monitoring. This scheme exhibit promising results for spectral detection.

(Jinto Jose et al., 2013) proposed the use of FFT algorithm for the implementation of the spectrum analyzer. The hardware components of a spectrum analyzer are

implemented using software tools. Software Defined Radios (SDR) is the cheapest software tool used for spectrum analysis and RTL Dongles are used for capturing signals here. (Madhuram Mishra et al.,2013) proposed the design of signal detection and monitoring system. The wireless Transmission monitoring system is implemented using GNU radio and RTL-SDR device. This system can also be extended as a signal receiver and is capable to monitor signals of GSM transmission.

(C. Song et al.,2016) proposed a new tightly coupled handheld resonant magnetic field (HH-RMF) charger operating at 20 kHz with low EMF and high efficiency. Using a guided magnetic flux in resonance structure, the EMF is reduced compared to the conventional inductive charger. In addition to the electromagnetic interference (EMI) reduction, the isolation inductor scheme is proposed as an EMI reduction method. (Prasanna Shete et al.,2013) proposed a new concept of analyzing the signal in frequency domain using an App based on Android OS. A java based application installed on android device accepts samples, performs FFT on them and display the signal in frequency domain. The performance of the proposed embedded system is measured against some standard spectrum analyzer parameters.

(E.G.Sierra et al.,2015) proposed the implementation and test of a Software Defined Radio based on the Raspberry Pi2 computer, the RTL-SDR dongle radio receiver, and the GNU Radio software. The installation and configuration of GNU radio and RTL-SDR drivers are based on Raspbian Operating System. This device can demodulate AM and FM signals and can meet the function of Spectrum Analyzer in moderate sensitivity demanding applications. (M B Sruthi et al , 2013)proposed an alternative to USRP using RTL-SDR which is only used for reception. For transmitting purpose, a mixer circuit can be used on the other end on Linux / Windows platform. Initially, the experiment is done in simulation. After that, it is tested with RTL-SDR. The cost for total transceiver system can be less than 10 times the existing one.

(Boonyarit Uengtrakul et al.,2014) proposed a way to minimize the cost of using software defined radio as an educational tool by combining an ordinary digital TV tuner with special software in classroom demonstrations and experiments.(R. W. Stewart et al.,2015) implemented an open source teaching and support materials for Software Defined Radios from DSP enabled radio systems.

Literature Survey

Proposed Work: The proposed system mainly deals with the design of Low cost EMI Analyzer using Software defined Radio. The RTL-SDR is used to simulate the Spectrum of the EMI analysis that is done. We also deal with complete power quality check up including power quality analysis and THD Measurement. While there are a number of affordable spectrum analyzers available to the product designer or EMC engineer, such as the Rigol DSA800-series or Siglent SSA3000X-series, we

discovered an extremely low cost analyzer useable for general-purpose EMI troubleshooting. A high quality software defined radio (SDR) can tune from 24 MHz to 1.8 GHz and is sensitive down to -130 dBm. If you need to

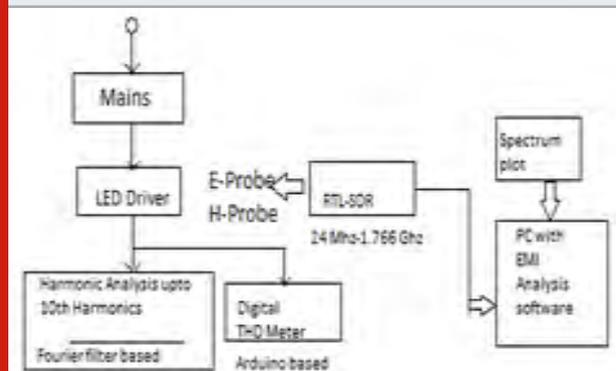
go down further in frequency, they have the companion Spyverter that tunes from DC to 60 MHz. Both units are controlled via USB and the processing is performed by a standard PC running Windows.

Table 1

Author	Implementation Details	Components And Controller	Technology Used	Decision Influencing Parameter	Analysis/ Remarks	Ref
Lawrence Goeller et al., (2014)	Providing allowance for all existing legacy radios to communicate with each other.	SDR kit, FPGA	DSP data compression technology	Power consumption	Difficulty in providing cutting-edge performance requirements of military systems.	[1]
Vijendra Singh Tomar et al., [2015]	Solving of inter-operability problems in Disaster Effectuated Regions using SDR with Raspberry Pi	Raspberry Pi, SDR kit	SDR technology	Low cost and power consumption	Should limit the usage of additional hardware components	[2]
Devarpita Sinha et al., [2016]	Provides a detailed analysis of SDR hardware focusing on analog and digital front end	SDR, RF hardware, FPGAs, DSPs	SDR technology	Longer lifetime and more flexible	The limitations in the traditional hardware structure should be resolved	[5]
Beong Geuk Kang et al., (2016)	Determines the values of wire shield turns and to minimize the noise voltage	Coupling capacitors, wire shield	-	Minimal noise voltage and increased efficiency	Compensation capacitor is very useful for reducing the noise only for low frequency range	[3]
D.N. Grujia et al., (2017)	Use of SDR platforms for wireless communications as well as RF measurements	Lime SDR, Spectrum analyzer	IoT based technology	Low cost	The quadratic relationship between the DAC value and average output breaks down if DAC parameter is above 0.5	[4]
F. Almoualem et al., (2017)	Implementation of moving target defence technique	MTD modules	Wireless network technology	High security	Shuffling rate should be close to zero.	[6]
H. Mohamed et al., (2019)	Provides low cost solution for the detection of partial discharge	Power transformers	-	Precise evaluation	Provides better accuracy for PD detection but its cost is expensive	[7]
Jinto Jose et al., (2013)	Use of FFT algorithm for implementation of the spectrum analyzer.	RTL-SDR, spectrum analyzer	Android technology with java application	Robustness, flexibility	The technology should be improved by adding programs to measure the signal characteristics	[8]

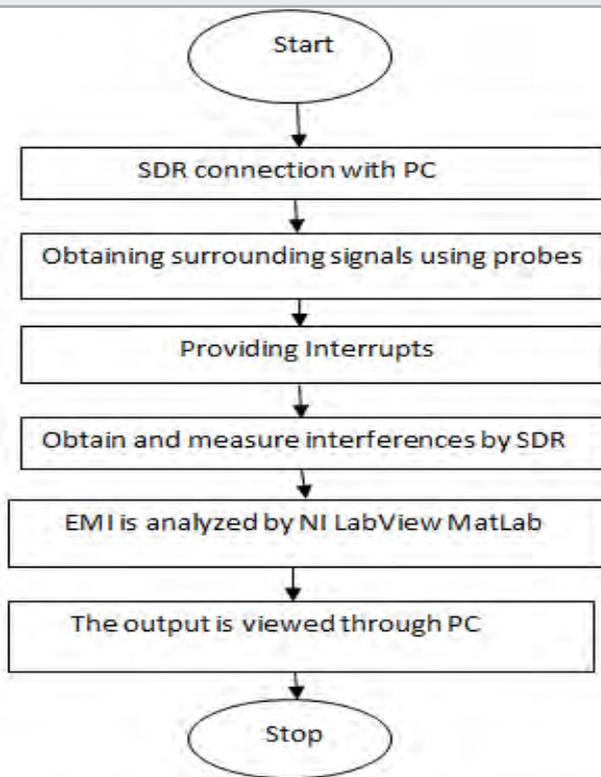
Madhram Mishra et al., (2017)	The wireless Transmission monitoring system is implemented using GNU radio and RTL-SDR device.	SDR, GNU radio	Radio technology	Low cost	Various GNU radio blocks should be added to provide extra options [9]
C. Song et al., (2016)	Usage of a guided magnetic flux in resonance structure to reduce the EMF compared to the conventional inductive charger.	HH-RMF charger	WPT technology	Efficiency: Coil-coil:98% Power:84%	Should further optimize and minimize the structure [10]
Prasanna Shete et al., (2013)	Implementation of an app, based on Android OS and java based application.	Android device, microcontroller, bluetooth	Android technology	Reduced error: 0.594%	The electronic device might misbehave and it should be controlled [11]
E. G. Sierra et al., (2015)	Implementation and test of a SDR based on the Raspberry Pi2 computer and GNU radio configuration based on Raspbian Operating System.	RTL-SDR dongle, spectrum analyzer, Raspberry pi board computer	-	Moderate sensitivity	Re-configurable Process should be done [12]
Sruthi. M. B et al., (2013)	Providing alternative to USRP using RTL-SDR and Linux / Windows platform.	SDR, mixer, USRP	SDR technology	Cost less than 10 USD	The cost of USRP is high and cannot be afforded by student community [13]
Boonyarit Uengtrakul et al., (2014)	Combination of an ordinary digital TV tuner with a special software framework written in Python into affordable SDR experimental kit.	RTL-SDR USB device, PC with simulink software	RTL-SDR technology	Accessibility	Should improve the integration in real world oriented activities [14]
R. W. Stewart et al., (2015)	Implementation of an open source teaching and support materials for SDR from DSP enabled radio systems.	SDR kit, frequency detector	Digital Signal Processing	Sufficient frequency range	Should have a precise control over ADC rates [15]

Figure 4.1: Block diagram of the proposed work



These signals are been sent to the RTL-SDR component for analyzing the EMI. The RTL-SDR is used to simulate the Spectrum of the EMI Analysis. The block diagram of the proposed system is shown in Fig 4.1. The SDR is been connected to the personal computer. Then the E Probe and H Probe design is done to receive the signals from the RTL-SDR as it is capable of only receiving. Then the Antenna design is done for transmitting and it is interfaced along with the PC. The signals are been obtained from the surroundings using the E and H probes that is done. The analyzed EMI is viewed using software applications such as either NI LabView or MatLab2018b. The final output is been obtained in the personal computer.

Table 1. Frequency Band with bandwidth



Algorithm for Proposed System:

Step 1: The SDR device is been connected to the Personal Computer for simulation.

Step 2: The surrounding signals are received using E and H probes.

Step 3: An interrupt is provided using a car key.

Step 4: The distortion that occurs in the spectrum is measured using SDR.

Step 5: The Electromagnetic Interferences are analyzed using NI LabView or MatLab 2018b.

Step 6: The output analyzed is viewed through the PC. This could also be used for:

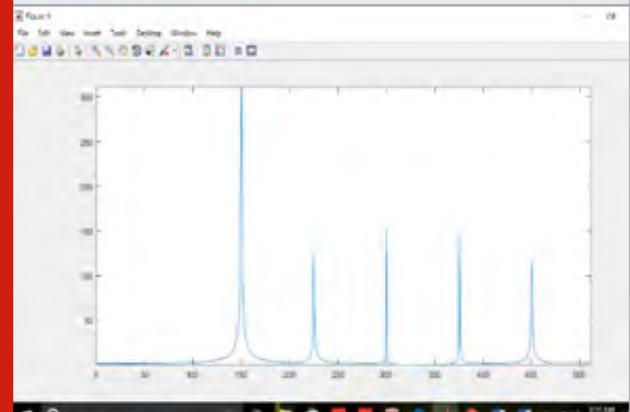
- Listening to unencrypted Ambulance/EMS/Police/Fire conversations.
- Listening to conversations of aircraft traffic control.
- The radar with ADS-B decoding used for tracking aircraft positions.
- Decoding aircraft ACARS short messages.

RESULTS AND DISCUSSION

The different strategies and results are compared by tabulating with the implementation details, advantages

and disadvantages of each research work as shown in the above literature survey table.

Figure 2.1: THD Analysis using MATLAB



The fig 2.1 is the THD analysis of power and frequency(Hz) where x axis denotes frequency and y axis denotes power(w) The power analysis was also done using LED driver for few consecutive stages. The results that we obtained are as follows:

Figure 2.2:First stage Harmonic Analysis for LED Driver

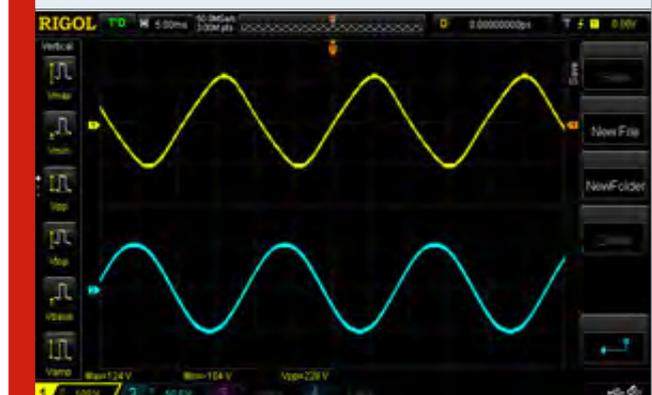


Figure 2.3: Second stage Harmonic Analysis for LED Driver

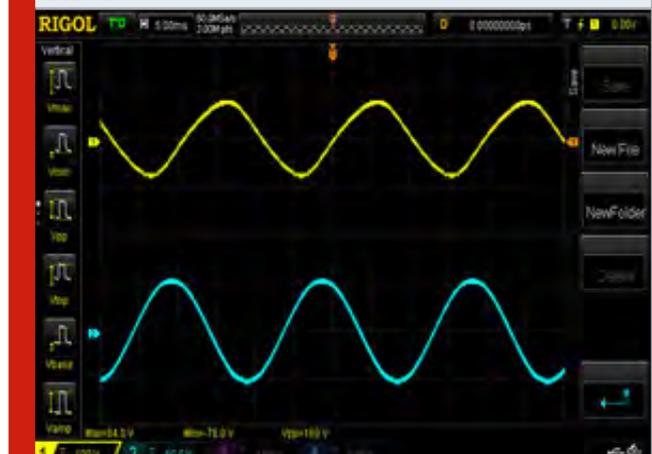


Figure 2.4: Third stage Harmonic Analysis for LED Driver

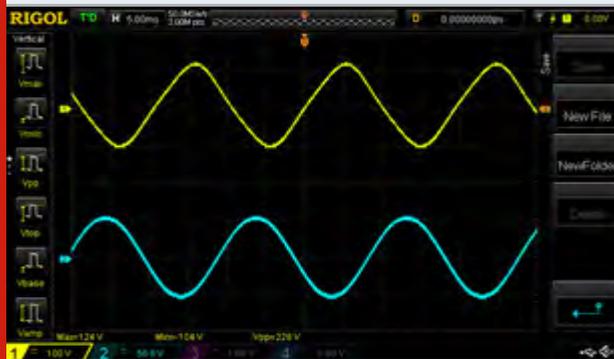


Figure 2.8: Seventh stage Harmonic analysis of LED Drive

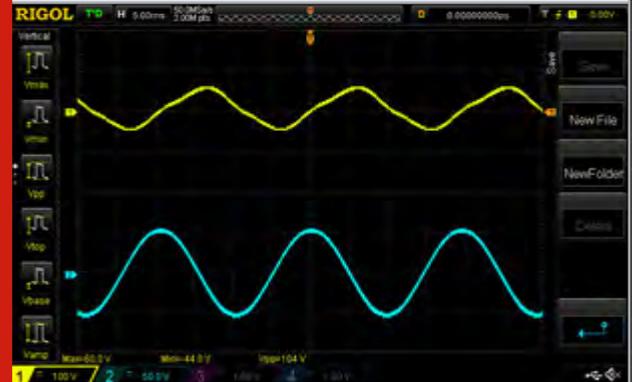


Figure 2.5: Fourth stage Harmonic analysis of LED Drive

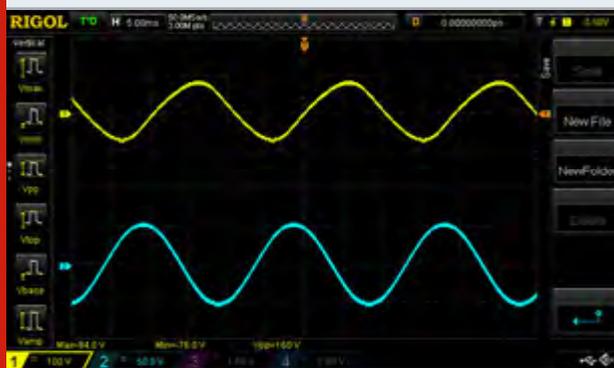


Figure 2.9: Eighth stage Harmonic analysis of LED Drive



Figure 2.6: Fifth stage Harmonic analysis of LED Drive

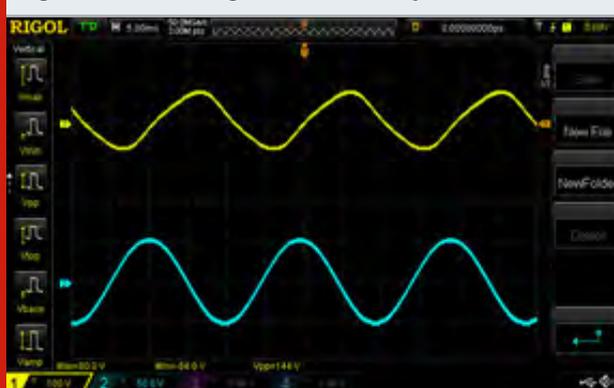
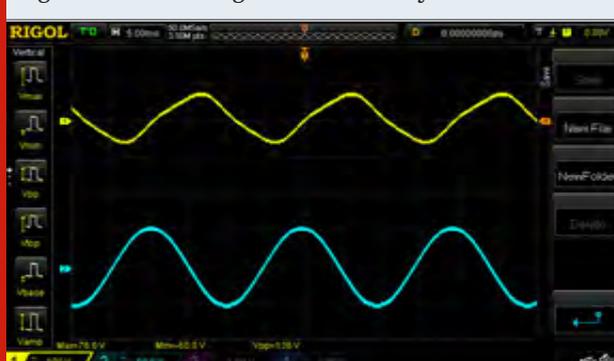


Figure 2.10: Ninth stage Harmonic analysis of LED Drive



Figure 2.7: Sixth stage Harmonic analysis of LED Drive



$r = \text{thd}(x)$ returns the total harmonic distortion (THD) in dBc of the real-valued sinusoidal signal x . The total harmonic distortion is determined from the fundamental frequency and the first ten harmonics using a modified periodogram of same length as the input signal and by using the band-pass filter can limit harmonics. Poor quality of power causes not only ends up in downtime (which, in turn, lowers productivity) and a considerable increase in energy costs but finally also causes physical damage to the equipment.

Power monitoring is a significant process in identifying potential power and current quality issues and addressing them before they get out of hand. Power quality, demand and flow are some reliable information that a good power

monitoring equipment can provide. In our project, we have got done the power facility analysis together with THD analysis.

Advantages

- Highly Accurate.
- Low Cost.
- Faster Analysis.

Applications

- Telecommunications.
- LED luminaries

Figure 2.11: THD and Power Quality Analysis Chart

Peak to Peak Voltage (Volts)	Frequency (Hz)	Order	THD (%)
228 V	50	1	25%
160 V	100	2	25%
148 V	150	3	25%
136 V	200	4	25%
128 V	250	5	25%
112 V	300	6	25%
92 V	350	7	24%
76 V	400	8	24%
40 V	450	9	24%
28 V	500	10	24%

CONCLUSION

Thus we have designed an SDR Based Low Cost EMI Analyzer to investigate EMC compliances for all equipment in the industry. We are able to deduct the severity of harmonics entering LED Drives using spectral harmonic filters and THD meter precisely. At real work place of the equipment, a solution is provided by measuring complex harmonic waves entering equipment and EMI Presence in the ambient surroundings and travelling in lines, and solutions to that harmonic content level is given for each case. On measuring the level of EMI and harmonics presence very accurately, solutions are provided for each case based on the power, environment and many other factors.

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Smart Bus System

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ABSTRACT

This paper is about an electronic device that is located in the moving public vehicle which provides real time data, a cloud server that absorbs this data, application software installed at bus depot and a mobile application for passengers travelling in buses. The devices gather substantial amount of information like number of passengers travelling, bus location and being connected to internet the collected information is synched up with cloud server to convert it into some useful data. Passengers in turn can check the status of bus on mobile app by entering bus number. Passengers can also pay the amount from their RFID cardbalance. The current work, realizes the full potential of IoT, also discourses its several challenges and advances the conceptual solutions to tackle them.

KEY WORDS: IOT, NODE MCU, MQTT PROTOCOL, RFID MODULE AND SMART BUS.

INTRODUCTION

A vehicle tracking is a prerequisite of the most basic function in all fleet management systems. A fleet management is the management of a company's transportation fleet. The fleet management system aims at improving the quality and efficiency of the industry by identifying major obstructions on the road and tracking real-time locations of their fleet on a map. Most of the vehicles tracking systems are designed by using GPS/GSM technology. In vehicle tracking systems, a vehicle location is one of the most important components. The location and time information anywhere on earth is provided by using GPS technology. Most of such tracking systems consist of an electronic device as usually installed

in-vehicle and can be used for tracking motor cycles, buses, and trains.

In this paper we propose a prototype of a smart bus system which would detect the exact location of the bus, find availability of seats inside the bus and detect the ticket amount from the user's RFID card automatically.

The objectives of this project are:

1. To build a Smart Bus system using IoT
2. To find exact location of the bus.
3. To find the seat availability

To detect the ticket amount from user's RFID card automatically.

Related Work: (TareqBinjammaz et al., 2013) has designed GPS monitoring for intelligent transport system (Fig 2.1). A Receiver Autonomous Integrity Monitoring (RAIM) algorithm is used to measure the quality of GPS positioning output.

The work proposed (Marcus Handte et al., 2016) an IoT enabled connected navigation system for urban bus rider. UBN(Urban Bus Navigator) provides two novel information services for bus users: 1) micro-navigation

ARTICLE INFORMATION

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and 2) crowd-aware route recommendation. Micro-navigation refers to fine-grained contextual guidance of passengers along a bus journey by recognizing boarded bus vehicles and tracking the passenger's journey progress. Crowd-aware route recommendation collects and predicts crowd levels on bus journeys to suggest better and less crowded routes to bus riders.

Figure 1.1: Block Diagram of proposed work

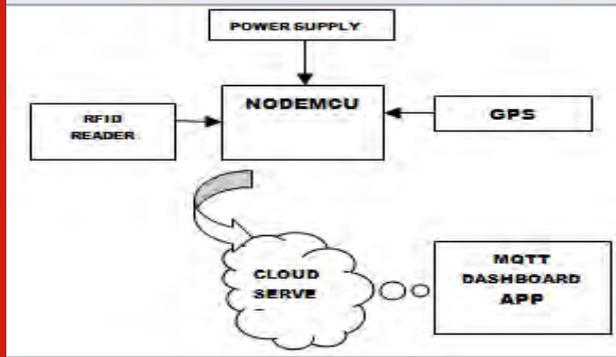


Fig 1.2 Flowchart of proposed work

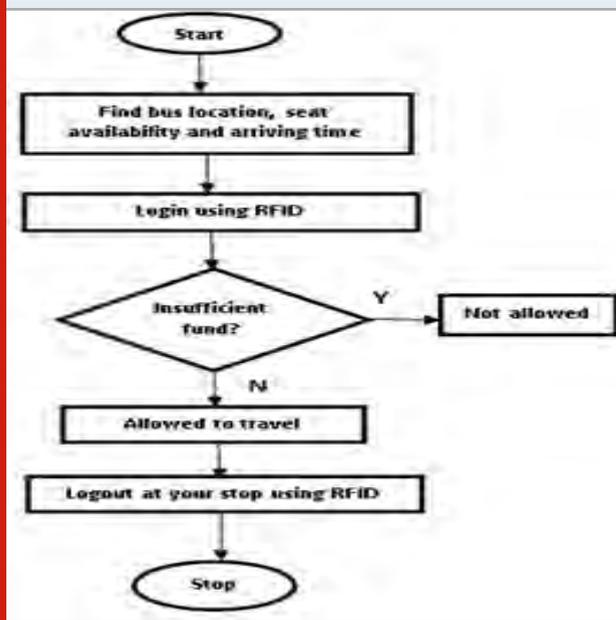
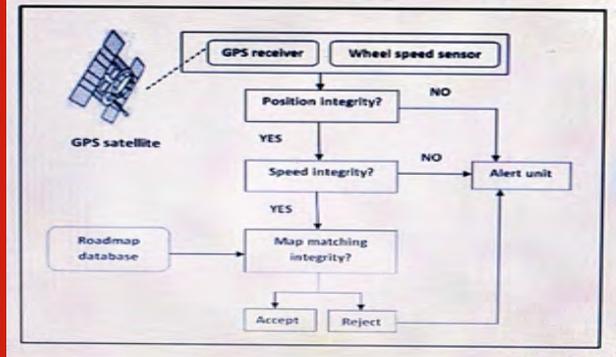


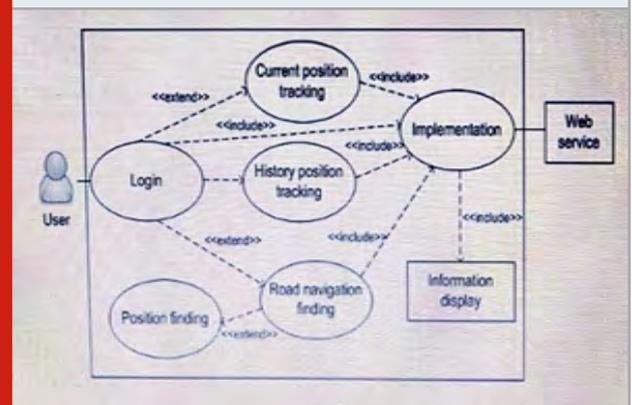
Figure 2.1: Architecture of proposed GPS integrity method



(WenjingXue et al., 2015)has proposed a paper on monitoring the speed, configuration and weight of vehicles using in-situ wireless sensing network. An implementation (Ha DuyenTrung et al.,2013) of a mobile vehicle monitoring system using android smart phones is described as in (Fig 2.2). Users can observe their vehicles' information using a mobile screen anytime, anywhere. Our proposed design is composed of small the GPS/GNSS receiver terminal, modern data acquisition modem, cellular data transmission network, and the smart phone application.

(SeokJu Lee et al., 2014) has implemented a vehicle tracking system using GPS/GSM/GPRS technology and smart phone application. The GSM/GPRS module is used to transmit and update the vehicle location to a database. A Smartphone application is also developed for continuously monitoring the vehicle location. The Google Maps API is used to display the vehicle on the map in the Smartphone application.

Figure 2.2: Functions of the Android Application



A research was proposed (AditiAbhimane et al.,2017) on IoT based vehicle traffic congestion control and monitoring system. This paper depicts a technique to take care of the issue of intangibility of activity flag created by colossal vehicles. (P. Chen and S. Liu ,2010) has proposed a paper on intelligent vehicle monitoring system based on GPS, GSM and GIS. The structure, network topology, functions, main technical features and their implementation principles of the system are introduced. Liang-Yi Hwang et al.,2005) has proposed a paper on wireless network environments supporting inter access point protocol and dual packet filtering. The goal of this paper is to provide a wireless network communication environment, in which mobile hosts can roam among various access points and across different subnets.

Abdurohman et al.2013) has designed a mobile tracking system using openMTC platform based on event driven method. This monitoring process is done using vehicle's position data from satellite through GPS device, and sending the data to a server through GSM modem. This paper proposes new approach on managing all vehicle data using Machine-to-Machine (M2M) communication

form which Open Machine Type Communication (OpenMTC) as communication platform for aggregating and processing location data.

(Wang et al.,2005) has proposed a paper on WebGIS based system model of vehicle monitoring central platform. The vehicle monitoring central platform is establishing a uniform information portal on vehicle monitoring. The WebGIS-based system model is striving to develop a technical umbrella for the distributed

and Web-based vehicle management systems, which employs several technologies, including communication technology - SMS (short message services), vehicle position technology - GPS (global positioning systems), and information display and matching technology - GIS (geographic information systems). The model presents prototype application for vehicle monitoring central platform, which provides an enabling technology to directives and city management for online dissemination of vehicles information.

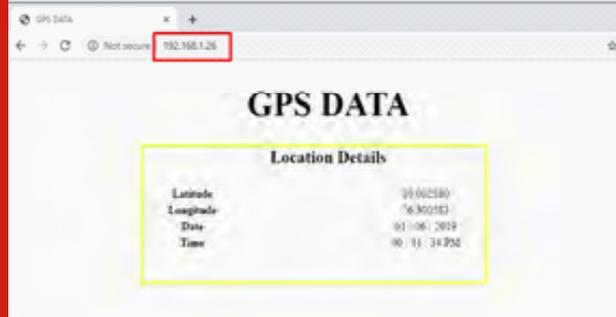
Table 1. Comparison of different methods and designs

Implementation details	Components	Decision influencing parameter	Analysis	Ref
GPS monitoring for intelligent transport system	GPS, alert unit, wheel speed sensor	Speed and position	Location and speed of vehicle is tracked through GPS using RAIM algorithm	[1]
IoT enabled connected navigation system for urban bus rider	IoT, smart phone, GPS	Wifi data through wireless communication	IoT based system connecting bus riders using wifi and provides continuous trip assistance	[2]
Monitoring the speed, configuration and weight of vehicles using in-situ wireless sensing network	Horizontal CTL asphalt strain gauge, KED-PA soil pressure gauge, V-Link wireless voltage node , USB base station.	Speed, configuration and weight of vehicle	Integrated transport monitoring system capable to estimate the speed, weight, and configuration of passing vehicles based on the pavement responses collected by in situ pavement sensors	[3]
Mobile vehicle monitoring system using android smart phones	GPS/GNSS receiver, UMTS,	Location, direction, speed	Monitoring using GPS /GNSS receiver terminal SOAP, modern data acquisition modem, cellular data transmission network, and the smartphone application	[4]
Mobile tracking system using openMTC platform based on event driven method	GPS and GSM module, M2M, openMTC ARM controller	OpenMTC data like speed, cabin temperature	Mobile monitoring and tracking using GPS and sending open MTC data to server through GSM	[9]
WebGIS based system model of vehicle monitoring central platform	WebGIS server, GPS server, projector and monitoring screen	Speed, SMS	Distributes the gathered information about the vehicle to connected centres in different cities	[10]

RESULTS AND DISCUSSION

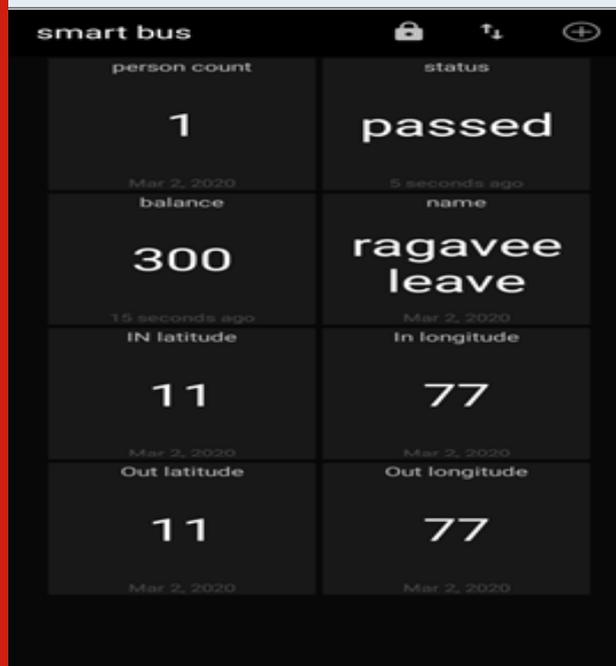
The results are obtained in an android application which is MQTT dashboard application. The location of the bus, number of passengers inside the bus and amount of ticket is all displayed to the user through the MQTT app.

Figure 3.1: GPS Testing Data



Mqtt Dashboard App Results

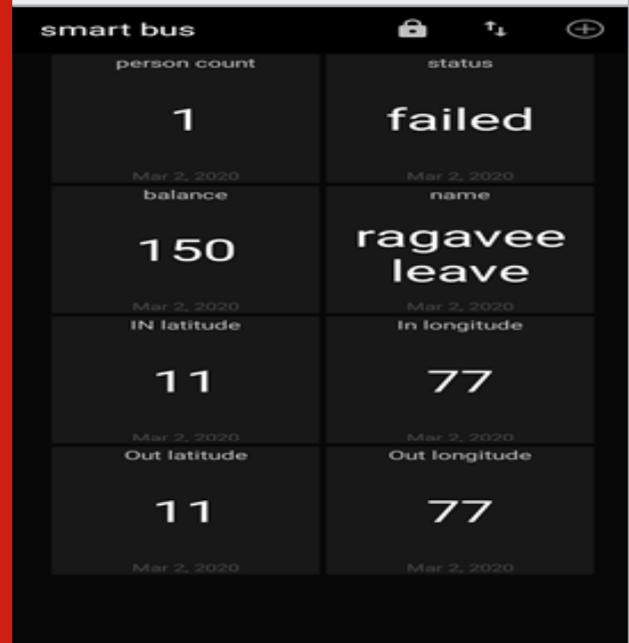
Figure 3.3: User success with minimum balance



CONCLUSION

This paper proposes the new Smart Bus system that helps end user to reach at their destination as shortly as attainable. The Smart Bus system provides a real-time data of exact location of local bus transport and tries to reduce the wait time at bus stop or at station and unnecessary crowding. The users can track the current location of vehicle using the user-friendly mobile application and can plan their travel effectively. As a conclusion, all objectives for this project were managed to achieve. The user is allowed to enter the bus with minimum balance and number of persons as set in the

Figure 3.2: User failed due to lack of balance



program. The user fails when the minimum balance is not satisfied as well as the number of persons inside the bus exceeds.

Future Scope: There is still a lot of space for improvement in this system. This idea covers a very large area which needed creativity, talent and dynamic mentality to fully optimize the technology, knowledge and inspiration of the technology. Some future works are, attached bank account details with RFID card and can apply this method for all type of transports.

Conflict of Interest: The authors declare no conflict of interest.

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Comparison of Different Bio Inspired Optimization Algorithms for Improving Network Lifetime in Wireless Sensor Networks

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ABSTRACT

Wireless Sensor Networks are becoming an inevitable part of modern life from healthcare to military applications and are becoming infamous day by day. Hierarchical approaches are used to increase network performance and increase its service life. The problem of extending the life of the network has led to a greater interest in research. Bio-inspired optimization algorithms founded on the principles of the biological evolution of nature appear to cover network life. This document compares these optimized algorithms. From the analysis, we see that the Swarm Intelligence paradigm depends on centralized clustering solutions based on much adapted for several applications with high data delivery speed, low power consumption or great scalability compared to algorithms founded on other offered paradigms.

KEY WORDS: BIO INSPIRED ALGORITHMS, CLUSTERING, ENERGY EFFICIENCY, NETWORK LIFE TIME, WIRELESS SENSOR NETWORK, HIERARCHICAL ROUTING, SWARM INTELLIGENCE, CLUSTER HEADS

INTRODUCTION

WSNs play a major role in all the fields, such as business, home, medical, transport, industrial applications, and disaster relief management. They are also used to monitor applications in (L. Farhan et al,2018) remote or manual environments . Touch nodes in WSN can limit communication, processing, and archiving functions. Thousands of sensor nodes have to be used in most applications and the durability of these sensors is significant. A A A. Ari et al., (2015) mentioned that

limited energy resources are the main limitation of sensor network. Hierarchical devices are used to increase the efficiency and life of the network. The entire network is separated into clusters that are controlled by cluster heads as given in Ema Teixeira et al., (2019). Recently Kashif Naseer Qureshi et al., (2020) describes the process of information gathering from its cluster member nodes and forwarding to BS. This could be a broadcast of one or more hops. In a one-hop transmission model, the CH sends data directly to the Base Station. In the multicast transmission model, CH uses particular in-between nodes to send data as described by M. M. Afsar et al., (2014). CH. Clustering reduces total energy consumption and balances energy consumption among nodes, thus increasing network life as described by Abu Salem et al., (2019).

ARTICLE INFORMATION

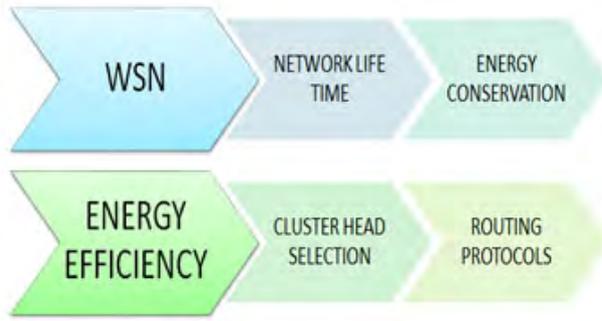
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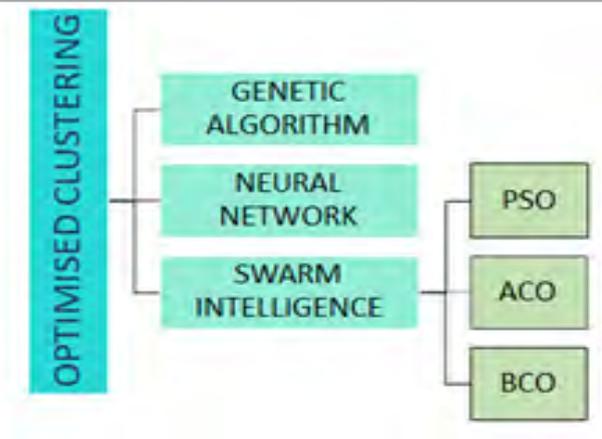
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Figure: 1 FACTORS IMPACTING THE NETWORK LIFE TIME OF WSN.



However, due to the assortment of WSN submissions, choosing the right model for the clustering solution is a problem. It is an important to choose CH to extend the life of the network. Many algorithms are proposed by Wang et al., (2018) through which network performance can be improved. Damien Wohwe et al., (2019) describes how researches on clustering based on bio-inspired algorithms outperform the traditional clustering algorithms.

Figure 2: Classification of Clustering Algorithms



A genetic algorithm is an optimization process based on Darwin’s principles of “Darwinian existence” in biological evolution. Liu et al., (2011) proposes a random search to offer the best design possible. Neural networks (NN) are scientific models that are inspired by the biological networks of neurons. Hussain et al., (2007) proposes NN to solve the clustering problem.

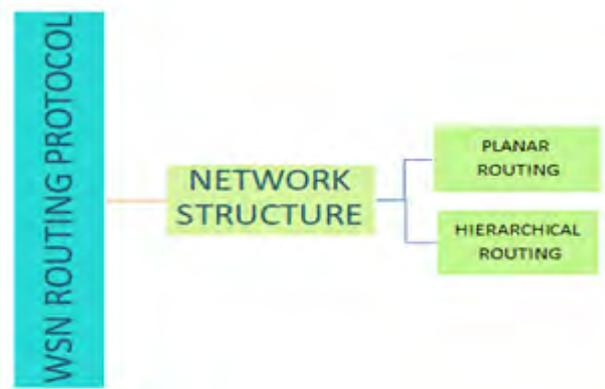
(Weifeng Sun et al,2020) proposes Swarm intelligence (SI) to pretend biological group intelligence that can be applied to clustering in WSNs. Three different types of SI are discussed here. The PSO is a commonly used algorithm described by Kuila et al., (2014)for clustering in WSN. The ACO is a nature-inspired algorithm that originated from the behaviour of ants is described by Wang et al., (2018). The bee colony method mentioned by Karaboga, et al., (2012) achieved success in determining the clustering issue in WSNs. In this study, some of the recent approaches in Clustering algorithms are compared.

The parameter selection and the validation platform of each method are summarized.

The rest of the paper is arranged as trails: In Section II the cluster properties and CH selection criteria are given. In section III, different approaches, including Swarm Intelligence optimized clustering techniques are discussed. A comparison of these clustering approaches is done in Section IV. Section V offered a conclusion with future scope.

2. Ch Selection Algorithms: Routing protocols classification is proposed by Xu et al., (2015) into planar routing and hierarchical routing based on the network structure.

Figure 3: Wsn Routing Protocols Classification



In hierarchical protocols, networks are split into clusters with a CH and numerous members. The cluster head controls the intra cluster communication and inter cluster communication. Its functions include data collection from the members, and forwarding data to sink node. Therefore, the energy consumption of CH will be higher. Several protocols are developed to keep this energy dissipation minimum.

Basic cluster classification attributes are listed below:

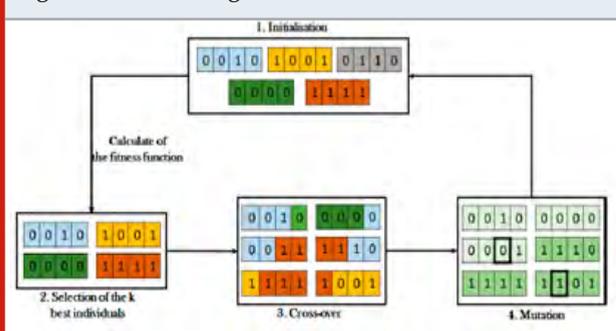
- 1.Sensor coverage mode:** Deterministic coverage refers to a fixed distribution of nodes, whereas random coverage denotes the random distribution of sensor nodes.
- 2. Clustering method**
 - a. Static clustering: In this clustering method, the network is split into several kinds of clusters
 - b.**Dynamic clustering:** In this clustering, a cluster is inactively generated near the CH node.
- 3. The sum of clusters:** There are two kinds of clusters, such as variable and fixed Cluster.
- 4. The dimension of the Cluster:** The dimension of the Cluster denotes to the extreme sum of nodes in the Cluster. It can be fixed or variable.
- 5.Inter-cluster communication:** It is the communication among CHs and CH to BS. It is divided into two types such as single-hop and multi-hop.
- 6.CH selection factors:** The main factors considered

for the selection of CH are residual energy (RE), distance from CH to sink (D2S), and distance from other nodes (D2N).

Optimisation Algorithms For Clustering

3.1. Genetic algorithm (GA): GA, based on Darwin’s theory of biological evolution, uses “best survival” and random search to provide the best possible design. It is used to create good cluster plans. In GA, a population consists of a set of strings called chromosomes. A chromosome search represents different points in space. Fitness or Objective Work is used to select a new generation. This is repeated until convergence occurs or as many generations as possible as proposed by Wazed et al., (2007).

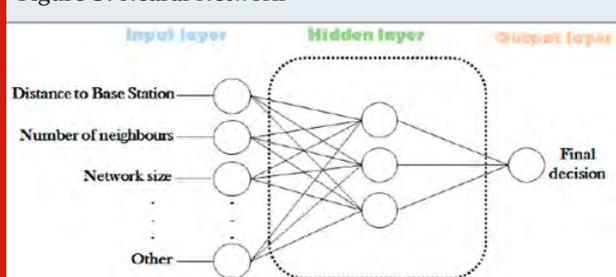
Figure 4: Genetic Algorithm



GABEEC is a WSN high-efficiency cluster-based GA, projected by Bayrakli et al., (2012) to improve the life of the network. GABEEC has two situations: installation and steady-state. In the configuration phase, all clusters are formed stably once. Founded on the residual energy, the CHs in the Cluster are dynamically replaced. It uses binary representation. A “1” parallel to a CH and “0” to a basic node. After evaluating every Cluster, the best profile is selected to make the energy dissipation minimum and network lifetime maximum.

3.2 Neural Network: NNs are calculated models based on the biological networks of neurons. Each neuron is linked to several kinds of other neurons to form a dense network. Neural networks have coordinated neurons at the input, concealment, and output levels, and they explore different pathways and determine their relationships. Neural network is used to solve the problem of clustering.

Figure 5: Neural Network



The algorithm offered by Kumar et al., (2009) is an NN based on routing and energy-efficient clustering, which is aimed at optimizing the network lifetime. Then chooses SN from higher levels of residual energy nodes. CH elections are conducted through adaptive training at NN. This is done in three stages, such as configuration, routing, and data transfer. At the preparatory stage, the election of CH is completed. During the routing and data transmission phase, all routes are analysed to find the best route to BS. Then the most energy-efficient route is selected to maximize the network lifetime.

3.3. Swarm Intelligence: Swarm Intelligence (SI) is defined as “an attempt to develop algorithms or distribute problem-solving tools based on the collective behavior of social insects animal groups and others.”.

Maximum are founded on flocks of birds, fish schools and the cooperation of insects like ants, bees, butterflies etc. They have partial resources like the battery life of the sensor node. SI approaches are classified into Ant Colony, Particle Swarm, and Bee Colony Optimizations.

Figure 6: Si Flow Chart

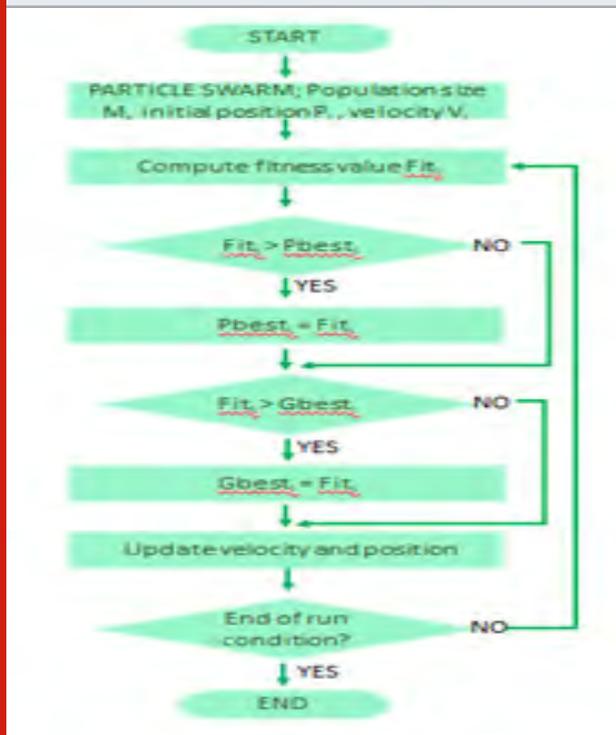


3.3.1. Particle Swarm Optimisation (PSO): Basically, it is an evolutionary computing technique. It deals with bird flocks, fishing education and herd theory. PSO is a population-based search that begins with a random decision by people called particles. The particle suitability value is evaluated by the matching function and optimized in each generation. To improve the WSN performance, PSO clustering strategies are currently being proposed.

A distance-based, energy-aware approach to centralized clustering using PSO is proposed by Vijayalakshmi et al., (2019). It takes into account the maximum gap between HF and cluster members when selecting HF and the residual energy of the HF candidates. During the

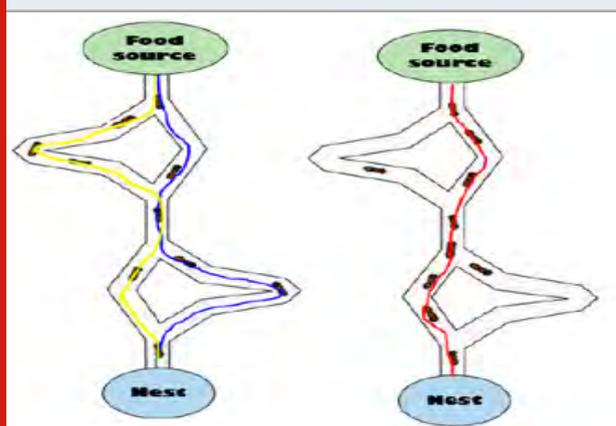
installation phase, all nodes send their remaining energy and information to the BS. Nodes with more energy than average can get CH in each round, as shown in the algorithm diagram..

Figure 7: Pso Flow Chart



3.3.3. Ant Colony Optimization (ACO): ACO is a natural algorithm that evolved from the behavior of ants. Each ant releases a chemical called pheromone in its path. When ants move, they place pheromones on the ground and acquire the power of pheromones. After some stage, the whole colony of ants can choose the lowest path to feed. ACO's benefits comprise strong global optimal capabilities and springiness in implementation. This is useful for integrating other procedures. Figure 8 shows the simple ACO in which ants discover the best path among the nest and food source.

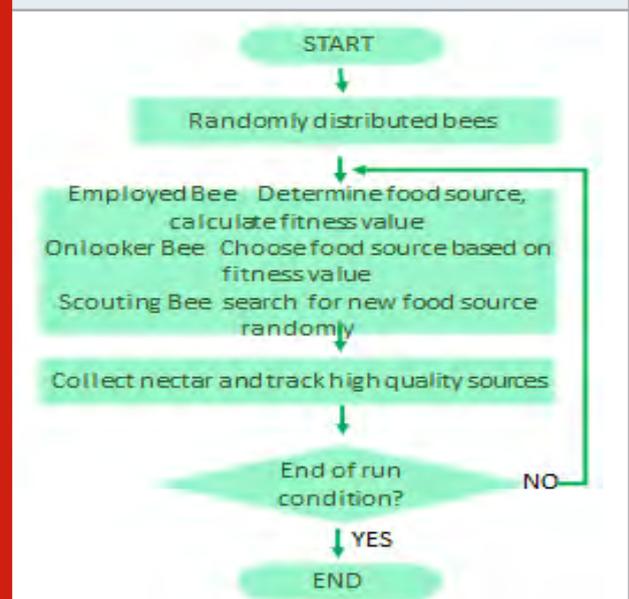
Figure 8: Ant Colony Algorithm



ACO have been used for clustering activities where n objects are allotted to K clusters. The space is calculated from the centre of each object and Cluster. In ACO-C, the BS selects the nodes with residual energy as CHS and not as the average power of the network. The ACO algorithm is used to find the best way. Then the BS informs each node of its channel and the Cluster to which they belong. At the end of each round, CH collects data from its members and directs it to BS.

3.3.4 Bee Colony Optimization (BCO): BCO protocols are based on the behavior of bees. "Artificial bee colony procedure is a kind of problem optimization approach that mimics bee intellectual behavior to optimize numerical functions. These bees form a colony with three types of bees: busy bees, curious and explorers. "It is the bees' duty to look for food. After finding the food (destination), they take the food and return home (source). When they return home, they start dancing in a disco. As more and more spectators engage the busy bees, they begin to dance and follow them.

Figure 9: Bee Colony Flow Chart



CHS are selected using the rapid detection functions of the BCO algorithm. CH checks the distance among neighboring CHS and BS and selects the shortest route. If it is a BS, the head of the Cluster transfers its data. But if this is the second channel, the head of the sender cluster sends a check of the remaining energy.

4. Comparison of the Optimized Approaches: Different CH selection algorithms to find the CH, conferring to the factors such as residual energy, distance of CH from member nodes and distance to sink, are summarised below.

A summary of optimized clustering algorithms discussed is given in figure11. Comparisons are based on a sum of factors such as data delivery speed, energy consumption, and type of approach. Data aggregation and node

uniformity are also taken into account. The data transfer rate is based on the quantity of data received by the BS or the sum of data sent by the receiving node. This display shows data loss during communication and reliability during communication. The energy consumption metrics relate to network life. Networks with low-energy nodes can live longer than nodes with high energy. The methods used to implement clustering algorithms can either be distributed or centralized. With centralized clustering methods, critical decisions are made on the OS or the synchronization node, which is not limited by its resources.

Figure 10: Summary Based On Ch Selection

	ALGORITHM	Static/Dynamic	Number of Clusters	Cluster Size	CH Selection		Multi hop	
1	GA	STATIC	VARIABLE	VARIABLE	Av Energy	D2N	Residual Energy	NO
2	NN	STATIC	VARIABLE	VARIABLE	D2N, D2S		Residual Energy	NO
3	PSO	DYNAMIC	FIXED	FIXED	D2N, D2S, Av Energy		Residual Energy	YES
4	ACO	DYNAMIC	FIXED	FIXED	D2S, Av Energy		Residual Energy	YES
5	BCO	DYNAMIC	FIXED	FIXED	D2N, D2S		Residual Energy	YES

Figure 11: Summary of Clustering Algorithms

	ALGORITHM	Energy Consumption	Data Delivery	Data Aggregation	Nature	N/w	Radio Model	Multi hop	Multi path
1	GA	HIGH	HIGH	YES	DISTRIBUTED	HOMOGENEOUS	FIRST ORDER	NO	YES
2	NN	HIGH	HIGH	YES	DISTRIBUTED	HOMOGENEOUS	FIRST ORDER	NO	YES
3	PSO	AVERAGE	HIGH	YES	CENTRALISED	HOMOGENEOUS	FIRST ORDER	YES	YES
4	ACO	AVERAGE	HIGH	YES	CENTRALISED	HOMOGENEOUS	FIRST ORDER	YES	YES
5	BCO	AVERAGE	HIGH	YES	DISTRIBUTED	HOMOGENEOUS	FIRST ORDER	YES	YES

Another metric careful in this revision is the uniformity of nodes in the field. When the performance of the microcontroller in the network, communication series, power level, etc. They say that the network is homogeneous when they have similar characteristics. If the nodes are of different energy or performance characteristics, the network is said to be heterogeneous. In this case, the nodes having higher energy are mostly selected as CHs. To estimate the amount of energy used by each node in the field, by using the clustering approach model that combines a radio model that should be as accurate as possible to the actual behavior. This parameter is significant because the energy transmitted by the sensor is due to the data sent and received by the transceiver. The algorithms based on SI ingest less energy than GA and NN algorithms. GA and NN algorithms are complex to implement and dissipate energy faster.

CONCLUSION AND FUTURE SCOPE

The limited energy of nodes is the critical problem in WSN. It can be improved by proper clustering methods. A review of new bio-inspired algorithms for potential usability of clustering is done. The metrics used for

comparison are CH selection, data delivery rate, energy consumption, data aggregation, control approach, nature of the network, and the radio model used. The centralized swarm intelligent algorithm based clustering solutions are more suitable for wireless sensor applications with less energy consumption and high data delivery rate than algorithms based on the other paradigms. As future works, different optimized algorithms can be combined to achieve better results. Further, it can be extended to underground and underwater wireless sensor networks.

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Design of Linearly Polarized Circular Disc Shaped Patch with Split Ring Resonator using FR4 Material for Bandwidth Improvement and Square Ring in Ground

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ABSTRACT

In this paper, an antenna with Linearly Polarized Circular disc shaped patch with Split Ring Resonator (SRR) is introduced. The proposed SRR consists of a microstrip, circular disc shaped patch structure and an SRR having only a single split with a square cut positioned in the ground for dual band properties. For improved bandwidth and directivity, Defected Ground Structure (DGS) approach is used. The simulation results reveal an improved bandwidth at 2.53 (2.37 - 2.6GHz) (perfect impedance matching/ good return loss is observed at 2.53GHz with -23.8dB) for a design with SRR of (40mm x 40mm) when compared without an SRR (50mm x 50mm).

KEY WORDS: SRR, GAIN, E-PLANE, BANDWIDTH, DUAL-BAND.

INTRODUCTION

Research in the field of wireless communication has gained much attention in the present-day communications due to its enormous applications. Applications like Wireless Local Area Network (WLAN), Wireless Interoperability for Microwave Access (WiMAX) requires antennae that are robust, compact and multi-band operations. Conventionally, antennas are designed to work in a single frequency band. But due to strong demand in wide variety of applications, and rigorous research in the field of antenna design has introduced antennas that work in multiple frequency bands. An application can demand a single antenna to work in dual bands and for the

operation of the antenna in dual bands, several antenna structures are proposed. To operate in dual band, though different antennas are proposed, the size and cost plays a very significant role.

For the size reduction, several methods are proposed. An antenna having high dielectric values gives better performance on comparison with an antenna having lower dielectric values. The cost of the antenna significantly increases due to this and along with the increase in surface waves which leads to redundant decrease in radiation pattern and increase in side lobes. To lessen surface waves a few strategies were proposed which includes: the dual band is structured and broken down into a rectangular printed monopole radio wire which utilizes cuts and truncation, Meander T shape opening of the receiving wire, rearranged U shape and a Complementary Split Ring Resonator (CSRR) loaded microstrip patch antenna.

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The CSRR type antenna is realized by the conventional mushroom type of structure in which the size of antenna is suitable for wireless communication G. K. Singh et al., (2012). The proposed prototype designed for operation in Wi-Fi band of 2.4-2.48GHz Herraiz-Martinez F et al., (2012). Dual band patch antenna based on short circuited split ring resonator which we use only one unit cell of double SRR as radiator, it printed on ground acting as a radiator, it printed on ground stub acting as radiating element at a micro strip patch antennas it was used for RFID applications and provides more flexibility A. Dadgarpour et al., (2017).

3.Existing Antenna Geometry: The design of the Linearly Polarized Circular disc shaped patch without SRR is shown in Fig. 1. The dimensions of the Linearly Polarized Circular disc shaped patch without Split Ring Resonator are shown in Table 1. The existing antenna geometry is having a total of 50x50 mm which is slightly larger for the application. To overcome this, the proposed antenna is fabricated on FR4 substrate which is having permittivity (ϵ_r) = 4.4 and with an SRR.

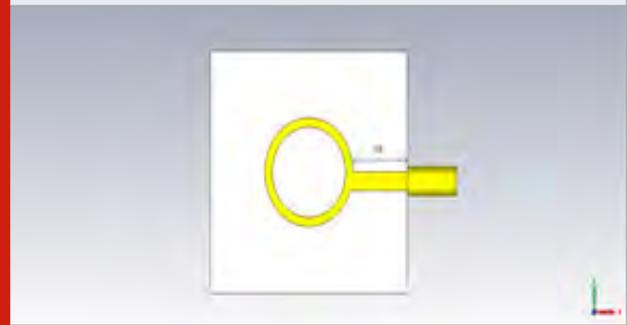
Table 1. Circular disc shaped patch without SRR

	mm
Ground length	50
Inner square length	26
Outer square length	28
Feedline distance	18
Patch outer radius	4.5
Patch inner radius	3.5

4.Proposed Antenna Geometry: The design of the proposed Linearly Polarized Circular disc shaped patch with Split Ring Resonator are shown in Fig. 2. The antenna system has dimensions which are expressed in Table.2 and total dimensions length corresponds to 40x 40. The patch is of Circular disc shape having dimensions of 3x2mm . Micro-strip Feed line is adjusted towards the edge from centre. Inner circle has been slotted to provide narrow patch for current flow. In our design, we used

defected ground structure to increase the bandwidth and directivity.

Figure 1: Circular disc shaped patch without SRR

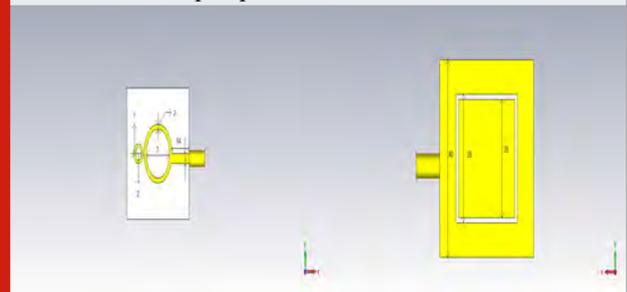


The Defected Ground Structure (DGS) approach have been widely used in microstrip antennas for size reduction, reducing harmonics, bandwidth improvement, diminution of cross polarization and mutual coupling in antenna arrays, etc. The defected ground structure has the dimensions - 26x26 mm and a square has been etched in the ground plane for impedance matching. Furthermore, a split ring has been placed to adjust and improve the bandwidth on ground plane as shown in Fig2. The position of the feed is optimized for better impedance matching and the dimensions of feed are 3 mm width and length of 14 mm. The back view of Linearly Polarized Circular disc shaped patch is shown in fig.3.

Table 2. Circular disc shaped patch with Split Ring Resonator

	mm
Ground length	40
Inner square length	26
Outer square length	28
Feedline distance	12
Patch outer radius	4.5
Patch inner radius	3.5
Split ring inner and radius and outer radius	3x2

Figure 2: Linearly Polarized Circular disc shaped patch with Split Ring Resonator and back view of Linearly Polarized Circular disc shaped patch



5.Designing methodology and parametric study: To design the proposed antenna, some considerations are taken into account. During that phase, a parametric study has been done. The observations of the responses helped in attaining an optimum design, which is further fabricated and tested.

Effect of parameters: Initially, a ground plane and substrate having length and width = 26 mm is considered, the results are not effective. Then, the defected ground structure (DGS) is used. DGS consisted of square cut in ground plane to increase directionality. By varying different parameters, we can observe changes in the bandwidth, surface current distribution and many others.

6. Simulated results: The complete geometry of proposed antenna is shown in fig 2 and the antenna is placed on FR-4 substrate with a thickness of 1.59mm. This antenna is fed by microstrip feed line. The return loss curve for design is shown in below fig 3. Wideband of frequencies are operated in proposed antenna from (2.3745 - 2.6427GHz) (significant dip is observed at 2.5326GHz with a gain of -23.8dB) which is a wide band operation. The VSWR plot is also shown in fig 4

Figure 5: 3D plot of far field region

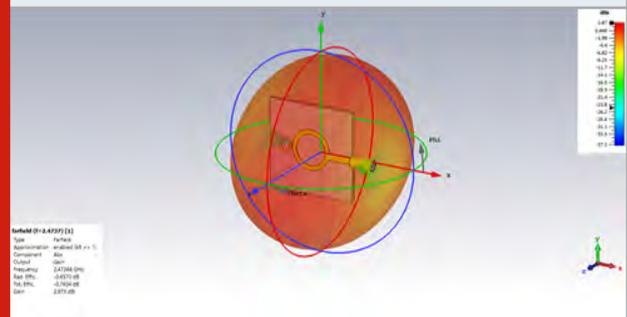
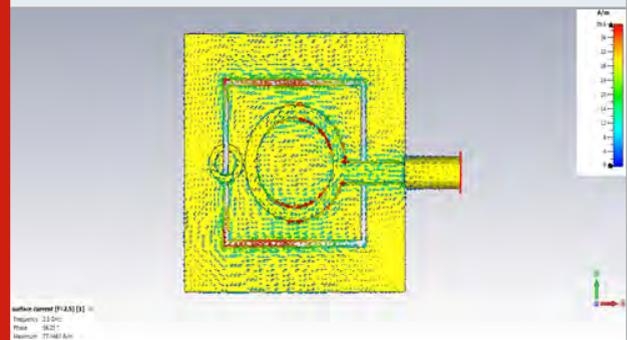


Figure 6: Surface current distribution



The simulated efficiencies peak gain comparison of the proposed SRR is shown in Fig.7. The patch antenna provides the peak gain of 2.86dBi

Figure 3: Return loss curves for development process

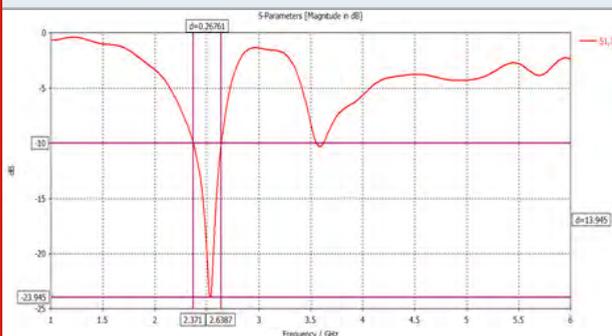


Figure 7: Simulated peak gain of proposed antenna

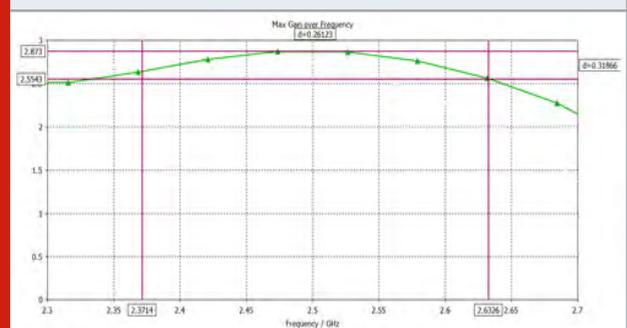


Figure 4: S-Parameter VSWR

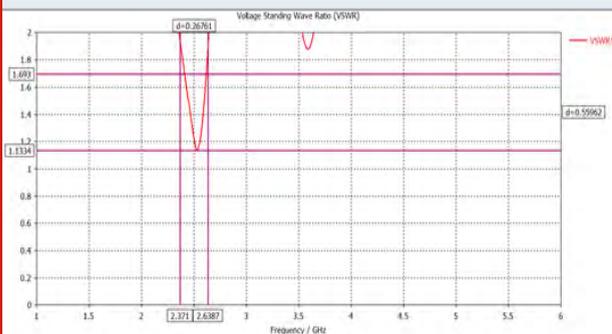
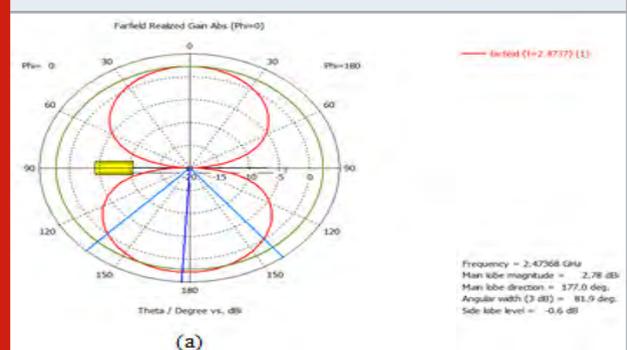
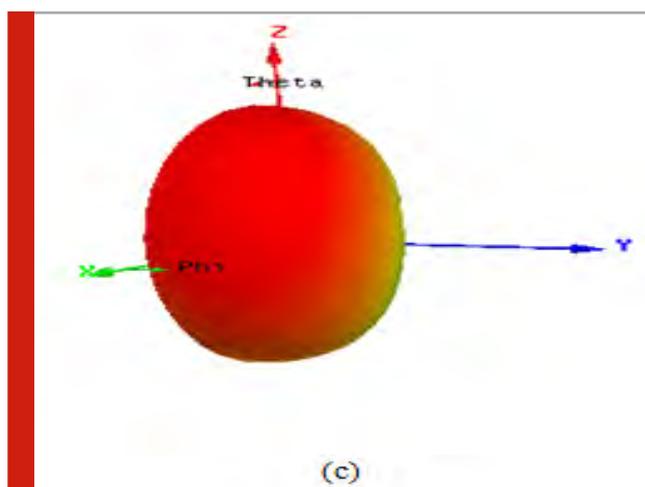
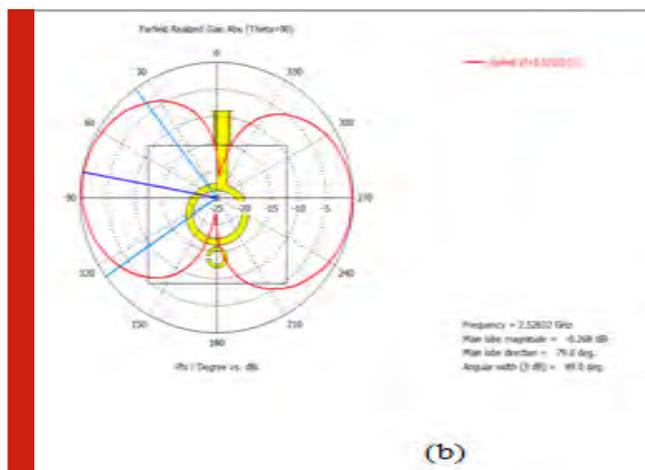


Figure 8: Electric and magnetic field distributions at 2.5 GHz: (a) H plane, (b) E plane, (c) Radiation pattern



The 3D polar plot for proposed design is as obtained as shown in fig.5

The below fig.6 resembles how the surface current is distributed over the antenna surface.



The 2D radiation patterns for E plane and H plane for the proposed design is shown in fig.9

CONCLUSION

A novel Linearly Polarized Split Ring Resonator with Defected Ground Structure has been designed and simulated for 2.4GHz communications. High gain and Directivity are obtained due to etching of square shaped slots in the ground plane. Addition of SRR resulted in the wide bandwidth 0.268GHz (2.375-2.647GHz) with -23.8dB gain which is higher than that compared to the design without SRR - 0.209GHz (2.403-2.612GHz) with

-18.1dB gain. Complete parametric analyses were carried out to select proper position and sizes. The proposed antenna resulted in higher gain and bandwidth compared to previously reported antennas using Defected Ground Structure (DGS) approach.

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Deep Learning Based Human Emotion Recognition from Speech Signal

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ABSTRACT

Emotion recognition is portion of speech recognition, which makes it more demanding, and demand is growing. There are such methods for detecting emotions using machine learning methods, but this project seeks to use the advanced learning method to identify emotions and categorize emotions by speech signals. This paper aims to use Mel-frequency cepstral coefficients (MFCC), Discrete Wavelet Transform (DWT), Fast Fourier Transform (FFT), as features. Before extracting the features, the signals undergo several processes to develop the presentation of the scheme. The Convolutional Neural Network is used for classification. In this paper we consider Happy, Sadness and Excitement of the Humans. Also compared with another existing study, finally our proposed model attained the better human emotion recognition than existing one.

KEY WORDS: FAST FOURIER TRANSFORM, CONVOLUTIONAL NEURAL NETWORK, SPEECH SIGNAL, DISCRETE WAVELET TRANSFORM.

INTRODUCTION

In the modern digital age, speech signal is now a means of communication between people and machines, made possible by the advancement of various technologies. Speech-to-text (STT) technology has emerged from speech recognition methods using signal processing methods S. Furui et al., (2004). which use mobile phones as a means of communiqué. Speech recognition is a fast rising research subject in which they try to identify speech signals. This has led to an increase in research in the field

of speech recognition (SER), which can lead to success in various fields such as automated translation systems, human communication used to synthesize speech from text, and so on.

SER is a field of research aimed at cultivating emotions from vocal signals. Various polls claim that the search for emotions will greatly simplify the system and make the world a better place. M. El Ayadi et al., (2011). The difficult problem is that emotions can vary depending on the environment, environment, and culture, and that individual facial expressions lead to ambiguous conclusions; The corpus of language is not sufficient to recognize emotions; Lack of voice databases in many languages.

Deep learning is a machine learning technique designed to model data related to a particular machine. Deep learning is used in neural networks for a variety of activities such

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as image recognition, classification activity, decision making, and model recognition. Y. Lecun, et al., (2015) in-depth learning and identification of multimodal images used to extract functionality. Emotion recognition is used in the call center to classify calls based on emotions. It acts as a performance component of speech analysis, identifying dissatisfied customers and therefore customer satisfaction.

Literature Survey: Shashidhar ji et al., (2012) suggested recognizing emotions through speech through subroutines and synchronous spectral features in the sound. When the predictive septic coefficient, the post's septal frequency coefficient, and the features extracted from the high amplitude region of the spectrum are recognized by drawing, the spectral features extracted from the secondary courses are used to present specific descriptive information of the emotions. These characteristics are extracted from the consonants, vowels and transitive regions of each letter to examine the involvement of these regions to the identification of emotions. Consonants, vowels and transferred areas are resolute based on the starting point of the vowel. The each growth cycle are also used to identify the emotions present in the language.

Fatim Nuruji et al., (2009) A model for identifying emotions is proposed. This proposed method first digitizes the signal to extract the required properties. According to an unprecedented emotional study, the tone of each person's voice can be expressed in tone, tone, or intensity with a timbre, speed of speech, and pauses, the changes of which transmit different information from the speaker to the listener. The main characteristics that transmit sound vibrations are divided into categories of tonality and intensity. The method for recognizing voice emotions and predicting the next response records eleven characteristics, depression, intensity, the first four formats as well as their range and standard deviation. This requires the use of multi-categories to classify the four emotional states of male and female participants. By setting time data from speech files and using neural networks (NN), the possibility of a further emotional state of the speakers is also reported.

Removing the emotional state of the speaker from his language is called recognition of the feelings of the language. Speech involves the analysis of speech cues in the identification of speech emotions to determine related emotions according to training in functions such as height, fermentation and foam. A large number of algorithms have been developed for testing character information and speech cues. Some of them are ANN, LPCC, MFCC, linear prediction coefficient and mail sepstrom coefficient as a reference vector.

June Deng et al., (2017) whispering is primarily a way of recognizing emotional states from language to motivation to learn. These methods use multiple non-linear variables to create the data to produce extra abstract and useful illustrations, which compensate for misunderstandings among training data (normal phonetic data) and test data

(whisper). It has been empirically noted that learning properties often lead to better representations, e.g. G. with respect to classification accuracy, the quality of samples generated by the prospective model or the supernatural properties of the traits learned. To learn this function, automatic tonal encoders are often used to learn a new transition from previously learned transformations to high non-changeable levels. En-ton encoders are developed primarily as multi-layer detectors (MLPs), with only one hidden layer from which their input is predicted. The purpose of a tone encoder structure is to clearly define a through feature encoding function in a certain parameterized secure.

Jia-ching Wang et al., (2015). Recommended verification of speech sensors using modeling of frequency changes and scale variation frequency maps. Feature information and verification - This system can be allocated into two stages. The first step is to analyze two kinds of acoustic features. One is the scaling frequency card and the other is the processor feature set. First, important atoms are selected from the Gabber dictionary for each sound frame using matching attempt algorithms. All atoms in the dictionary have the appearance of a gabber function, which contains frequency, scaling, phase, and location information. After the selection of the atom, the scale is aggregated and averaged, by which a scale frequency map (SFM) is obtained. MDGs provide critical band portability and fine-tuning that are more suitable than even distribution frequencies for modeling the concept of human hearing and are less prone to noise. Rare representations are used to convert scale frequency maps into sparse coefficients to increase the extra power compared to the difference of emotions.

After the feature information, the fusion mechanism is used to integrate the analytical scores obtained by the following two methods. The first is a projected review of sparse representations based on residual errors created by Gussie who may consider differences in emotion in the speakers 'voices. Another approach involves using an indicator, EAI, to measure the size and variability of mixed emotions. A higher index suggests that the approach to checking for sparse representation creates ratings with greater certainty. The indicator uses a sparse coefficient similar to the sparse representation probe. After calculating the two ratings, they are merged together.

Proposed Method: The projected scheme can be separated into two phases training and testing stages. Initially the data from the database is read and then the data is converted into a suitable level for further usage generally the data is converted between 0 to 1 this is called normalization. After normalization the noise from the data is removed in Filtering stage after that the full-length audio is converted into frames for convenient duration.

The four features namely Mel-frequency cepstral coefficients (MFCC), FFT, DWT and finally the re-sampled input data are extracted. After feature extraction the

extracted features are cascaded in a fashion to train the Convolutional Neural Network. Normally the CNN accept the training data in matrix format only so the data is arranged as shown in Fig.1. Then the CNN is trained using these data. In testing stage, the trained CNN is tested with the test input. In this phase also all the operations performed in training phase is carried out. Finally, the presentation of the scheme is evaluated here the performance is evaluated in terms of Accuracy Sensitivity and Precision.

Figure 1: Block Diagram

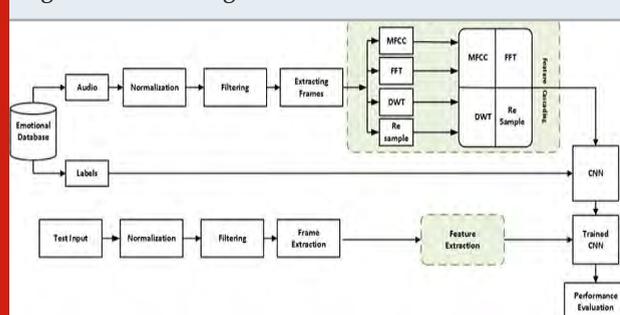
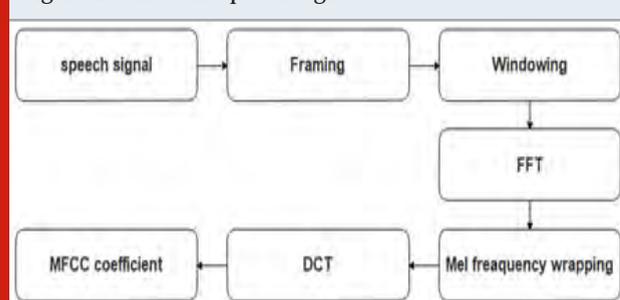


Figure 2: MFCC in speech signal



Dataset: In this project we have used CASIA emotional speech database to do the experiment Xu S et al., (2013). This database contains 1200 utterances which were collected from 4 speakers (2 male and 2 female), each of the 4 speakers read 50 sentences with the following six different emotions: happy, angry, surprise, neutral, fear and sad. The sampling frequency for all utterances is 16000 Hz. The simulations select a total of 120 samples of four different emotions (happy, angry, neutral, fear) as a test. In the speaker recognition part, because of the need for large amount of voice and data, some other speakers joined.

MFCC: The calculation of the MFCC is based on the known modification of the critical bandwidth of the human ear with frequency. The main reason for understanding language is that artificial sounds are filtered based on the shape of the vocal cords, including tongue, teeth, etc. This shape determines which sound is emitted. If the quantity is precisely determined, the result can be an accurate reflection of the phoneme. The shape of the vocal tract appears in a wrapper with short-term performance spectrum and the purpose of the MFCC is to accurately reflect this coverage. This method of feature extraction has been used widely in feature extraction

process. Its calculations are based on the characteristics of human ear, which has a nonlinear frequency unit to make it similar to that of human auditory system.

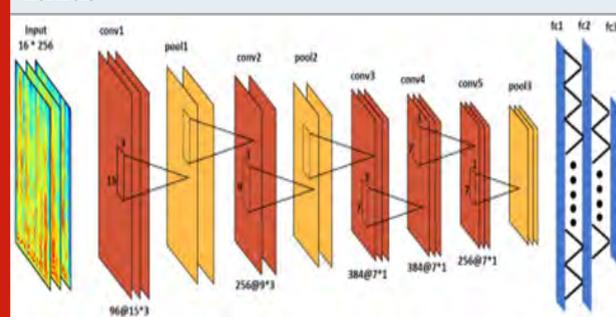
DWT: The transformation domain uses DWT to retrieve objects. DWT uses signal analysis over time, signal decomposition, and signal recovery for processing speaker signals. The wavelet functions shown in (2), are derived from initial time-limited wavelet $h(t)$ which is dilated by a value of $a = 2^m$, translated by constant $b = 2m$ and normalized so that

$$h_{m,k} = \frac{1}{\sqrt{2^m}} h(2^{-m}t - k)$$

FFT: FFT is designed to filter the logarithmic characteristics of the auditory system of a person by measuring the energy of the spectrum bands. First, the signal is divided into short-term windows, which are respectively 16 ms and 20 ms for the samples of emotion and stress. The reason for using a short frame duration for an emotion database is that it includes female vocal aids that have a shorter tilt duration than male speech and that the frame size should include two basic frequency periods. Field.

CNN: The proposed CNN framework is shown in Figure 3, which includes the input layer, five convoluted layers, three pooling layers, three fully connected layers, and one Softmax layer. Spectrograms (resized to 16×256 and 256) generated by emotional speech signals are input to CNN. Conversion kernels are applied to inputs in the initial layers to draw feature maps from this spectrogram. The first convoluted layer C1 contains 96 kernels measuring 15×3 , applied to a string arrangement of (3×1) pixels. Its activation functions are modified linear units (RELUs) followed by maximum pooling layer (3×1) Stride 2. Likewise, the second convoluted layer C2 has a $25 \times$ kernel size of 9×3 , and the input layer after C2.

Figure 3: Proposed CNN architecture with rectangular kernels



There is a maximum pooling layer with size 1 and a strip 1. Similarly, layer C3 layer contains 384 (7×3) kernels and C4 contains 384 (7×1) kernels respectively. The last conventional layer C5 consists of 256 kernels of size 7×1 , followed by a maximum pooling layer (3×1) . After layer C5, there are three fully connected (FC) layers with 4096 and 7 neurons, correspondingly. After

the first two layers are completely joined, the drop-out of 75% ratio is regulated to avoid excessive fitting. The output of the last FC layer is given to the Softmax layer, which calculates the output potential of the class of seven emotions.

These networks are designed to take into account the nature of the information encoded in the spectrogram. The frequency and vibration of each input spectrogram correspond to a small sample of coded input speech. In the lower layers, the intermediate center is relatively short and relatively wide in height and can effectively capture the surrounding local characteristics. In subsequent layers, the height and width decrease, but the shape of the roots is still square. Helps create an effective local reception area for Spectrogram. The main features of this architecture are the nuclei, pyrids and nearby rectangular pools, which allow CNN to effectively capture the specific features of the spectrogram.

This system is worked with the configuration of data encoded in spectrograms. Each info spectrogram compares to a short example of information discourse in which frequencies and amplitudes are encoded. At lower levels, portions have a moderately low heel stature and width so they can adequately catch nearby attributes from the area. In the accompanying layers, both the tallness and the width have diminished, however the state of the beans despite everything stays rectangular. Assists with making powerful territories of neighborhood lodging for spectrograms. The primary highlights of this design are rectangular parts, steps and pool neighborhoods, which permit CNN to adequately catch different highlights from the spectrogram.

3.4 Model training: The proposed CNN architecture was created using Nvidia DIGITS 5.0 as a pioneer of Dello training and authorization. Matte cards were used to create spectrograms from each of the emotions in the database. Spectra 16 × 256 was created in 50% overlapping size. About 1500 spectrograms were created for each emotion in the dataset. A sum of in excess of 10,000 spectrograms have been made for all pass on sound documents in the dataset. These spectrograms were appropriated for preparing and testing so that 75% of the information was utilized for preparing and 25% was utilized to check the usefulness of the information model. Cross confirmation was utilized multiple times for all investigations. Preparing process was done for cluster size size0 time of 12 procedure. We set the initial education rate at 0.01 with a loss of 1 every ten years. The single Nvidia GeForce GTX with 12GB of non-board ID memory was used to train the Titan X GPU model and then optimize it. Achieved maximum clarity after 29 eras. The training set lost 0.8066, while the test set lost 1.0695.

RESULTS AND DISCUSSION

In this segment we discuss the simulation outcome and their performance measure. And also discuss and comparison of existing techniques with our model. Trials

are showed to appraise the presentation of the planned scheme to use MFCC, FFT, and DWT. The simulations outcomes are conducted by using the CASIA dataset by using MATLAB 2018b with 4GB RAM, 1 TB hardisk and 2GHz processor.

Performance measures: In this work we used three different types of feature extracting methods are such as MFCC, FFT, and DWT. This three features outcomes are compared with different emotions. And also we examine the result by combing the one feature with every one feature.

Table 1. Classification accuracy of three features

Emotion	MFCC	Features FFT	DWT
Happy s	79.32	78.36	77.65
Sad	81.47	79.45	80.32
Angry	91.06	89.65	89.78
Fear	74.12	71.28	72.21

In this table 2 and figure 4 explained that the emotion recognition classification accuracy of different three features. In MFCC recognize the accuracy level of four different emotions, in 79.32% of emotions as happy and 81.47% emotions as sad, 91.06% of emotions as angry and 74.12% emotions of fear. In another FFT attained the accuracy level of 78.36% as happy and 79.45% as sad, and 72.21% as fear. In last DWT features achieved the accuracy of 77.65% as happy and 80.32% of accuracy for sad, 89.78% accuracy for angry and 72.21% accuracy for fear.

Figure 4: Emotion accuracy of three features



Combination of three features: In this section we discuss the combination of three different features with each features. The combined the features are namely MFCC-FFT and MFCC-DWT. In this two different combination methods are used to evaluate the speech emotion classification accuracy.

In table 3 and figure 5 shows that the performance of combination of two features classification accuracy. In MFCC-FFT combination method achieved the emotion recognition accuracy level of 82.98% as happy, 83.88% as sad, 93.85% as angry and 76.25% as fear. This combination method performance is better than the

only MFCC feature performance. Another MFCC-DWT attained the emotion classification from speech signal of 84.85% as happy, 85.58% as sad, 91.45% as angry and 77.95% as fear. In this combination feature provides a better classification performance in speaker emotion classification.

Table 2. Evaluate the performance by using MFCC-FFT and MFCC-DWT.

Emotion	Features	
	MFCC-FFT	MFCC-DWT
Happy s	82.98	84.85
Sad	83.88	85.58
Angry	93.85	91.45
Fear	76.25	77.95

Figure 5: Performance of emotion accuracy by using MFCC-FFT and MFCC-DWT.

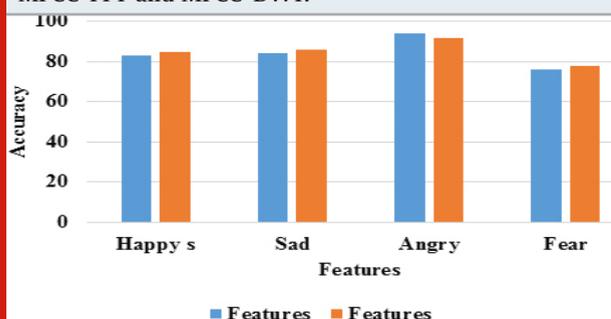


Table 3. Overall classification accuracy of proposed method with existing method.

Emotion model	Accuracy	
	Jain M, et al., [10]	Average accuracy of our
Happy s	70.94	83.36
Sad	71.32	83.45
Angry	85.65	91.65
Fear	64.59	82.28

Comparison analysis: In this section we discuss the comparison analysis of our proposed method with recent some existing techniques. In our method, we compared with Jain M, et al., (2020), Classifies the speech taken as one of the four emotions of sadness, anger, fear and joy. The samples taken to complete this project are taken from the LDC dataset. The overall average accuracy is computed by using confusion matrix method.

In table 4 and figure 6 displayed that the overall average accuracy of proposed method is combined with one existing method. In happy emotion, the existing method recognize the accuracy value of 70.94% and our method achieved the accuracy of 83.36%. Another sad emotions

existing methods provide 71.32% accuracy but proposed model gives the 83.45% of accuracy. Next emotion of angry conditions existing method achieved 85.65% of accuracy but proposed method achieved the accuracy of 91.65%. In lastly fear emotions, traditional model attained the classification accuracy of 64.59% and but our proposed model attained the accuracy of 82.28%. In this comparison analysis, we conclude that our proposed model attain better performance in speech emotion classification.

Figure 6: Comparison of emotional accuracy result.



CONCLUSION

Today, the SER has become one of the most important research areas. The type and the number of emotional classes, feature selection, classification algorithm are the important factors of this system. In this work we utilized profound learning and picture grouping technique to perceive feeling and arrange the feeling as indicated by the discourse signals. And also use MFCC, FFT, and DWT as features. Before extracting the features, the signals undergo several processes to recover the presentation of the method. After that, in classification process CNN is applied. The results are convincing and can identify the emotions in the voice signal. Using the Cassia Dataset with a small number of parameters in the model used to obtain an intuitive output system, our method achieves a maximum accuracy of 91.65% and an accuracy of 85.18.

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Design and Performance Analysis of Rhombus Shape Microstrip Patch Antenna for Wireless Vehicular Communication

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ABSTRACT

Vehicular communication is a wireless technology that enables vehicles to interact with each other. For vehicle communication, the frequency ranges from about 4.5 GHz to 5.923 GHz. Microstrip patch antennas typically have a radiation field on one side of the dielectric substrate and ground on the other. The patch is usually made of a conductive measureable. In this work, a rectangular diamond field is used as the main radiator. The proposed work consists of two antennas, one of which serves as the transmitter of the antenna, and the other as the receiver. Man power is reduced by fixing the transmitting antenna in manually controlled vehicle. The receiving antenna will be fixed in another vehicle that follows the transmitting antenna fixed vehicle. Hence, the vehicle with the receiving antenna will be driven automatically without any manual power. This transmitter and receiver mechanism work efficiently by matching their frequency at 4.7 GHz.. The antenna is designed for the frequency of 4.7 GHz with gain 2.61 dB. Design of microstrip patch antenna is improved in terms of gain, directivity and radiation pattern The basic theory and design of the antenna is analyzed, simulated and optimized using HFSS (High Frequency Structure Simulator).

INTRODUCTION

An antenna is the interface between electrical currents that move in a metal conductor that is used by a transmitter or receiver that is transmitted in space by radio waves. Patch antenna is a type of antenna radio with a low profile that can be mounted on a flat apparent. Wireless networks are an important component of any wireless communication scheme because they are answerable

for sending or receiving electromagnetic waves over a wireless transmission channel. A peg is frequently designed to operate in one or more specific frequency bands. In automotive communication there are many factors that influence the properties of the antenna (for example: the position of the antenna on the vehicle, the size of the vehicle and the dynamics of the vehicle, the antenna works together).

For communication between vehicles, the frequency is relatively high (i.e. 4.7 GHz). The vehicle dimensions are influenced more by the antenna model than other low-frequency technologies. In adding, in the case of communication between the vehicle, both the transmitting and receiving antennas are located at approximately the same height. Antennas can be categorized as single-port and multi-door antennas. A microstrip patch antenna

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typically refers to an antenna made using microstrip technology on a printed circuit board and is a kind of internal antenna that is mainly used at microwave frequencies.

The use of microstrip antennas in wireless communication has increased in recent years. Due to their properties, simplicity and low production costs, they enable the development of high-quality and powerful antennas for a variety of applications. Special short-range communication is often used in automotive communication - this is one of the potential applications. In this document the plan of the antenna for DSRC (Dedicated Short-Range Communications) is described with European standard and selected according to its radiation pattern for road communication.

The proposed paper consists of two antennas one antenna acts as a transmitter and the other acts as a receiver. The proposed system reduces the man power by means of fixing the transmitting antenna in manually controlled vehicle. The receiving antenna will be fixed in another vehicle which follows the transmitting antenna fixed vehicle. Hence, the vehicle with the receiving antenna will be driven automatically without any manual power. This transmitter and receiver mechanism work efficiently by matching their frequency at 4.7 GHz. The proposed system is made efficient from the existing papers in terms of gain, directivity, axial ratio and radiation pattern.

Literature Survey: Improve the direction of antennas used in automotive wireless local area networks (WLANs) and increase the ability to install antennas in the same shark fin trim that can be used in different ten antennas of different automotive wireless communication systems. The modified Vivaldi antenna was cut at the front with conical and cross-cut plane guides. That is also the focus. In addition, the improved Vivaldi antenna can improve the vehicle's ability to withstand polarization deformation through the roof, which acts as a larger surface plane than conventional ones Shan Hong He et al., (2014).

An ultraviolet band antenna (UWB) with a notch band is proposed and is currently being analyzed. It has a square bright point and an earth plane. The properties of the jagged strip are analyzed using a pair of T-shaped caps inserted into the square slot of the light bearing and a pair of U-shaped strips next to the power line. The results measured with the proposed notched planner antenna are 3.3-4.0 GHz (WiMAX), 5.05-5.9 GHz (WLAN), 5.5 GHz (DSRC) and 6.2-9, 5 GHz (wireless and fixed radar) D.Nivitha et al., (2014).

Applying two dielectric layers in the form of paper substrates provides information about the high level of selectivity of the resonance cavity antenna. According to this approach, two hollow single broadband with two different operating frequency bands are available to create. There are two distances, one is the distance between the superstrat and the other is the distance

between the ground plane. This proposed technique could increase bandwidth from 9% to 17.9% Muhanned A et al., (2013).

Conventional SP channels (sequential phase) use different sections to convert impedance. The daily SP feed system now has a transition in a passage where the transmission line width is the same. This simplifies the optimization task when adjusting component spacing. The SP feed contains two square thumbnails of $\Lambda \times 4$ and $\Lambda \times 8$ sizes. It is also suitable for large CP arrays with printing Shih Kai Lin et al., (2013). This article proposes and analyzes a new design of a rectangular microstrip patch antenna (RMPA) without slots with slots and arrays. The designed design is made with HFSS software. Presented and discussed are the results of the modeling of the return loss, of the radiation model and of the gain. The proposed network bandwidth is 2.4-5.9 GHz for VSWR <2, which is obtained on the basis of return losses as an acceptable standard in wireless applications E.Sivakumar et al., (2015).

A matrix of 4-component cone-shaped antennas with high gain and EBG gain is introduced. The design of the EBG power supply is designed to suppress surface waves, resulting in unbalanced separation of power and unwanted interaction between the output ports. The design parameters of the array are tuned to a gain of 20 dB with a frequency of 30 GHz and why the impedance band covers the entire frequency band. The working band in the array has a steady increase and a constant radiation pattern, making it suitable for wireless communications and image processing at short distances of millimeter waves Ayman et al., (2014).

The new 64-component circular band polarized circular microstrip antenna array has been developed for the dual use of sequential feeding methods. The corners cut sections of the microstrip as the main element and the matrices of four elements act as auxiliary matrices. This antenna measurement shows the effect of the reflection coefficient and the axial ratio of less than 10 dB Axin Chen et al., (2011).

The purpose of this article is to develop and model a ring antenna for various wireless networks. The antenna FR-4 substrate has a dielectric constant of 4.4 and a substrate thickness of 1.6 mm. The radiant patch is cut with a C-shaped groove to create multiple frequencies for different wireless networks. Return loss, VSWR and radiation pattern have been proposed for the proposed antenna and it has been found that the return loss in all frequency bands is less than 10 dB and less than VSWR 2 R.Samson Daniel (2014).

Low cost, high gain and 60 GHz broadband cone slot, Fernita Tennita was introduced with Sin Correction. New design parameters of the corrugated structure offer high flexibility, improving the characteristics of the tent. The proposed ten antenna antenna offers an amplification from 18.8 dB to 60 GHz, a high overall radiation

efficiency of $\sim 90\%$ and the impedance bandwidth, covering the 50-70 GHz band with its features Zouhair Briqech et al., (2014).

A low side lobe substrate integrated wave guide antenna array using broadband unequal feeding network for millimeter wave handset device at the frequency of 28 GHz band. The ground plane size is fixed halves to the size of Samsung galaxy note 4. It is implemented with multi-layer structure that is stacking 3 substrates and 1 copper plate. These unequal T junction dividers with face compensation are introduced to obtain various output ratios. It produces a gain up to 13.97 dB with a low cross polarization and symmetrical fan beam radiation pattern with low side lobe levels. This antenna array provides low cost broad band performance and good radiation performance with low side lobe levels for millimeter wave handset devices Seong-Jin Park et al., (2016).

Obtaining a dielectric Resonator antenna (DRA) above the basement floor is modified by placing a dielectric disc at half wavelength above the basement floor. A dielectric disk gives a quarter of the thickness of the dielectric wavelength. This method is used to improve the growth of anthrax and reduces the number of ahreya components by up to 75%. The dielectric gap acts as a dual roll, which is objective and random. The microstrip power supply is used with all 50 ohm microstrip line with 20 amps which reduces the power Ahmed A.Kishk (2011).

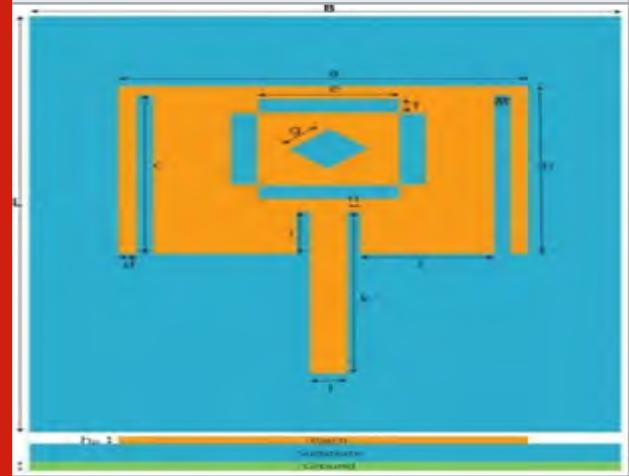
This article introduces a novel kind of patch antenna in the form of a dense dielectric patch antenna in which the metal patch of the microstrip antenna is replaced by a thin, large diameter dielectric plate. At lower microwave frequencies, the main TM₁₁ mode has the same efficiency as the conventional circular Tennita metal microstrip tube. The prototype operated with H.9 is GHz, which corresponds to 1% of the impedance bandwidth and d. dB increases. Due to the lack of metal spots, these antennas have better radiation efficiency at mm waves and frequencies in the terahertz range than conventional microstrip antennas Mujtaba Afzal et al., (2016).

In this article, a compact hexagonal planar ultra wideband monoband microstrip antenna (UWB) is proposed, which has a single band notch with increased suppression in the 5.5 GHz frequency band at 5 to 6 GHz. In order to investigate the features of this extended hacking of the 5.5 GHz band, an open and inverted L slot is integrated in the power line of the proposed UWB antenna. The suggested compact size is 30 * 30 mm. The hexagonal band corresponds to a good resistance in the frequency range from 3.1 to 10.6 GHz Hau Wah Lai et al., (2013).

The next generation communication network requires faster data transmission and greater capacity. There will be more interaction between people and millions of smart devices at the same time. Fifth Generation (5G) wireless technology will provide a reliable and compatible connection between them. A compact Microstrip Patch Antenna (MSA) is designed for 5G wireless communications, which is inexpensive, works in high

frequency range with small size and has effective gain and bandwidth. In this paper, a high profile Microstrip Antenna is designed for frequencies of 5.6, 6.5 and 7.5GHz which is best suited for 5G wireless network.

Figure 1: Design of Microstrip Patch



Design of Rhombus Shape Micro Strip Patch Antenna:

The structure of antenna is based on X, Y and Z axes. The substrate is mainly used to improve electrical and mechanical stability. They are used to lessen the antenna size (high dielectric constant, small size) and can help create bias currents that generate different magnetic fields.

In this proposed method a substrate is made using a material namely FR4-Epoxy (4.4). The substrate is made in such a way, whose length, width and height are SUB X=123.39mm, SUB Y=83.6mm, SUB Z=1.6mm. where, SUB refers to substrate, SUB X means substrate of x axis, SUB Y means substrate of y axis and SUB Z means substrate of z axis. The ground is made to give a negative potential to the antenna. The length and width is GX=123.39mm, GY=1.6mm. GX stands for ground of X axis and GY stands for ground of Y axis.

Figure 2: Port

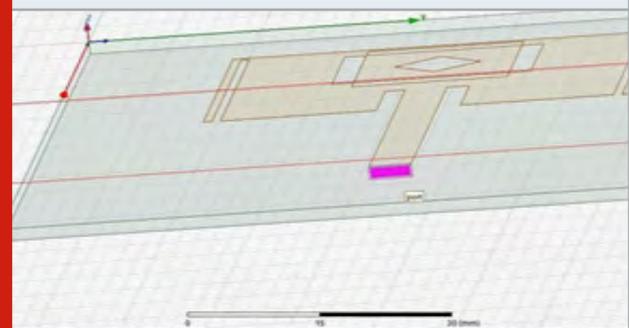


Figure.1. Design of Microstrip Patch: Assigning material for ground is perfect electric. In the proposed work, the patch is made up of a perfect electric one. This patch acts as a radiating surface to transfer electric and magnetic waves. The radiation occurs on the edges of the patches. This radiation gives rise to fringing effect.

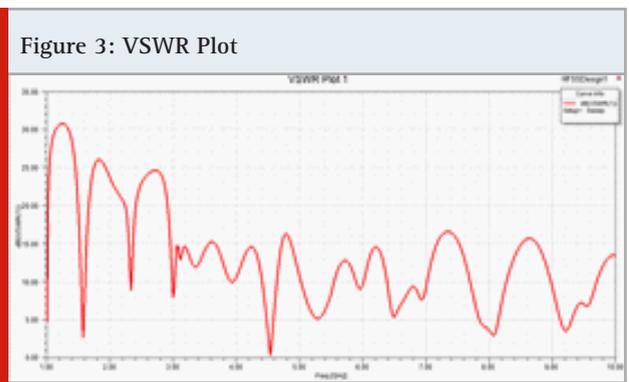
In this proposed work, patch is made in such a way that the square patch is used. Inside this square patch a rhombus shape cut is inserted. By using the optioning HFSS namely unite and substrate the rhombus and square patch is united as shown in figure.1.

The radiation occurs only through edges of this patch and it gives rise to fringing effect. This can be achieved with the help of feed. This feed is used to fed the current to the patch. This patch and feed is uniting for perfect impedance matching (that is, no reflection takes place). Though the patch is a conducting material, assigning patch is perfect electric for conduction. This rhombus shaped patch and feed is united with the help of various dimensions. These dimensions are as follows A=49.41mm, B=41.36mm, C=40.36mm, D=1mm, E=18mm, F=2.5mm, G=7mm, H=1.6mm, I=12.633mm, J=17.853mm, K=50.708mm, L=4.852mm, M=1mm, N=2.426mm.

Lumped RLC is used for models with ideal components such as boundary resistors, capacitors and inductors. Once the R or C or L values are specified, HFSS defines a square RLC barrier at each frequency, which effectively converts the RLC limit into an impedance limit. Impedance is equal to $i\omega$ reactance and full port impedance is 50 ohms. The lumped port is shown in Figure.2. The values are PX=1.6mm, PY=4.852mm. PX stands for port of X axis and PY stands for port of Y axis.

RESULTS AND DISCUSSION

Frequency at 4.7 GHz



The VSWR parameter is an indicator that numerically describes the degree to which the antenna is protected from the radio or transmission line to which it is connected. VSWR stands for SWR and is also called Standing Wave Ratio (SWR). Theoretically, the value of VSWR is 1.92 whose value is equivalent to -10 dB. In the proposed work, as shown in figure.3, the practical value of VSWR reaches 9dB at 4.7 GHz. When it compared to the theoretical value the return loss is low at 4.7 GHz. The reduction of return loss is achieved in this proposed work.

In practice, the most frequently mentioned parameter related to antenna is S11. S11 signifies how much power is reflected by the antenna. If S11 = 0 dB, then

all the power is reflected by the antenna and nothing is emitted. S parameter denotes the scattering parameter. As shown in Figure.5, at 4.7 GHz, S parameter falls to 30 Db. which denotes that there is a no scattering loss at that particular frequency. While there is no scattering loss in that frequency, the directivity is high in that particular frequency.

Figure 4: VSWR smith chart



Figure 5: S Parameter slot

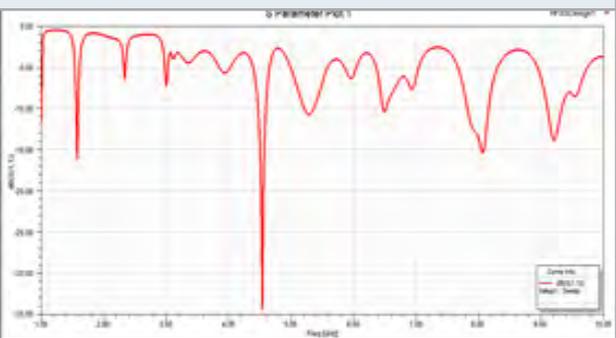


Figure 6: Impedance plot

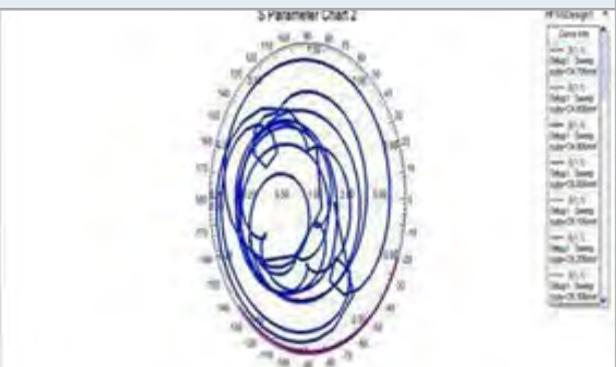
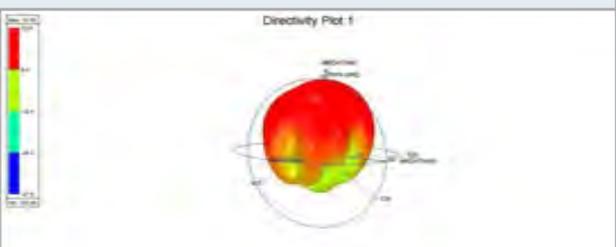


Figure 7: Directivity plot



The directivity of the tenant is the ratio between the maximum radiation intensity (power per unit area) through the antenna ten and the maximum direction transmitted by the hypothetical isotropic tenant, which is radiated by the hiatus antenna. As shown in Figure 7, the maximum direction obtained is 10.59. This value is same as that of S parameter value. Different colours indicate different ranges. The red in the directivity plot indicates the maximum directivity of the antenna. The dark blue region indicates the minimum directivity of the antenna. As shown above, this proposed work obtained a maximum directivity of 10.56 dB which is included in the range of 0 to 12.5 dB and considered as a maximum directivity.

Figure 8: Gain Plot



As shown in Figure.8, the obtained maximum gain is about 2.61. This value is same as that of VSWR parameter value. There are different colours indicate different ranges. The red in the directivity plot indicates the maximum gain of the antenna. The dark blue region indicates the minimum gain of the antenna. It was known that gain is directly proportional to the directivity, when the efficiency is 100 percent. As shown in Figure.8, when the frequency increases the slot moves from inductive region to the capacitive region.

Animated Images: By applying the angle for theta and phi it is easy to observe the radiation pattern of both electric and magnetic fields. In our proposed work, by making the angle for theta as 0 to 360 degree and phi as -180 to 180 degree. The electric and magnetic radiation is made possible as shown in figure.9 and figure.10

Figure 9: Animated Image for magnetic field

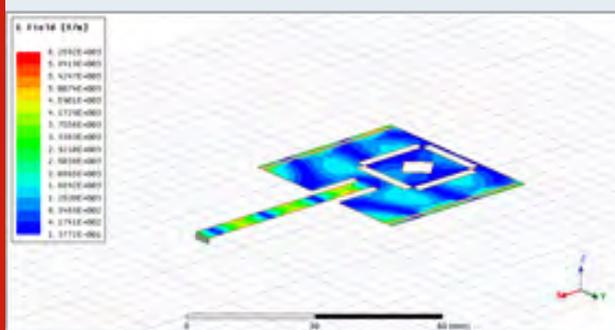
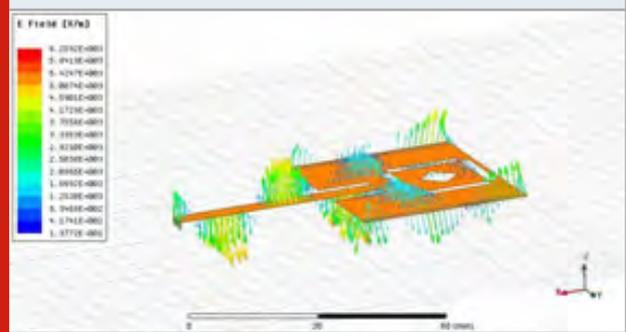


Figure 10: Animated Image for Electric Field



From figure.9 it is the clear that the radiation happens from the feed to the patch. From that patch it radiates towards its edges.

As shown in figure.10 the electric field radiates clearly through the edges of patch and also it give rise to the sin wave.

Comparitive Analysis Interm of Antenna Shape

Table 1. Comparison of results

Parameters	Values	
	Existing method	Proposed method
Shape	V Shape	Rhombus shape
Frequency	4.7 GHz	4.7 GHz
Dimension	134.5*61.9*0.1 mm	123.36*83.6*1.6 mm
Substrate	FR-4 Epoxy	FR-4 Epoxy
Gain	2.41	2.61
Directivity	6.59	10.59
Axial Ratio	109.22	114.78
S Parameter	10.04	10.5
Efficiency	70%	80%

CONCLUSION AND FUTURE SCOPE

The patch antenna with microband in this document is designed using HFSS and is modeled on frequencies other than 4.5 GHz to 5.9 GHz as shown in Figures 3 to 10, where samples of ten antennas are shown in Figures 4 to 8. , 7 GHz. Patches and ground planes are separated by FR4 epoxy with low dielectric constant and air gap. The bandwidth obtained at high frequencies is high, but the problem is that the loss of radiation is high even at high

frequencies. The improvement in gain and directivity is achieved in this paper. In future, gain can be improved further using the Rogers material.

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Design of High Performance Binary Circuits for Low Power Applications

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ABSTRACT

Today modern science and technology environment to develop the highly reliable digital design circuits which operates at low voltage, high speed, less area and small delay. It senses 1 or 0 and produces the output of logic high to logic low outputs at rising clock edge. The first stage sense amplifier and second stage is latch. The High sensitivity Signal strengthening Binary Circuit (HSBC) operates double time much faster than Master Slave binary with less energy consumption. The high sensitivity signal strengthening binary stollo's latch produces the relative outputs compared to other high sensitivity signal strengthening binary circuit, but it has some of glitch frequency and is removed by using removing glitch free circuit.

KEY WORDS: HIGH SENSITIVITY SIGNAL STRENGTHENING BINARY CIRCUIT, FLIP -FLOPS, STOLLO LATCH.

INTRODUCTION

The general instrument of binary is not quite the same as the master slave binary that comprises falling of two latches and glitch draws near. The master slave binary makes issue if the clock stages overlaps. High sensitivity Signal strengthening circuits (Sense Amplifier) acknowledge weak information signals to and intensify them to get rail to rail swings to strengthen the either improved performance or decrease power dissipation Strollo A. et al., (2005). When all is said in done the

parallel activity can be categorized in two squares. Like the approach of combined master and slave binary is shown in figure.1.

This implies the overall part of the force scattering and clock process duration of FFs is critical. In this way, the structure of low power flip-flops with little information D to yield Q delay, Test data is important. The high sensitivity signal strengthening binary circuit (HSBC), which is made out of a differential signal strengthening circuits following the slave circuits constructed by NAND gates is moderately unhampered by the previously mentioned huge Tsetup and the estimating issue. Hence, HSBC is viewed as a suitable decision for low vdd applications. Binary are the significant stockpiling components in all SOC's of advanced structure. It suit a large portion of the force that has been applied to the chip. Binary circuit is one of the important utilization segments. It is essential to

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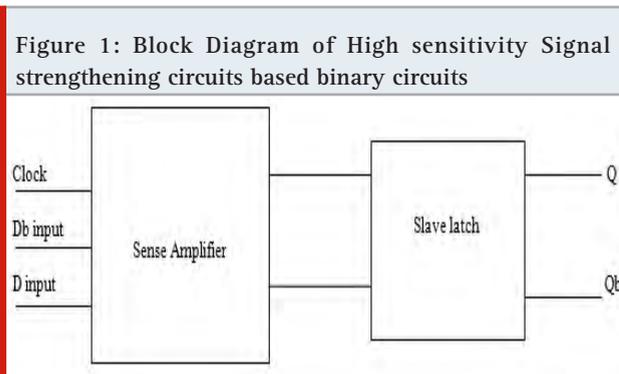
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diminish the force dispersal in both clock appropriation systems and binary s Han wool Jeong et al., (2018). For elite increment the clock recurrence with the innovation scaling. In any case, in profound sub micrometer age's better is acquired by parallelism in the engineering level Kim J et al., (2000).



However, the ordinary HSBC experiences two significant issues in low V_{dd} conditions. In the first, the slave circuit constructed by NAND gate works gradually, on the grounds that the Q delay relies upon the load on Qbar and the other way around. It was found that the standard speed bottleneck of existing HSBC's is the cross coupled set-reset (SR) latch at the yield stage. To bode well speaker increasingly proficient, structured a timed CMOS based latch for the sense amplifier Markovic D et al., (2001). The principle disadvantage of HSBC proposed is the slave component, created by a setRbareset NAND latch while this circuit requires a limited transistor count, it brings about deviated delays with a moderate high-to-low clock-to-yield delay Akila M et al., (2014). Low power, High speed Multipliers are needed for high speed switching applications like Digital Signal Processing (DSP), microprocessors and filters. Various multiplier architectures are implemented by various research people Strollo A. et al., (2005).

The Proposed Nikolic's HSBC improved exhibitions by utilizing a symmetric slave latch made out of two inverters and two complex CMOS logic gates. The exhibition gain is paid with an expanded number of transistors in the final stage, which is made out of 16 MOS transistors Rajendra prasad and narayan krishan vyas (2015). In Kim propose a HSBC circuit that utilizes a slave latch acknowledged with two CMOS circuits and two cross-coupled frail inverter sets, which are expected to make the binary static. The Kim HSBC is exceptionally quick, with the output falling progress having a one logic gate delay concerning the dynamic logic edge, and requires 14 MOS transistor in the yield latch. The HSBC proposed still has a few detriments. The first is the glitching on the output hubs, which is increasingly articulated for light burden conditions. The subsequent impediment is because of the utilization of cross-coupled inverter latches that require a suitable gadget estimating for a right activity and experience the ill effects of crow-bar current that increase power consumption.

METHODOLOGY

Now a days digital design systems to develop integrated circuits using tools like cadence, synopsys, mentor graphics, xilinx etc. Cadence Virtuoso Analog Design Environment sets the standard in quick and precise design. Cadence Environment includes different models like gpdk180nm, gpdk90nm, gpdk45nm, gpdk30nm, gpdk25nm...etc., when all binary s are completely gpdk45nm technology used.

HIGH SENSITIVITY SIGNAL STRENGTHENING BINARY CIRCUITS:

The conventional HSBC is essentially made out of two phases: a Signal strengthening circuit with NAND gate RS latch depicted in figure 3. During the pre-charge stage, the clock signal CLK switched to low. Similarly, MN1 is off and MP1 and MP4 are turned ON. Accordingly, 2 output points of the Signal strengthening, Sbar and pre-charged to higher level, which induce RS slave circuit to hold the previous state of Q and Qbar. Likewise, the inward node in the Signal strengthening stagey are additionally pre-charged to moderate voltage levels dictated by the limit voltages of NMOS transistors. At the point when the assessment stage begins with CLK rising, the Signal strengthening stage begins to turning ON MN1 and making off of MP1 and MP4. This makes midpoint be reduced to the zero voltage, V_{gnd} , by MN1. In the event that D is low and Dbar is high, this released midpoint causes MN3 to turn ON, while MN2 remains off. This causes Rbar to be reduced more than S bar, while Sbar and Rbar at the end of transition as V_{dd} and V_{gnd} separately.

As a result of Signal strengthening, either Rbar or Sbar turns out to be low. At that point, Q and Qbar are driven by the slave latch as indicated by the condition of Rbar and Sbar. The Rbar changes to low under the condition that the past conditions of Q and Qbar are logic 1 high and logic 0 states. Similarly, Qbar is first changed to high by NAND2. This outcomes in the two inputs of NAND1 being high and Q is changed to zero. The proposed binary circuits can be made more secure by embedding a output isolated inverter turned on and to the detriment of another phase of delay. For this situation, the various delay organizes between the low-to-high and the high-to-low changes can be compensated by utilizing marginally equal output inverters. The Nikolic's HSBC is depiced in figure 4. The cross coupled inverters used in this circuit produces R and S signals used to control the pull down path of Q and Qbar, separately. Along these lines, the speed of the high-to-low progress of Q (Qbar) is found by how quick R (S) ascends in the Signal strengthening stage, which implies that the deferral of Q is free of the/(Q) delay. The slave latch of Kim's HSBC appeared in figure 5, which is additionally gives the pull down way to Q, Qbar, which is controlled autonomously of Qbar.

The Kim's HSBC experiences a glitch on the output Q and Qbar. This happens when the past conditions of both Q and the tested D are high. At the rising edge of CLK, Q must remain high for this situation. In any case, Sbar

has not yet been released by the Signal strengthening stage, the pull down ways of Q, MN7 and MN8, are empowered. This outcomes in a discharge of Q until Sbar is completely reduced to zero, prompting a glitch on the node Q. Measuring the glitch is critical, as discharging Sbar is a protracted procedure. This is on the grounds that MN5 in the discharging path of Sbar in the Signal strengthening stage (MN5–MN2–MN1 in figure 3) is driven by the temporary reduction in Rbar from vdd at the rising edge of CLK. The slave latch of Strollo’s HSBC is depicted in figure 6. It joins Kim’s plan with the regular NAND2-based slave latch to beat the restrictions of the regular HSBCs.

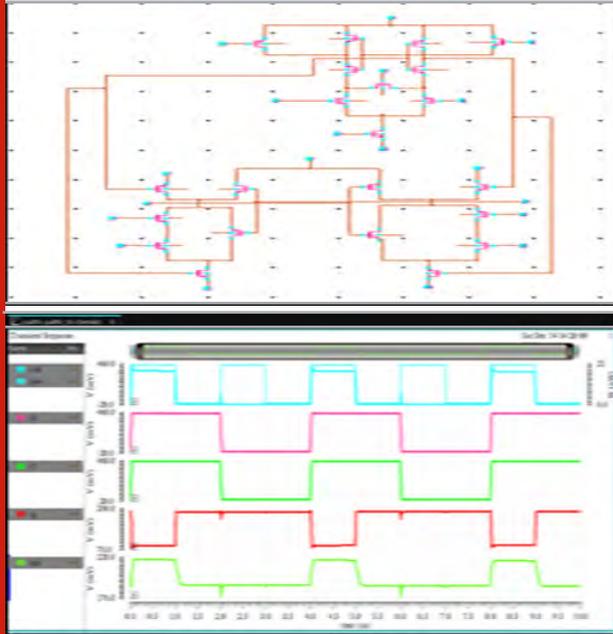
Also, by introducing NMOS gate by Dbar and D at the pull down path of Q and Qbar, separately, the glitch identified in Kim’s HSBC is prevented by pull-down ways appropriately doesn’t evacuate the current contention. Stollo’s HSBC is the benefit results compared with the previous binary s and also are appearing glitches also. The next step is to remove these glitches by using Strollo’s HSBC with glitch free circuit.

RESULTS AND DISCUSSIONS

The results of high sensitivity signal strengthening binary circuits are designed using cadence virtuoso gpdk 45nm technology those schematic and operational waveforms are shown in figure 2.

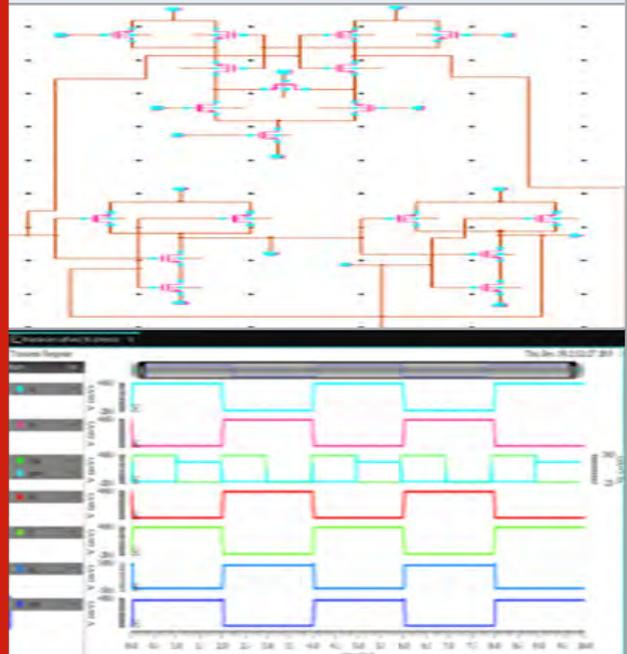
A. Proposed Hsbc

Figure 2: Schematic of proposed high sensitivity signal strengthening binary circuits & its Output Waveforms



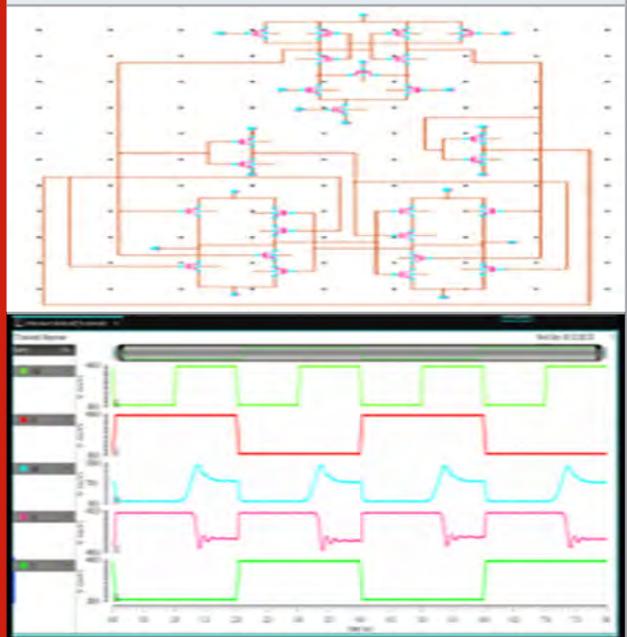
B.NAND2 HSBC: The schematic and output waveforms of NAND based high sensitivity signal strengthening binary circuits is shown in figure 3.

Figure 3: Schematic & output waveforms of NAND2NAND HSBC.



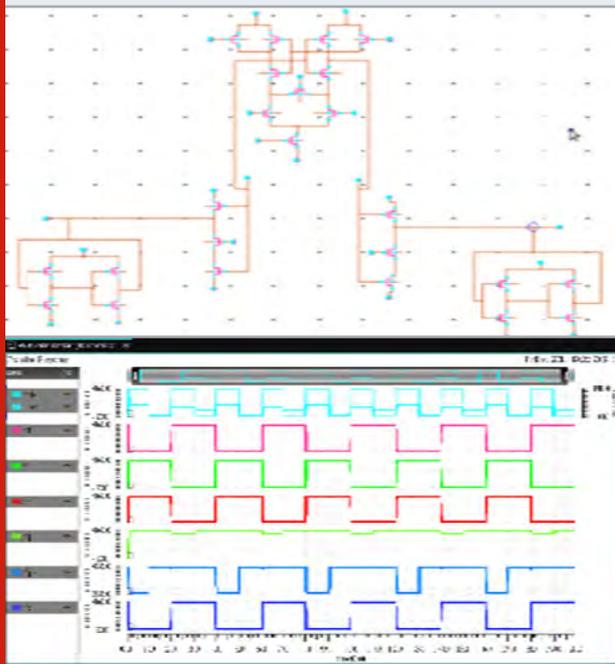
C.NIKOLIC HSBC: The schematic and output waveforms of Nikolic based high sensitivity signal strengthening binary circuits is shown in figure 4. It is observed that, glitches will be produced in the output during the transitions of clock signals.

Figure 4: Schematic & Output Waveforms of NIKOLIC HSBC



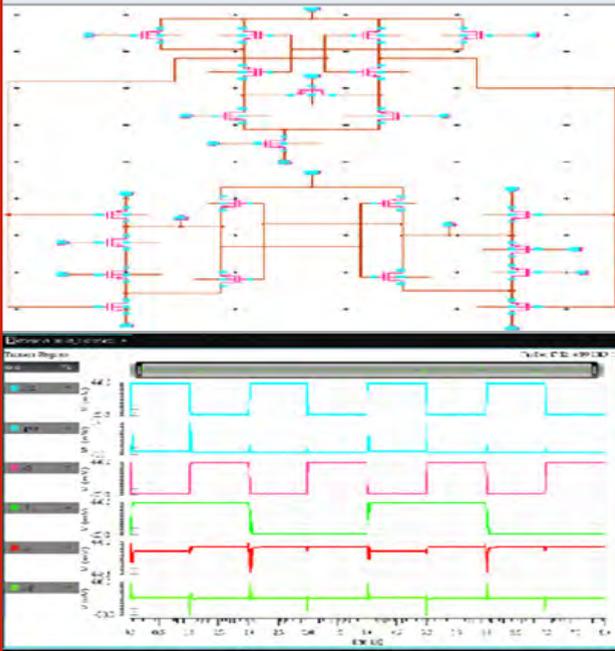
D. KIMS HSBC: The schematic and output waveforms of KIMS high sensitivity signal strengthening binary circuits is shown in figure 5.

Figure 5: Schematic and output waveforms of KIM'S HSBC.



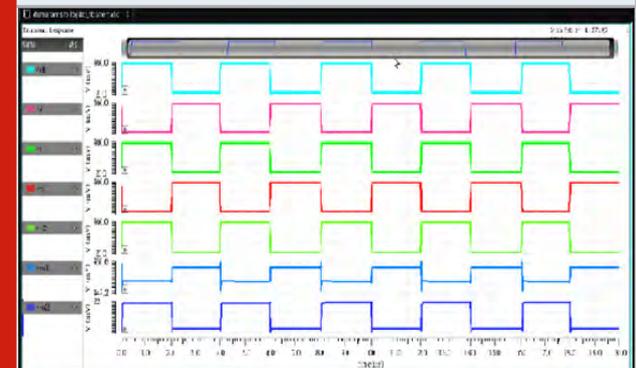
E.STROLLO'S HSBC: The schematic and output waveforms of STROLLOS high sensitivity signal strengthening binary circuits is depicted in figure 6.

Figure 6: Schematic and output waveforms of STROLLO'S HSBC.



F.Strollo's Hsbc With Glitch Free Result: The glitches are removed by adding the additional circuits in Strollos high sensitivity signal strengthening binary circuits . The simulated output waveform without glitches are depicted in figure 7.

Figure 7: Waveforms of the stroll's glitch free HSBC.



CONCLUSION & FUTURE SCOPE

High sensitivity Signal strengthening Binary Circuits with a differential unique structure for its testing is proposed for superior and low power application. For low flexibly voltage activity, a fast and profoundly dependable, high affectability signal strengthening binary circuits has been proposed. To develop the project linear feedback shift register based on test vector generation using high sensitivity signal strengthening binary circuits then the results comes under glitch free output and asynchronous single pulse applied to 4 bit LFSR d binary s when exclusive operation output is applied to 4 bit of single input stuck at faults is to be designed. At the point when the circuit has current contention and glitches of past HSBCs can be additionally strengthened by the detection signal associates with the pull down path of the high sensitivity signal strengthening stage and in this manner the slave latch. The proposed and previous binary are operational parameters, hold time, power consumption and area.

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Capacity Enhancement in Mobile Cellular Communications

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ABSTRACT

In modern cellular communication, capacity enhancement is a vital factor. Smart phones and other user equipments which uses data from internet increases day by day, hence there is a need to cater data to these user equipments. With the available spectrum, catering these huge number of equipments pose a great challenge. In this paper we present various methods of capacity enhancement in a mobile cellular cellular network.

INTRODUCTION

Mobile communication is one of the successful technology innovations in modern history. Due to the increasing popularity of smart phones and other data devices, demand for mobile data is increasing. Currently employed 4G Long Term Evolution- Advanced(LTE-A) systems uses modern technologies like Orthogonal Frequency Division Multiplexing (OFDM), Multiple Input and Multiple Output (MIMO), Multi user diversity, link adaptation, turbo codes and Hybrid automatic request Sherif Adeshina Busari and KaziMohammed Saidul Huq. According to an estimate mobile data demand grows at a rate of 108 percent compounded annual growth. In order to meet this exponential growth the network capacity has to be increased manifold. One way to increase the network capacity is to cover the Geographical area with more number of small cells Zhouyue pi and Farooq khan.

Increasing cells will only increase the capacity linearly, to meet the exponential growth of mobile data demand, the under utilized 3GHz to 300 GHz has to be exploited. Radio waves of frequency range 3 GHz to 30 GHz is called Super High frequency (SHF) and the frequency range 30 GHz to 300 GHz is called Extra High Frequency S. Vahid et al., (2015). Since radio waves at these two bands share similar propagation characteristics, the frequency range 3 GHz to 300GHz is called millimeter wave band. In this paper we exploit the various methods to increase the capacity of mobile data network A. Goldsmith (2005). A comparison of performance metrics of 4G and 5G networks is shown in table 1.

I (a)Conventional methods: At present capacity of cellular mobile network is increased by adopting various techniques like frequency reuse, reducing the cell radius, reducing the cluster size and cell splitting S. Mattigiri and C. Warty (2013).

By reducing the cell size, the number of clusters over the given geographical area can be increased and since each cluster is allotted with the whole frequency band. These same band of frequencies are reused at different clusters thereby increasing the number of users. The cell size cannot be decreased beyond a limit which produces serious co-channel interference.

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If the cell size and the power transmitted at the base stations are same then co-channel interference will become independent of the transmitted power and will depend on the radius of the cell (R) and the distance between the interfering co-channel cells (D). If the D/R ratio is increased, then the effective distance between the co-channel cells will increase and interference will decrease. Frequency reuse ratio (Q) is related to the cluster size and is given $D/R = \sqrt{3N}$ for hexagonal geometry. Small values of Q Results in small cluster size and increase in system capacity, whereas larger Q results in larger the cluster size and decrease in system capacity H. Innaglu (2013). Quality of transmission decreases with smaller cluster size because distance of co-channel cell D, reduces and more co-channel interference. Larger the Q, larger the distance between co-channel cells and lesser is the co-channel interference. Signal to interference ratio (SIR) can be approximately written as

Performance Metrics	4G	5G
Peak data rate (Gbps)	1	20
User experienced data rate	10	100
Connection density (devices/KmK ²)	10 ⁵	10 ⁶
Mobility support(Kmph)	350	500
Area traffic capacity(Mbit/s/m ²)	0.1	10
Latency(ms)	10	1
Reliability(%)	99	99.99
Positioning accuracy(m)	1	0.01
Spectral efficiency(bps/Hz)	3	10
Network energy efficiency (J/bit)	1	0.01

$$\frac{S}{I} = \frac{R^{-n}}{\sum_{i=1}^{i_0} D_i^{-n}} = \frac{(D/R)^n}{i_0} = \frac{(\sqrt{3N})^n}{i_0}$$

The worst case SIR with path loss exponent n=4 is

$$\frac{S}{I} = \frac{R^{-4}}{2(D-R)^{-4} + 2D^{-4} + 2(D+R)^{-4}}$$

This is the case for a cluster size of 7.

$$\frac{S}{I} = \frac{1}{2(Q-1)^{-4} + 2Q^{-4} + 2(Q+R)^{-4}}$$

For cluster size of N=7, Q= $\sqrt{21}$ =4.6, the worst case SIR now is 17.3dB, which is slightly less than the accepted SIR of 18dB. The table below shows the standard value of cluster size and their corresponding SIR.

If the total geographical area is A, then the number of clusters required to cover area A is given by

$$M = \frac{A}{N3\sqrt{3}R^2/2}$$

From the above equation , the number of clusters and hence the capacity of the system can be increased by decreasing the cluster size which in turn compromises QoS by decreasing SIR, hence there exists a trade off between cluster size N and number of clusters M. channel density per square kilometer can be increased by reducing cluster size.

I.(b)Cell splitting: Cell splitting is employed where capacity has to be increased in certain parts of the regions of coverage. Here a cell of larger radius is split into smaller cells, with both large and small radius cells co-existing. If the radius of the new cell is half that of the large cell radius, then four small cells will occupy a single large cell. The transmit power of smaller base station is reduced in such a way that the power levels of the large cell and small cell at the edge of the cell should be same. If P₁ and P₂ are the power levels of large and small cells, by assuming path loss exponent of n=4, then the power levels at the edge of the cell

is $\frac{P_1^2}{R^4}$ and $\frac{P_2^2}{r^4}$ respectively. If the power levels are to be same then $P_2 = \frac{P_1}{16}$ i.e. the transmit power level of smaller base station should be 12 dB less than that of large base station in order to maintain the same SIR.

NSIR in	dB
3	8dB
7	17.2 dB
12	22.5 dB

I (c) Cell sectoring: Another method to increase the system capacity is by employing sectored antennas at the base station. The sector angles can be 60° or 120°. Three sectored antennas are required to serve a single cell, similarly six sectored antennas are required to serve a single cell. If 120° sectored antennas are used then a particular cell will receive interference from only two co-channel cells in the first tier of a seven cell cluster. Similarly for 60°sectored cell only one co-channel cell in the first tier of seven cell cluster interferes with the cell.

SIR for 120°sectored cell is given by

$$\frac{S}{I} = \frac{(\sqrt{3N})^n}{1} = \frac{(\sqrt{3 \times 7})^4}{1} = 26.4 \text{ dB}$$

where the path loss exponent is assumed to be four.

Since 15 dB SIR gives a satisfactory performance, cluster size can be reduced from seven to four which gives an SIR of 21.6 dB. Further reducing the cluster size from four to three gives SIR of 16.07 dB which is still above

the chosen threshold. Here the frequency reuse ratio $Q=D/R=\sqrt{3N}$ decreases and increase in cellular capacity.

II Proposed methods:

II (a) Millimeter wave systems: The spectrum currently employed for cellular mobile communication is 900 MHz band and 1800 MHz band. These spectrum is already overcrowded and will not be able to cater the exponential growth of data traffic. Usage of spectrum in millimeter wave band i.e. 30 to 300 GHz is one of the promising candidate for capacity enhancement in the forth coming 5G systems. The huge available bandwidths at these frequencies enable higher mobile data traffic per geographical area, higher user data rate, more connected devices and reduced end to end latency. The attenuation at these frequencies is relatively high, according to Friss free space model the received power in a LOS scenario is given by

$$P_r(d) = \frac{P_t G_t G_r \lambda^2}{(4\pi)^2 d^2}$$

Where the received power reduces with increase in frequency, but this decrease in power is compensated by gains of transmitting and receiving antennas, where effective aperture of antenna increases with increase in frequency. Gain of half wave dipole antenna is given by

$$G = \frac{4\pi A_e}{\lambda^2}$$

Short wavelength requires smaller dimension of half wave antenna. Hence more number of these smaller antennas can be compactly as an array of antenna in base station and user equipments. Also high frequencies require smaller cells to overcome blockage and path loss at the same time interference also decreases rapidly.

figure 1 shows atmospheric absorption characteristics of millimeter wave. Attenuation peaks at around 60GHz and 183GHz which are the oxygen and water vapor absorption bands. Figure 1 also shows low attenuation transmission windows which are at approximately 20GHz and 38GHz. these low attenuation transmission windows can be exploited for millimeter wave mobile cellular applications. while low frequency signals can easily penetrate buildings and other materials mm waves suffer high attenuation by buildings. table 2 gives attenuation in dB of millimeter waves for different materials.

Table 3

Material	Thickness in cm	Attenuation for f=40GHz
Concrete	10	175
Brick wall	10	178
Mortar	10	160
wood	0.7	3.5
plaster board	1.5	2.9
clear glass	0.4	2.5

from table 2 it is seen that for millimeter wave transmission mostly signals will be confined to outdoors structures and streets. Indoor coverage will be mostly due to wooden doors and glass windows. Millimeter waves suffer high attenuation due to heavy rains. Figure 2 shows attenuation in dB / Km for rain rates in mm / h.

Figure 1

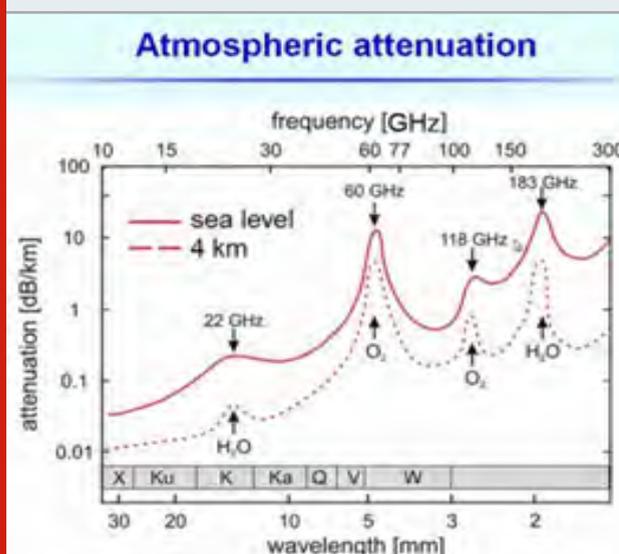
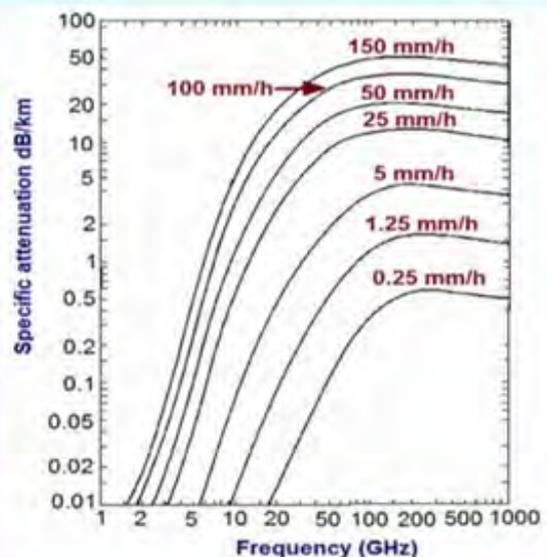


Figure 2



from the above figure light rain at the rate of 1.25 millimeter per hour causes attenuation of around 1dB per kilometer. Heavy rain at the rate of 150 mm/h causes tens of dB/km. these are the challenges to be considered while

designing millimeter wave systems. Other promising aspects of Millimeter wave systems are Massive MIMO and Beamforming techniques. Massive MIMO employs more number of high gain antennas at the transmitter and receiver compared to conventional MIMO. It enhances the capacity of the mobile network through aggressive spatial multiplexing and beamforming techniques which reduces interference.

II (b) Orthogonal Frequency Division Multiplexing: due to multipath propagation in wireless channel intersymbol interference occurs. In high bit rate data transmission, due to arrival of signals along different paths adjacent symbols overlap with each other resulting in Intersymbol; interference. Orthogonal Frequency Division Multiplexing (OFDM) is one of the techniques used to mitigate InterSymbol Interference.

If P number of bits are transmitted in T seconds serially then the bit rate is P/T bits/sec. In OFDM bit duration is increased to T seconds and each of the P bits modulate P orthogonal subcarriers. signals are said to be orthogonal if it satisfies the following condition. If $x_1(t) = e^{j2\pi f_1 t}$ and $x_2(t) = e^{j2\pi f_2 t}$ are complex exponential signals then $N = \int_{t_1}^{t_1+T} x_1(t) x_2^*(t) dt$ where f_1 and f_2 are integral multiples of $1/T$. For orthogonal signals $N=0$. If f_1 and f_2 are equal then N gives energy of the signal.

P serial bits are converted to P parallel bits each of duration T seconds, these parallel bits amplitude modulate P orthogonal sub carriers and the modulated signals are summed up, the resulting expression is given as

$$y(t) = \sum_{n=0}^{P-1} c_n e^{j2\pi f_n t} \text{ where } f_n = \frac{n}{T_s} \text{ if these signals are sampled at } t = \frac{kT_s}{P} \text{ then}$$

$$y(k) = \frac{1}{\sqrt{T_s}} \sum_{n=0}^{P-1} c_n e^{j2\pi n \frac{k}{P}}$$

the above equation represents IDFT of P symbols. The time duration T_s of each symbol should be greater than the RMS delay spread of the wireless channel. In other words the signal Bandwidth should be less than that of the coherence bandwidth of the channel.

To further reduce ISI, guard time is inserted between symbols. The guard time is in such a way that a part of the end of the symbol is copied and inserted to the front of the symbol, this is known as cyclic prefix. If useful symbol duration is T_s and guard time is T_g , then the total symbol duration is $T_s + T_g$. Figures 3 and 4 shows OFDM transmitter and receiver.

(MIMO): According to Shannon’s capacity theorem ,the channel capacity in bits/sec/Hz is given as

$\frac{C}{B} = \log_2(1 + \rho)$ where C is capacity of the channel in Bits per second , B is Bandwidth of the channel and ρ is signal to noise ratio at receiver. according to this equation channel capacity can be increased by increasing the Bandwidth of the channel or increasing signal to noise ratio of the signal. since spectral resource is scarce, bandwidth is limited. By increasing the transmit power, capacity increases only logarithmically. In MIMO system the number of channels between transmitter and receiver can be increased by using multiple transmit and receive antennas as shown in the figure 5.

Figure 3: OFDM transmitter

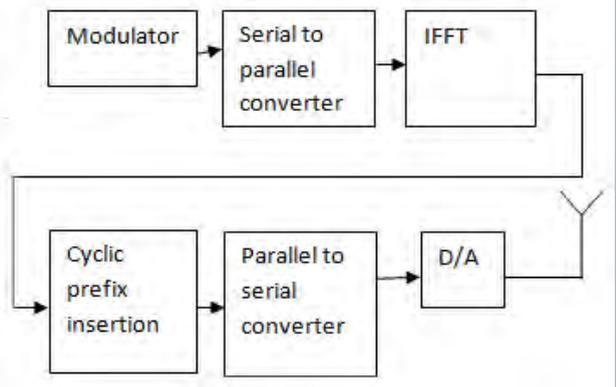


Figure 4: OFDM receiver

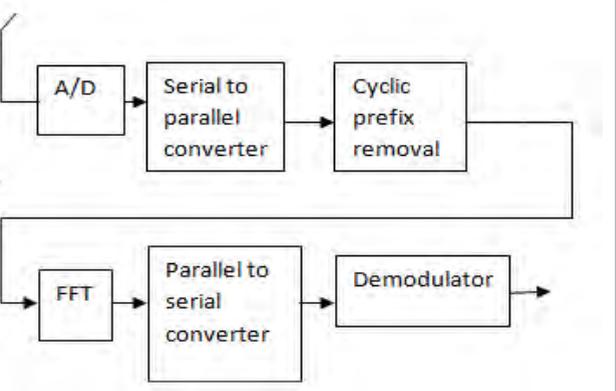
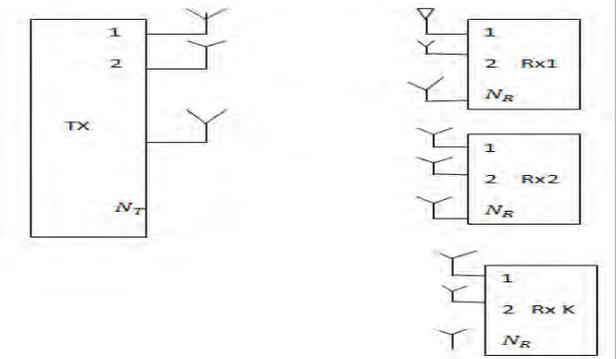


Figure 5: MU- MIMO system



Consider a $N_t \times N_r$ MIMO system as shown in the figure. Where N_t is number of transmit antennas N_r is the number of Receive antennas in a single receiver. Channel voltage gain between transmitter K and receive antenna I is denoted as h_{ik} it is a complex number with real and imaginary parts with corresponding power gain $|h_{ik}|^2$. If s_k is the voltage transmitted from antenna k , then the received voltage at antenna i is $s_k h_{ik}$.

The transmitted signals in Matrix notation is

$s = [S_1, S_2, \dots, S_{N_t}]$ and channel gain matrix H is

$$H = \begin{bmatrix} h_{11} & \dots & h_{N_t 1} \\ \vdots & \ddots & \vdots \\ h_{1 N_r} & \dots & h_{N_t N_r} \end{bmatrix}$$

Signal arriving at i^{th} receiver antenna is

$$x_i = \sum_{k=1}^{N_t} h_{ik} s_k + w_i$$

$$i=1, 2, \dots, N_r$$

w_i is additive white gaussian noise term. In vector form it can be compactly represented as

$X = [x_1, x_2, \dots, x_{N_r}]^T$ is the received vector and $W = [w_1, w_2, \dots, w_{N_r}]^T$ is noise vector.

For $N_t \times N_r$ MIMO system, Shannon's limit is given as

$$\frac{C}{B} = E \left\{ \log_2 \left[\left(I_{N_r} + \rho \frac{1}{N_t} H H^* \right) \right] \right\}$$

H^* is complex conjugate of channel matrix H . Here Channel is modeled as Rayleigh fading model, hence H is complex Gaussian.

By Eigen decomposition $H H^* = U \Lambda U^H$ where U is Eigen vector matrix, Λ is diagonal matrix of Eigen value λ_i . Hence

$$\frac{C}{B} = E \left[\sum_{i=1}^{N_r} \log_2 \left(1 + \rho \frac{\lambda_i}{N_t} \right) \right]$$

for $N_t \geq N_r$.

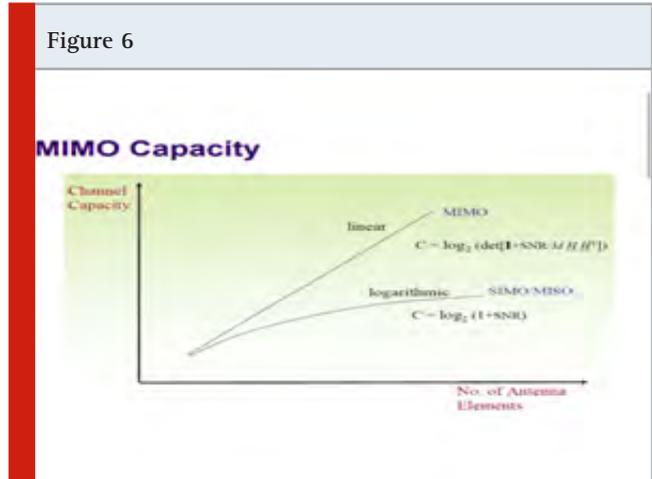
$$\text{and } \frac{C}{B} = \sum_{i=1}^{N_t} E \left[\log_2 \left(1 + \rho \frac{\lambda_i}{N_r} \right) \right]$$

for $N_r > N_t$

these expressions suggest that the total capacity of a MIMO system is the sum of capacities of individual channel of SNR $\rho \frac{\lambda_i}{N_t}$ it is clear that the channel capacity increases linearly with the number of channels unlike Single input single output (SISO), Where capacity

increases logarithmically with signal to noise ratio. Figure 6 shows comparison capacity improvements in Multiple input Multiple output (MIMO) system and Single input and single output systems (SISO).

Figure 6



CONCLUSION

In this paper we have presented the various methods employed and proposed for enhancing the capacity of mobile cellular networks. Millimeter wave spectrum with frequencies in the range of 30-300GHz can potentially provide the Bandwidth required for the future 5G networks and beyond 5G networks. These Millimeter wave systems may need to be redesigned relative to the current 4G systems to obtain the full potential of mm wave bands. In particular the heavy reliance on directional transmissions and beamforming will necessitate reconsideration of many basic procedures such as cell search, synchronization, random access and intermittent communication.

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Military Based Voice Controlled Spy Bot with Weapon Detector

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ABSTRACT

The project is designed to develop robotic vehicles using smartphones for remote control with wireless cameras for monitoring purposes. With a camera, the robot can transmit wireless video in real time. The proposed robotic unit will be useful for cleaning military territories. At the end of the transfer, the instructions are sent to the receiver using the buttons on Android to control the activities of the robot so that it moves forward, backward and right or left. At the end of the reception, two engines are connected to the microcontroller to move the car. Mobile Android functions as a remote control, which has the benefit of having a sufficient sort of the respective ten networks. The receiver decodes the motor for the necessary operation before nursing it to another microcontroller to control DC motors through IC. The wireless camera is attached to the spy robot body even in complete darkness with infrared lighting. The project is used to collect weapons on the battlefield using a vacuum pump in front of the robot.

INTRODUCTION

The foremost impartial of this paper is to collect the weapons lost by soldiers in the war fields with the help of surveillance camera. Many technologies emerged and paved its way in various fields of (science and technology) life and development. Technology has extended its space and advancement in industrial developments, military bases and etc. Some advancement is needed for making

the things much easier. The novelty of the project lies in finding objects and human in calamity affected areas. The existing methods use IR sensors, a UV detector etc with in a limited working range and with less operating life. Another problem arises which is the internet or Wi-Fi connection, because in a calamity affected area or destructed area or military base, internet connection won't be available in good condition. This makes us to find solution should to overcome the major flaws in the war field.

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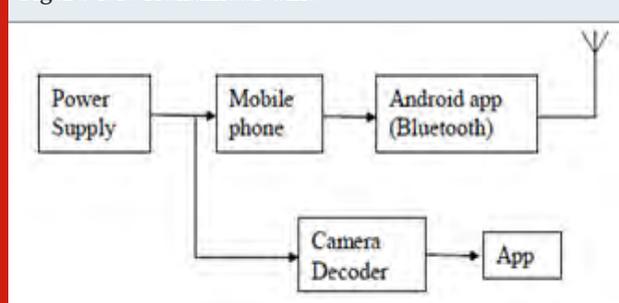
Transmitter Division Of The Robotic Vehicle

Related Works

Yan Xiangwu and Yan Xiang Wu (2014) discussion of Smart Car Design The SCS A11A is a type of single-chip MCU that was developed to process voice signals

as the chief controller and uses transistors to create an H-bridge driver control route to control vehicle speed. Completes the acquisition and playback of the voice signal using voice input to control vehicle operation. The system uses fewer hardware connections. E Amareswar et al., (2017) mentioned that a system with appropriate sensors and cameras performs various tasks. Mobile robots work remotely for reconnaissance patrolling and transmitting images back to the operator. There are many submissions on the Internet that use the built-in equipment of these devices, such as Wi-Fi technology, Bluetooth, to control other devices. Multipurpose military service robot designed to meet the requests of the military and police.

Figure 1.1: Transmitter Unit



Donald et al., (2016) explains about intelligent vehicles in which accidents rarely occur, congestion is condensed, carbon emissions are reduced, and mobility is increased for a large part of the population. It is understood that autonomous and intelligent machines can earn security. Shih-Chia Huang, Bo-Haochen, Sheng-Kaichou Visualize a smart car that will provide and conduct virtual control of every part in your life. Increasing daily traffic on highways, urban roads, and chaotic landscapes will become a reality in the next few decades. At this point, drivers of the smart world can create their own smart cars based on their tastes and needs. As a result, a smart car will provide not only driving conditions, but also a safe environment.

Bhuvaneshwari Jolad et al., (2016) developed a system for controlling robotic vehicles through voice commands for remote operation. Arm Series Microcontroller with Android with Plications is used for the desired surgery. By using long-range modules and other connectivity devices, the robot gets long-distance connectivity. P. Parthasaradhy and k. Manjunatha Chary presented the application of solar energy to control a robotic vehicle using speech recognition. An Arduino is used along with an android submission for the preferred operation. Production of solar vehicles will create employment opportunities and less pollution. Solar vehicles also require less maintenance compared to conventional automobiles.

Atif et al., (2017) A system has been developed that connects autofocus to an infrared sensor. The front assistant will monitor the movement in front of the car, take precautions when the car is approaching the

brakes, and helps maintain a proper distance from the obstacle to avoid obstacles. Bluetooth Innovation is a small, remote wireless connection that uses low-energy radio frequency with minimal effort. Almost no energy. Sudeep Sharan et al., (2019) has developed a convenient if a speech and voice recognition system. In this article, the author discusses voice control software systems with slam algorithms available on robotic operating systems (ROS). The voice system shows good results in various experiments and recognizes the speaker's voice and performs the task in accordance with the speaker's commands.

Zeeshan I. Sheikh and K.N.Kasat described that the robot can be organised using voice commands. It uses Arduino for voice control to avoid interruption, and for voice control modules. This system makes life as convenient as possible, and also has advantages. Marchel T. Tombeng et al., (2016) explained that the system is connected to the Ardino smart watch via Bluetooth, and after connecting to this Ardino will check the commands or signals sent by the smart watch. Using a digital scheme that integrates a smart watch with a microcontroller takes fewer time than a manual system. Zhadyra, T. Zhumasheva Aidana and S. Kyzdarbekova explained the task of refining the sound control efficiency of robots based on the adaptation process. Problems considered in the context of the sound resistance process of speech signs for voice recognition subsystems. Experimental results obtained by sound resistance and accuracy parameters for detecting speech commands for mobile robots' voice regulator systems.

Yogeswaran.S and Venkatesh.S demonstrated a technique by which text-based text can be identified to regulator gear changes in light vehicles. This can be useful for persons who lost their hands in an accident while driving. Lots of research for a useful driver-car interface. Shahidraza et al., (2017) explained that in the last few years there has been a lot of interest between the Internet of Things (IoT), the transcending industry, education and government. The optimism of the IoT has also exaggerated the basic technology before it matures into a sustainable environment. The authors experimented with Bluetooth being the perfect technology for low energy devices in the Internet of Things. Tayyabzafar et al., (2019) developed a system that is flexible enough to quarter any superior camera without any variations to the equipment of the system. A universal solution that can intelligently resume work in the event of a temporary interruption. Petrmašek and Michalruzicka developed that the system is based on the primary function of a system command. The solution uses a pre-learned database with a bias method. The main advantage of the presented method is the processing time. Process time does not affect growth.

Proposed System: The design of our project encourages the development of Bluetooth-based robotic vehicles for remote control with wireless cameras mounted on a surveillance robot. The robot is equipped with a built-in microcontroller of the Mega series for the preferred process and is usually used for espionage purposes. The

3.2.4 Wireless Camera: The proposed system uses a wireless CCD camera. This camera supplies a 12 volt DC power supply. The camera has a receiver mounted on a remote station. The output takes the form of audio and video signals. These signals are sent directly to the TV or computer via the tuner card. This CCTV camera is mounted on a robot. The camcorder captures audio and video signals and sends them to a remote station. We can display recorded signals with a camera receiver connected to a TV or computer. It is a mini video camera that is a wireless monitor and is used for home and small business surveillance and wireless receiver which we use for performance purposes. We're putting this wireless camera on an existing combat robot on the battlefield.

Relay: The relay shown in Figure 2.2. is a switch controlled by an electromagnet. This is beneficial if you have a lamp or a low-current motor to drive another circuit with a system requiring high current, or if you want to control several different switch contacts at the same time. A relay is a switch controlled by an electromagnet. This is beneficial if you have a small current to control another circuit with a system that requires a large duct, such as a lamp or an electric motor, or if we want to control several different switch contacts at the same time. When the current driven by the coil flows, the soft iron core becomes magnetic and attracts the L-shaped soft iron reinforcement. It sways at its main point and opens, closes or changes, an electrical contact controlled by a circuit closes this contact. The current required for the relay to operate is called the trip current.

When the current in the reed switch coil drops to zero, a large amount of voltage is encouraged in the coil. This voltage can harm any transistor used to monitor the current in the coil. However, if the diode for the supply voltage is connected to a reverse bias, it provides an informal path to the induced voltage and stops the construction to a higher value. Sometimes it is present as a protective device in the main electrical circuit. In one case, an electric current passes finished the "disconnecting coil" of the relay type to the ground, for example, a malfunction causes the metal casing of the equipment to start working. The resulting rod in the coil unties the switch, which can be configured to open the route before it comes to, say, 25V.

Figure 3.2.5: Relay

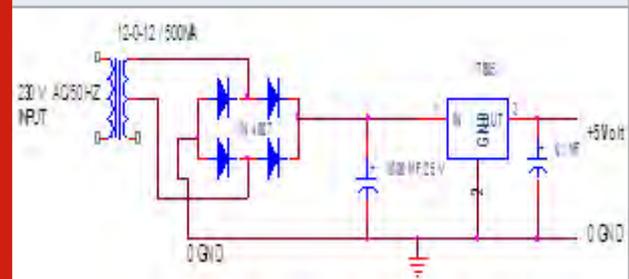


3.2.6 Power Supply Unit: Figure 2.2. The power supply circuit shown in the figure is an important part of any electronic system and therefore its design is an important

part of every application. In order to overcome the influence of the product so that the load is reduced and the supply is interrupted, it is really necessary at the moment to make the right choice of the power source. This chapter describes the functions of a circuit that was created with filters, rectifiers and then with voltage regulators. A constant DC voltage is obtained by correcting an AC voltage, starting with an AC voltage, then filtering it to a DC level and finally ordering to obtain the required DC voltage.

Regulation is typically accomplished through the use of the IC voltage regulator unit that accepts a DC voltage and provides a slightly lower DC voltage that is converted to an input DC voltage or that changes the output load connected to the DC voltage even if it is the same. An AC voltage, typically 220 V rms, is connected to a transformer that lowers this voltage to the desired level of DC output voltage. The diode rectifier then provides a modified half-wave voltage, which is originally filtered through a simple capacitor filter to maintain a constant energy. The resulting DC voltage usually has a ripple or AC voltage. The regulator circuit reduces ripples and maintains the same DC value even if the load connected to the DC input voltage or the DC output voltage variations. Such voltage regulation is usually achieved by using one of the IC units of the common voltage regulator.

Figure 3.2.6: Power supply unit



3.3 Software Description

3.3.1 Embedded C: Programs have an adequate structure (which is determined by the programming language C) and can be divided into separate functions. Contributes to the reuse of ASCII text files and to the excellent overall design of the application. The possibility of mixing the selection of variables with certain operations improves the readability of the program. Keywords and operational functions similar to those used in human thought processes can also be used. When using Embedded C, the programming and test time of the program is significantly reduced. The C runtime library has many standard routines such as formatted output, numeric conversions and floating point arithmetic. Existing parts of the programming device can often be easily integrated into new programs thanks to modular programming techniques. C can be a very portable language that is largely supported and is definitely available on most systems. Existing programs can be quickly converted to other processors that require investment.

3.3.2 Arduino Ide

- The features of Arduino IDE are
- Nine simple data types.
- Use full of the 8051 registers banks.
- Interrupt functions may be coded in c.

RESULTS AND DISCUSSION

Most of the devices were handled by embedded systems with Arduino, processors etc. This is because it is more easy and convenience to handle. In the automotive industry, embedded systems are used for infotainment, safety, driver information, maintenance and general vehicle system management. The growing need for cars with advanced navigation, driver assistance and road communications only increases the demand for embedded systems. This project aims to develop a broadband for military automation networks which helps the user to access the data or information from the receiver side with consistent delay and low packet losses. This project kit shown in Figure. 4 can also be useful in the application areas where huge volume of data or information is involved such as industry, military.

Figure 4: Military based spying bot with weapon collector



CONCLUSION

The designed military based spying bot with weapon collector is used for the purpose of gathering the weapons which are left by the soldiers in the war field. This robotic vehicle is also used for spying purpose to detect the enemies with the help of wireless camera attached in the front of the robot. The wireless camera sends the real video and it also used at the night times because of infrared sensor present in it. In future a recorder unit with storage availability can be implemented to sense the voices in the field.

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Sarcasm Sentiment Detection and Classification Model on Twitter

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ABSTRACT

Present days, posting wry messages via web-based networking media like Twitter, Facebook, WhatsApp, and so forth. Has become another pattern to maintain a strategic distance from direct antagonism. Recognizing these circuitous pessimism i.e., mockery in the web-based social networking content has become a significant errand as they impact each business association. The property of mockery that makes it hard to investigate and distinguish is the hole between its exacting and expected significance. Along these lines, a mechanized framework is required for mockery identification in the information gathered from microblogging sites or interpersonal organizations which would be equipped for distinguishing genuine slant of a given book within the sight of mockery. This paper displays a novel element extraction based order model for the powerful location of mockery on Twitter. A lot of four groups of highlights are extricated: opinion related highlights, accentuation related highlights, syntactic and semantic highlights, and example highlights. Then, the extracted features are selected with the help of efficient Modified Whale Optimization Algorithm feature selection algorithm. For the effective detection of sarcasm on Twitter in this proposed system three different classifiers are analyzed such as RNN, LSTM and Auto-encoder. The proposed technique archive Accuracy of 88.98% for RNN, 92.94% for LSTM and 95.64% Auto-encoder.

KEY WORDS: SARCASM SENTIMENT DETECTION, MODIFIED WHALE OPTIMIZATION ALGORITHM, LONG SHORT TERM MEMORY NETWORKS, RECURRENT NEURAL NETWORK AND AUTO-ENCODER.

INTRODUCTION

Feeling investigation in twitter has been foremost well-known investigation points in NLP (Natural Language Processing) in the previous time, as appeared in a few ongoing studies (Liu et.al (2012) and Tsytsarau et.al (2012)); The objective of assumption examination to

consequently identify the extremity of a twitter message, while mocking or unexpected proclamation changes the extremity of an evidently P or N articulation into it inverse. So it is imperative to separate snide articulation from the expressions that express P or N frames of mind without mockery (Davidov et.al (2010)). Mockery discovery is viewed as a significant part of language which merits unique consideration given its pertinence in fields, for example, assessment examination and feeling mining (Pang et.al (2008)). The issue of programmed mockery discovery in twitter has been tended to in the previous hardly any years, the mockery identification is typically considered as a grouping issue, past approaches

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for the most part depended on highlights displaying to the single tweet (Wang, Zelin, et.al (2015)).

Numerous creators grasp a general view on incongruity, as communicating an inverse or distinctive significance based on what is actually said (R. W. Gibbs Jr and J. O'Brien ((1991))). Under this viewpoint, the nearness of incongruity related non-literal gadgets is getting one of the most fascinating angles to check with regards to online life corpora since it can assume the job of extremity reverser concerning the words utilized in the content thing (A. Reyes and P. Rosso (2014)). In any case, an assortment of kinds of non-literal mails can be perceived in (TW) tweets: beginning incongruity to snide posts, and to clever TW that can able to fun loving, planned for entertaining or at reinforcing ties with different clients. Amusing and wry gadgets can express unique relational importance, evoke diverse full of feeling responses, and can act distinctively as for the extremity inversion marvel (C. Bosco et.al (2013)).

In this way to recognize them can be significant for improving the exhibitions of frameworks in slant investigation. As indicated by the writing, limits in significance between incongruities, mockery etsimilia are fluffy. While a few creators consider incongruity as an umbrella term covering likewise mockery (R. L. Brown (1980) and R. J. Kreuz ((1993)) & R. M. Roberts), others gives bits of knowledge to a partition.

2.Related works: In recent years, researchers have paid more attention to analyzing sentiments on Twitter, and numerous recent articles have been devoted to the classification of tweets. However, the nature of the classification and the characteristics used vary be contingent on the purpose. Maynard and Greenwood have relied on hashtags that Twitter users use on Twitter to recognize sarcasm on Twitter. They also explored how detecting sarcasm can significantly improve the analysis of tweet sentiment and suggested a rule for determining the polarity of a tweet (i.e., whether positive or negative) depending on the mood and content of the tweet, apparent tweet and the hashtag.

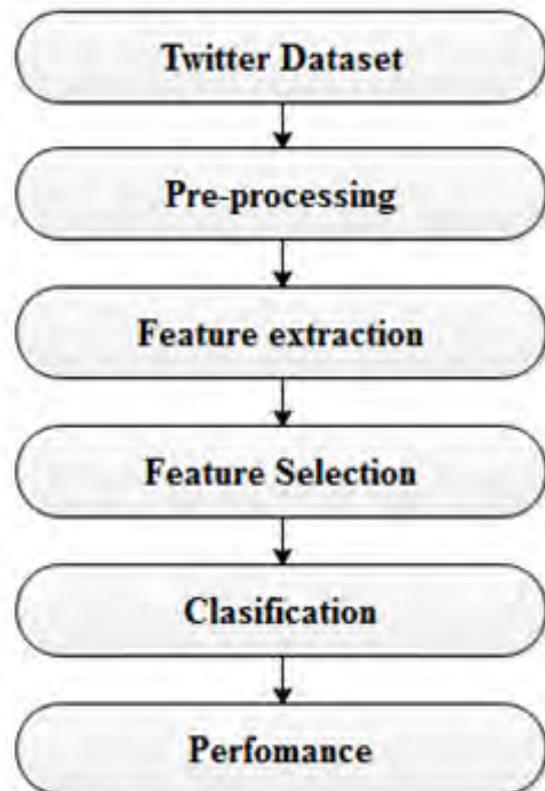
Riloff et al. (2013) has projected a method for detecting a certain type of mockery in which a positive mood contrasts with a negative condition. They presented a bootstrap algorithm that uses the initial word “love” and a set of ridiculous tweets to robotically detect and learn phrases that show positive emotions and phrases that refer to negative conditions. Their methodology shows some potential. However, most of the ridiculous tweets on Twitter do not fall into the ridiculous category above. Furthermore, this approach is based on the existence of all possible “negative situations” in the training set, which makes it ineffective when working with novel tweets.

F. Bravo-Marquez et.al (2016) executed a technique for assessment dictionary extension for consequently clarified tweets from three kinds of data sources, for example, tweets of emoji explained, hand-commented on and

unlabelled tweets. The space explicit issue was handled by moving the strategy into explanation approach for unlabelled tweets. The disambiguated grammatical form (POS) was remembered for the extended dictionary for three extremity classes, for example, P, N and unbiased. The direct connection among slant and words were found out by utilizing PMI-semantic direction (PMI-SO) and stochastic inclination plunge SO (SGD-SO). 3 datasets, for example, 6HC, Sanders and SemEval were utilized to approve the regulated vocabulary systems. This methodology utilized the work escalated way to deal with diminish the clamor in marked POS-disambiguated wrds, however it fresh the information just by physically.

Alsmadi, I. and Hoon, G.K., (2019) structured an administered term weighting approach (SW) for considering the exceptional attributes of short messages in high-dimensional vector. The SW strategy estimated the quality of a term in report to adapt to the meager condition and brevity of short content. The examinations were done on 2 datasets, for example, Sanders and self-gathered dataset to approve the viability of SW. When contrasted and solo methods, the SW strategy achieved shifted execution and prevalently well. The constraint of this SW technique was its petite messages in informal organizations which incorporates quick nature, nearness of incorrect spellings and much dimensionality of its element space which drives lackluster showing in grouping precision.

Figure 1: The proposed flow diagram



H. S. Manaman et.al ((2016)) has proposed a half breed strategies for data portrayal known as N-gram learning approach and casings. The N-gram approach comprises of two stages in particular preparing and test step. The preparation step contains four profiles for each organization and utilized 80% of accessible tweets to construct the organization profiles. The staying 20% information were utilized to approve the effectiveness of N-gm attitude in test stage. The trials were led on Sanders and accomplished higher arrangement precision when contrasted and NN, Bayesian technique. The calculation work sum for N-gram founded characterization strategy was better high.

3.Proposed Work: This paper presents a novel featureextraction and Feature selection based model for the effective detection of sarcasm on Twitter is introduced. A setof four relatives of structures are take out: sen-related, pun-related, syntactic and semantic, and pattern features. Then, the extracted featuresare selected with the help of efficient Modified Whale Optimization Algorithm feature selection algorithm. For the effective detection of sarcasm on Twitter in this proposed system three different classifiers are analyzed such as RNN, LSTM 92.94% and Autoencoder.The proposed flow diagram is exposed in the fig.1.

A. Dataset: In this part we depict the assets utilized in our work. There are 5 arrangements of TW slithered from the TW utilizing the Twitter Streaming API and handled over and done with Flume before being put away in the HDFS. Altogether, 1.45 million TW were gathered utilizing catchphrases #sarcasm, #sarcastic, mockery, wry, cheerful, appreciate, miserable, great, awful, love, euphoric, loathe, and so forth. In the wake of preprocessing, around 156,000 tweets were originate as wry. The rest of the tweets roughly 1.294 million were not mocking. Each set enclosed an alternate amount of tweets. Contingent upon the quantity of TW in each set, the creeping time is given in Table 1.

Table 1. Database captured for trial and examination

Database	sum of TW (approx)	Extraction period (h)
1	5,000	1
2	51,000	9
3	100,000	21
4	250,000	50
5	1,050,000	187

B.Pre-processing: The procedure changes over the datasets, which is in a reasonable structure for the PC is alluded as pre-preparing. The snide proclamation must have an objective. What's more, it relies upon the wellspring of the corpus, regardless of whether to recognize these objectives or not. Like in an audit everybody focuses on the item, while in tweets because of unstructured and short printed substance with

various exceptional images; endeavors to distinguish the objective isn't worth. While in mockery recognition, preprocessing of information incorporates two stages, for example, Tokenization and Stop words evacuation.

- **Tokenization:** the database is disconnected into tokens for next level to preprocessing. It can be a solowrd or course of action of words. To accomplish tokenization maker presented TextBlob pack in NLTK.
- **Removal of Stop words:** These are the unessential wrds, (for example, "a", "you a") which are sifted through afore handling of regular semantic information. The information from internet based life, surveys, and gatherings contain different unessential wrds which increment the preparing time; along these lines, removable of such undesirable wrds or strings streamline handling.

C. Feature extraction: In this proposed system4 set of features are take-out such as S-R, P-R, syntactic and semantic, and pattern-f.

i.Sentiment-related features: So as to catch the Positive (P) or Negative (P) extremity of words in a line. Three unique marks were utilized to get the estimation communicated in tweets: P, N and a complete worth (that thinks about both P and N qualities). The assessment assets we abused can be part in two classes: those made by basic records out of P and N words, and those where every word is marked with a conclusion quality in a scope of extremity esteems (from P to N). In the principal case, so as to acquire the P and N score for each tweet we aggregate the quantity of words having a place with every classification (P or N articulations). For assets doling out a score value of numerals differing in a scope of force for the extremity valence, the P/N score is the whole of all the P/N qualities in a tweet. In the two cases, the all-out worth is characterized as the contrast between the P and N score. In absolute 24 assumption highlights were acquired from nine unique assets.

ii.Punctuation-related features: This marks have been broadly fetched in incongruity recognition. Some lexical imprints help the essayist to call attention to the sense and significance in a book. As per the utilization of some printed variables (for example accentuation marks) may give solid insights for recognizing amusing goal in internet based life contented. In short messages like tweets this sort of viewable prompts can accomplish the genuine expectation behind the exacting substance in the articulation. In IDM, the accentuation imprints and capitalized words are measured as lexical indicators to recognize amusing from non-unexpected expressions.

iii.Semantic features: The fundamental test in Paraphrase Identification and Semantic Text Similarity investigation is to characterize the sets of sentences dependent on their importance similitude, semantic highlights are required. Notwithstanding the NER cover highlights (registered as a component of the content cover includes), the theme displaying highlights were processed. With respect to

Arabic NER comment, a few devices can be found to help this errand. For this examination, the Polyglot was utilized to clarify the tweets with their comparing NER labels. The Polyglot just labels the Person, Organization, and Location substances. Lastly the example highlights are removed.

After gaining the feature extraction process, forclassificationpropose.In the proposed system feature selection process is taken by using the Modified Whale Optimization aalgorithm.

Feature selection: The definition of brightness is also indicated by the selection of an element, the selection of an attribute, or the selection of a subset of variables for the development of the model, which makes it difficult to select a subset of relevant key points. In this projected structure, the Modified Whale Optimization (WOA) algorithm is used to determine the inclusion.

D. MWO Algorithm feature selection: In this segment, the WOA changes the benchmark to accommodate other kinds of methods. Three changes proposed and detailed in the MWOA. A key problem for large scale worldwide enhancement (LSGO) cover by metaheuristic computing (MAS) is that most of them are rapidly converging in the direction of the optimal neighborhood due to the rapid decrease of differential diversity, and the first WOA is not a superior case. In previous studies, the Levy flight course has been widely used in MA to prevent the close agreement of Optima and accelerate integration in light of worldwide hunting productivity. Therefore, levy flight is used to escape near-optimal at MWOA, which differentiates population diversity.

The Lévy flight is a sort of non-Gaussian randompractice with step length subsequent a Lévyassumption. Anupfront power-law vision of the Lévy conveyance is:

$$L(s) \sim |s|^{-1-\beta}, 0 < \beta \leq 2 \tag{1}$$

Where β an index, s is is the step length of the Lévy flight. Mantegna's procedure is applied to calculating

$$S = \mu|\nu|^{1/\beta} \tag{2}$$

Where, μ and ϑ obey normal distribution, i.e.

$$\mu \sim N(0, \sigma_\mu^2), \vartheta \sim N(0, \sigma_\vartheta^2) \tag{3}$$

$$\sigma_\mu = \left[\frac{\Gamma(1+\beta) \sin(\pi\beta/2)}{\Gamma(\frac{1+\beta}{2}) \beta 2^{\frac{\beta-3}{2}}} \right]^{1/\beta} \tag{4}$$

$$\sigma_\vartheta = 1 \tag{5}$$

A step size avoiding the Lévy flight leaping out of the design field is adopted. It is defined by:

$$Levy = random(size(D)) \oplus L(\beta) \sim \frac{0.01\mu}{|\nu|^{1/\beta} (X_i - X^*)} \tag{6}$$

If dimension (D) is the scale of the problem, \oplus it indicates the initial multiplication, X_i is the ith vector

of the solution. Due to the unlimited fluctuations in the circulation of the levy, the levy flight sometimes does the development of a long separation to increase research capacity, while the development of a short separation is done to increase performance. Obviously, this legality can guarantee that MA will recover to nearby Optima. At MWOA, the procurement tool is replaced by Levy's trip to discover the research space more and more skillfully. The novel location is updated in the same way..

$$X(t+1) = X(t) + \frac{1}{\sqrt{t}} \cdot sign(rand - 0.5) \oplus Levy \tag{6}$$

Where $1 / \sqrt{t}$ is the factor associated with the in progress iteration numbert, and \sqrt{t} is the sqrtprocess. In this regard, an earlier search may be performed at an earlier stage, while a slighter one is used in a later passé. Sign (rand-0.5)signifies a sign function with only three values -1, 0, 1, which makes the search additional random. The MWOA exploration phase is summarized as follows:

$$X(t+1) = \begin{cases} X(t) + \frac{1}{\sqrt{t}} \cdot sign(rand - 0.5) \oplus Levy & \text{if } p < 0.5 \\ D' \cdot e^{bi} \cos(2\pi l) + X^*(t) & \text{if } p \geq 0.5 \end{cases} \tag{7}$$

Classification Procedures: In below three grouping designs are then applied on the preprocessed dataset.

RF: is a tree based technique that is utilized for both organization and relapse inspection. Different trees are developed and the mean forecast would be the return for combination.

ANN: The nerry schemebe determined by on the ability of biological neural schemes, we works on a PC to perform certain tasks, such as grouping, reorganizing a project, and defining characteristics. RNA is a non-linear and measurable information model because it shows a complex relationship between data sources and output data. The structure of the ANN affects the flow of data, since this structure is modified and trained based on the navigation info and characteristics of the neural system..

DT: DT is an attitude to displaying info. Use a tree drawing as a forecasting model. The goal of the DT is to create a perfect to predict results or values based on input factors. The results represent an important sequence and are widely used for simple orientation. This technique is a well-known artificial intelligence tool that can aid you find the right process for achieving stunning resolutions, because it can be converted into many important criteria by integrating path concentrators and final concentrators.

NB: The NB hypothesis is the associated:

$P(C|X)=P(X|C) \times P(C)/P(X)$. Note that classifiers claim that the rating of any component is different from any other factor, depending on the class variable. Information X and class C. P (X) is constant or equal to each of the classes. Note that it works well with a large data index, knowing that property pricing is strictly based on the assumption that the property is correct, which is unreasonable.

RESULTS AND DISCUSSION

This part brief around the investigational outcome and conversation of the novel scheme and also complete about the presentation metric, investigational setup, quantitative study and comparative investigation. The proposed framework was executed utilizing Python code with RAM size of 4 GB, hard disk have 1 TB, and 3.0 GHz Intel i5. The exhibition of the anticipated framework was contrasted and other arrangement techniques and previous examination study dependent on twitter dataset so as to survey the viability of proposed framework. The exhibition of suggested framework was assessed as far as exactness, review, order precision, and f-measure.

Evaluation Metrics: Problem assessment metrics are used to calculate the efficiency of our segmentation and classification method. In terms of classification, the three parameters are identified as sensitivity (SE), specificity (SP) and accuracy (AC). This are equated in the below three equations are defined as:

$$SE = \frac{tp}{tp+fn} \quad (9)$$

$$SP = \frac{tn}{tn+fp} \quad (10)$$

$$AC = \frac{tp+tn}{tp+fp+tn+fn} \quad (11)$$

In above equations, in short term given equalities are expressed as the true positive(tp), false positive(fp), true negative (tn) and false negative(fn).

Table 2. Classification Performance

Method	SE (%)	SP (%)	AC (%)
RNN	72.25	83.24	66.52
LSTM	100	94.65	64.35
Auto encoder	98.47	96.58	65.35
Without MWOA-RNN	97.25	96.67	66.47
Without MWOA-LSTM	96.47	97.23	67.80
Without MWOA-Auto encoder	94.65	97.56	70.46
Proposed-RNN	98.87	98.02	88.98
Proposed-LSTM	98.61	98.58	92.94
Proposed-Auto encoder	99.31	98.87	95.64

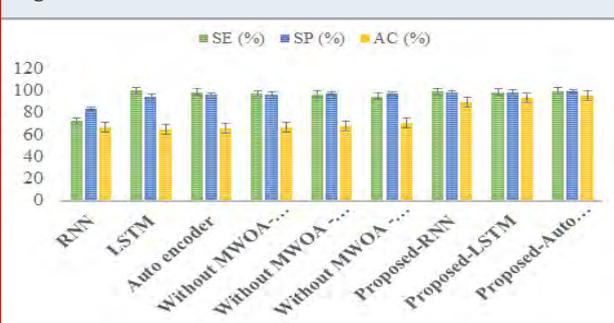
Classification Performance: In this unit we discussed the performance evaluation of the some previous existing scheme with our proposed method. In below

table 2 shows the presentation of the different models outcomes.

In twitter sentimental classification scheme, the RNN methods is used to evaluate the performance metrics of SE value of 72.25, SP of 83.24% and accuracy of 66.52%. In LSTM scheme attained better SE value of 100%, SP of 94.65% and accuracy of 64.35%. This accuracy value is lower than RNN scheme. But Auto encoder attained the 65.35% accuracy value. It is better than LSTM model. In another combined scheme of MWOA-RNN attained better SP value of 96.67% but accuracy value is 66.47%, but independent RNN method attain better accuracy than without MWOA-RNN. In another MWOA-LSTM attained the accuracy of 67.80%, SE of 96.47% and SP of 97.23%. Without MWOA-Auto encoder attained the best accuracy value of 70.46%. This scheme attained better accuracy value than previous methods. And also SE and SP values also better values in twitter classification model.

In figure 2 displays the graphical illustration of the different existing and proposed classifier models. Before some previous classifier models attains the better parameter performance. But our proposed RNN method achieve the SE of 98.87%, SP of 98.02% and accuracy of %, it is better than previous models performance .and proposed LSTM achieved the accuracy value of 92.94%. It is better than the previous existing methods and proposed RNN methods. But proposed Auto encoder attained the SE of 99.31 %, SP of 98.87% and accuracy value of 95.64%. finally our proposed auto encoder classifier achieved the better performance metrics compare to existing methods and proposed RNN and LSTM schemes. So it is a best classifier model to detect and classify the sarcasm on twitter applications.

Figure 2: Classification Performance



CONCLUSION

TSA is one of the rising examination fields for breaking down and recognizing the assessments and perspectives of clients. The proposed strategy comprises of two phases, for example, Feature extraction and order of TW. The gained TW information is pre-handled by killing the superfluous emoticon from the TW worth

action. The assumption related highlights, accentuation related highlights, syntactic and semantic highlights, and example highlights are improve the proposed framework results. This paper displays a novel element extraction based order model for the powerful location of mockery on Twitter. A lot of four groups of highlights are extricated: opinion related highlights, accentuation related highlights, syntactic and semantic highlights, and example highlights. Then, the extracted features are selected with the help of efficient Modified Whale Optimization Algorithm feature selection algorithm. For the effective detection of sarcasm on Twitter in this proposed system three different classifiers are analyzed such as RNN, LSTM and Auto-encoder. The proposed technique archive Accuracy of 88.98% for RNN, 92.94% for LSTM and 95.64% Auto-encoder. In upcoming effort, to recover the characterization rate, a half breed estimation attitude will be produced for added internet based life information, for example, YouTube and Facebook to recognize the feeling of individuals near specific concerns.

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Design of area efficient and Low power Square Root Carry Select Adder

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ABSTRACT

The Carry Select Adder can be a fast adder that uses multiple slim add derivatives and quickly offers broad add derivatives. This task uses a simple and inexpensive gate level change to significantly limit the scope and functionality of CSLA. This change is supported. Eight, 16, 32 and 64 bit square root CSLA designs were developed and compared to the typical CSLA Sqrt designs. Binary-Extra-1 Converter (BEC) is used instead of sprinkler with sprinkler in normal CSLA to reduce space and energy consumption = 1. The planned CSLA style requires significant space and distance behind the recently planned BEC-based CSLA. This article compares the planned style of normal 16-bit Sqrt-CSLA with a improved version of Sqrt-CSLA. The results show that our method is healthier than normal CSLA.

KEY WORDS: SQUARE ROOT CSLA (SQRT CSLA) CARRY SELECT ADDER (CSLA),.

INTRODUCTION

Additives are of special importance in the development of VLSI and are used in personal computers and in many different mainframes. Addresses, table indexes and similar applications are usually calculated (B. Ramkumar et.al (2013)). Adders work in multipliers, and digital signal processing. In VLSI-style analysis, the development of logic systems today takes up a lot of space with low energy consumption and high-speed knowledge pathways in space. Quick connectivity ranges are often used to connect (Alioto.M, and Palumbo.G (2011)). Digital additives contain an additional summary of every bit position and therefore the produced one is transferred and transferred to a future location. Reduces transfer

rates. Carry Select supplements are used to reduce this negative effect (Bedrij O. J (2012)).

The Carry Select combiner is the wildest couplings in terms of area and power consumption. It generates Carry, given the partial sum and input Carry, the total amount and square measure chosen by the multiplexers. One of the most common schemes used in this project is to use a binary access device-1 (BEC) in its place of RCA (Ceiang .T.Y, and Hsiao. M.J (1998)). This document is prearranged in the subsequent units. II. Literature review III.CSLA IV with BEC. Normal Sqrt CSLA and Spoken Sqrt CSLA V. Explanation Sixth General 16-bit Sqrt CSLA Seventh Summary Report. Summary report for the modified 16-bit Sqrt CSLA VIII. Output.

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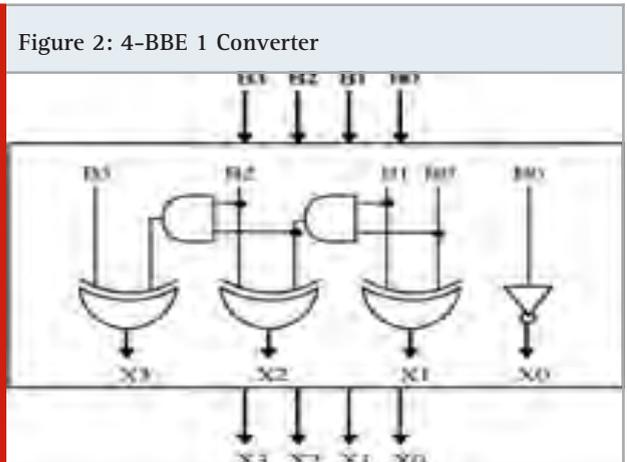
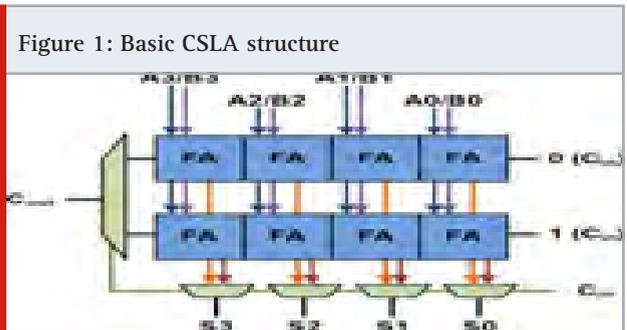
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Font Adder. The wave of Kerder der came most recently; As a result, it has n single-bit full adders. Each connector connects and holds. The earlier full adder is shown as the media incoming adder. Carrie is transmitted at every stage and the worst case scenario of late is known as late. Rising N prices will increase delays to Ripple Carrier Adders (Chang Y et.al (2005)).

CSLA uses a double RCA to obtain a partial total value and a total total value and carry, since $sin = 0$ and $sin = 1$ are selected by the victim's multiplication factor. The additional space is used in conventional CSLMs due to the use of double RCA (JC George et.al (2013)). The mandatory scheme of this work is to use a binary device with an excess number of 1 (BEC) instead of RCAA with $CN = 1$ and lessen the world and power. The benefit of BEC is that it uses a smaller gate range than full n-bit add-ons. Replace the N-Ripple Carry Adders area block with a BEC N + 1 bit to measure the return delay. Therefore, a modified CSLA Sqrt takes up more space than a normal CSLA (Kim .Y and Kim. L.S).

In (T Abimannan et.al (2013)), offers VLSI architecture design for image compression. The VLSI architecture was developed using a discrete facelift-based wavelet transform (DWT) and implemented in the Spartan 3EDK suite. This is useful for implementation.

2. BEC with CSLA



The BEC consists of four inputs and the outcome is also gotten by adding 1 to each of them. This argument has been replaced with $sin = 1$ in RCM. This logic applies to the various bits used in the improved configuration. The

main benefit of this BEC logic is that it uses a smaller range of gates than the design of an N-bit full adder. The BEC structure includes a function that will perform the same process as the RCA operation, replaced by $Cin = 1$. The four bit BEC expressions are listed below. The key is to use a binary converter in a regular CSLA to get smaller footprints and higher speeds. This argument has been replaced with $sin = 1$ in RCM. This logic has been applied to the various bits used in the modified style.

$$X0 = \sim B0$$

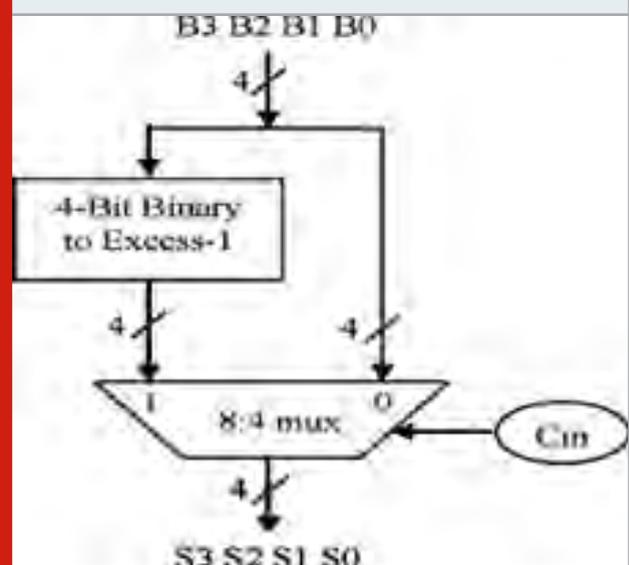
$$X1 = B0 \wedge B1 \quad X2 = B2 \wedge (B0 \wedge B1)$$

$$X3 = B3 \wedge (B0 \wedge B1 \wedge B2)$$

Table 1. Truth Table of 4 Bits Binary To Excess -1 Converter

Binary logic B0,B1,B2,B3	Excess-1 logic X0,X1,X2,X3
0000	0001
0001	0010
0010	0011
0011	0100
0100	0101
0101	0110
0110	0111
0111	1000
1000	1001
1001	1010
1010	1011
1011	1100
1100	1101
1101	1110
1110	1111
1111	0000

Figure: 3. 4 -BBE-1 logic with 8:4 mux



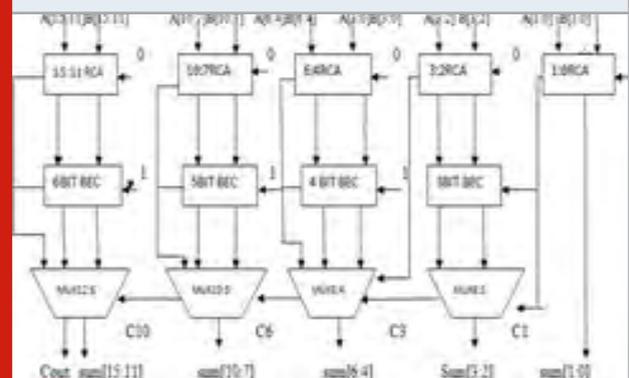
BEC is used with a multiplexer when a pair is added. If the null MUX line is selected, then the input (B3, B2, B1 and B0), otherwise the input is the BEC output. For this reason, the modified CSLA requires less space and energy than a normal CSLA. In addition, RCA has been replaced by BEC.

3. Delay and Area of Regular 16 Bit Adder: Delays are often considered by totaling the sum of shutters in the lengthiest path of the logic block, which adds to greatest deferral. The advancement of the region closes with an investigation of the complete amount of AOI ports essential for each intelligent unit. The arrangement of a traditional 16-piece Sqrt-CSLA is appeared in Fig. 4. The arranged structure incorporates 5 gatherings with various RCA sizes. Each bunch contains two RCA and MUX. The deferral and region of every group are determined and at last decide the complete space and postponement. The fundamental weakness of the CSLA standard is the huge utilization of plate space, which is overwhelmed by utilizing a changed CSLA.

Pulsating transport additives are the best and most complex additives. Be that as it may, their exhibition is restricted by the convey, which ought to proliferate from the least huge piece to the most critical piece. Numerous 16, 32, 64, and 128-piece CSLAs can be created utilizing chain pipelined adductors. The exchange viper speed is improved by playing back additional items in equal and diminishing longer exchange delay.

instead of RCA with $C_{in}=1$. In view of the thought of defer esteems, the hour of appearance of determination input C1 of 8:3 mux is previous the whole of RCA and BEC. For different gatherings the determination input appearance is later than the RCA and BEC. Along these lines, the sum1 and c1 are relying upon mux and outcomes processed by RCA and BEC individually. The sum2 relies upon c1 and mux..

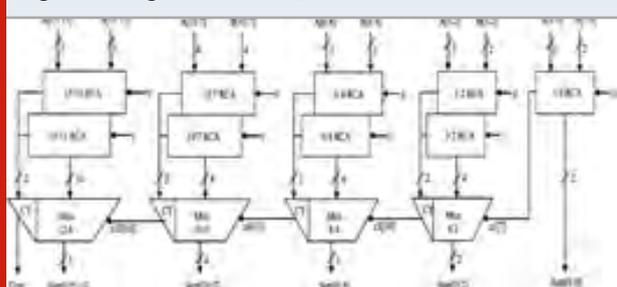
Figure 5: Modified 16-bit Sqrt CSLA



RESULTS

This work is developed using tool such as Xilinx. The territory productive convey select viper accomplishes a remarkable execution in power utilization.

Figure 4: Regular 16 bit Sqrt CSLA



Adjusted Sqrt CSLA is comparable to it of ordinary Sqrt CSLA the sole differentiation we tend to supplant RCA with $C_{in}=1$ with BEC. The supplanted BEC perform indistinguishable activity as that of the supplanted RCA with $C_{in}=1$. Figure 5 displays the altered Sqrt CSLA. This structure takes lesser region, postponement and force than ordinary Sqrt CSLA (Kuldeep Rawat et.al).

The changed square outline is moreover isolated into various gatherings of variable dimensions of bits with each altered Sqrt CSLA bunch having the wave convey adders, BEC and comparing mux as appeared inside the Fig. 5, bunch 1 comprise one RCA exclusively that has contribution of lower noteworthy piece and convey in bit and delivers aftereffects of aggregate and complete that is going about as mux determination line for resulting gathering, similarly the method proceeds for higher gatherings. Anyway they incorporate BEC rationale

Figure 6: Output of Regular Sqrt CSLA a (15:0) to i15

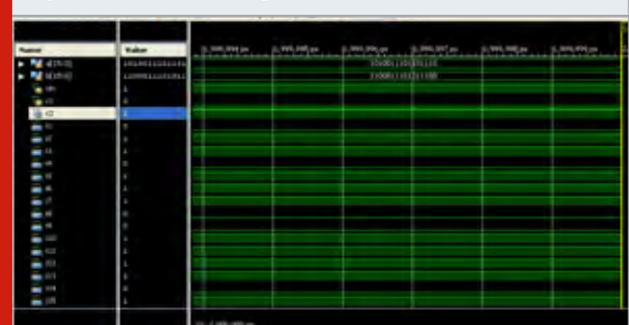
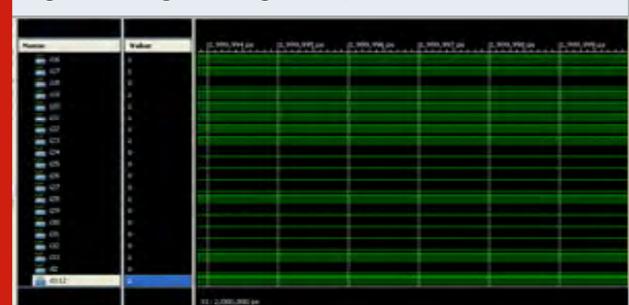


Figure 7: Output of Regular Sqrt CSLA i16 to d112



Energy consumption can be significantly saved in our space saving proposal for the transport of the selected adder, therefore, we want to use only xor gates, as well as gates and / or gates in every extraction operation. the modified CSLA Sqrt has fewer logical gates and

therefore less space. The Xilinx ISE 9.2i software is used to synthesize additives and Modelsim6.4a is used to compile and simulate the verification of the VHDL code.

Figure 8: Output of Modified SQRT CSLA a (15:0) to i17

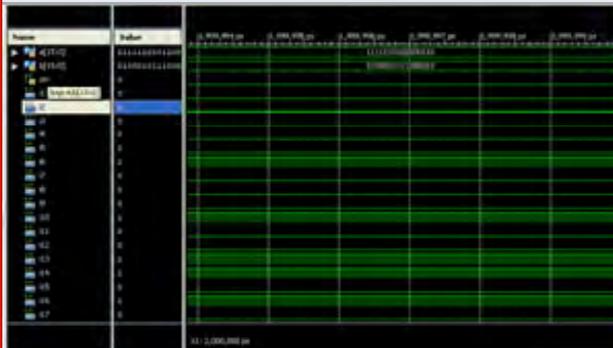


Figure 9: Output of Modified SQRT CSLA i18 to d5



6. Synthesis Report For Regular 16-Bit

SQRT CSLA

Total Delay: 12.172 ns
 Total Memory usage is 140148 KB

Table 2

Logic Utilization	Method Utilization Summary		
	Used	Available	Utilization
No. of 4 Input LUT's	78	9.312	1%
No. of Occupied Slices	43	4.656	1%
Total no. of LUT's	78	9.312	1%
No. of Bonded IOB's	113	158	71%

5.Synthesis Report For Modified 16-Bit Sqrt Csla

Total Delay: 11.776 ns
 Total Memory usage is 138100 KB

Table 3

Logic Utilization	Method Utilization Summary		
	Used	Available	Utilization
No. of 4 Input LUT's	78	9.312	1%
No. of Occupied Slices	43	4.656	1%
Total no. of LUT's	78	9.312	1%
No. of Bonded IOB's	111	158	70%

CONCLUSION

During this project, an effective approach to resizing the SQRT Carry Select Adder was proposed, and a comparison of the achievements in the SQRT CSLA features was mentioned. A decrease in the sum of gates was achieved by swapping the transfer adder converter with transfer from the binary converter to redundant 1 in the improved CSLA SQRT construction. The proposed project uses the VHDL module (Xilinx 12.1 and 9.2i).

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Kuldeep Rawat, Tarek Darwish and magdy Bayoumi||A low power and reduced area carry select adder||.

High Dimensional Data Space Using Shrinkage Diversity

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ABSTRACT

Effective spacing tasks in multidimensional data spaces, clustering, finding nearby neighbors, and being used as indexes, are very important in solving many of the tasks of data mining. Recent studies have shown that if the difference in Pearson's distance distribution is zero with growing amplitude, the distance function in multidimensional space becomes unstable (or meaningless) even though Euclidians use the LP metric commonly used in space. However, the condition required for the instability of the gap function, which is required to create the function, is still unknown. In this article, we have proven that various important situations are related to instability. Having obtained these outcomes we have the sufficient and essential situations of instability, from the negativity of those who observe the adequate and necessary situations of stability. Founded on this theoretical result we use specific operative and realistic indices to test the strength of distance work.

INTRODUCTION

In modern years, the curse of the media has been carefully studied in a number of data mining issues, such as Clustering, searching, and indexing close neighbors, as this is serious to both productivity and superiority of data mining presentations (Aggarwal CC (2000)). In multidimensional space, the distance of the adjacent data point reaches the longest data point of a assumed query point with cumulative magnitude (Aggarwal CC et.al (2000)).

In fig. 1 shows the beyond situation, where is a very lesser number. From the study point of view, the distance from the nearest neighbor. This sensation is called an unstable occurrence for the reason that there is a weak distinction between the nearest and farthest neighbors to request the nearest. (Aggarwal CC and Yu PS (2001)),

Designing the required spacing function in a multidimensional space is a exact significant issue that has a important impact on a wide range of data mining requests (Bennett KP et.al (1999)). In this document, the function of the distance that causes this unstable occurrence is called a trivial function in the multidimensional space; Otherwise they are called important (Beyer K et.al (1999)).

A necessary condition for instability is that "the Pearson change in the distribution of the consistent distance deteriorates to 0 with cumulative amplitude (Chih-Ming

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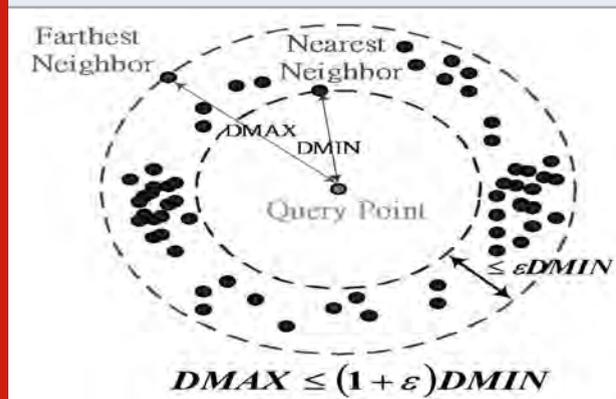
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Hsu and Ming-Syan Chen (2009)). Agarwal has given the following criteria for critical distance work:

Figure 1: Unstable phenomenon



1. Contrasting
2. Skew magnification
3. Statistical sensitivity
4. Compactness

This article shows that the subsequent settings are equivalent to instability:

1. Pearson converts the difference between distant distributions to 0 with increasing amplitude for any request.
2. The ratio of the distance among two inquiry points is converted to 1 with increasing probability of measurement.
3. The coefficient of the second moment with increasing dimensions is converted to 1.

which negativity indicates sufficient and necessary conditions for stability (D. Francois et.al (2007)). To show the theoretical results, we developed a critical distance function called compression deviation proximity (SDP) based on this distance function. The nearness of two points is the characteristic close combination of each point. Indicates differences in distance attributes based on the SDP attribute to avoid volatile events. For each quality of two data points, if the approximate approximation of two data points falls at a short distance, we limit the properties of this series to zero. If the points are more similar than the others than the same properties (Katayama N and Satoh SI (2001)).

There are two aspects to this article's contribution:

1. Chief, as a theoretic justification, they provide and demonstrate the most necessary and adequate circumstances for volatile phenomena in multidimensional space. It should be noted that the negative state of the required state of static instability is a adequate condition for stability, which delivers advanced and effective guidelines for designing significant remote functions in multidimensional space (i.e., dimensional strength). Our theoretic

outcomes show that all remote functions must be empty in a multidimensional space, otherwise they may resist increasingly different reactions with increasing intensity (M. Ledoux, (2001)).

2. Secondly, we are developing a function near a dimensional resistor called SDP. It has been experimentally proven that SDP is significantly superior to other metrics commonly used for stability in multidimensional data spaces and is therefore considered more suitable for classification and remote cluster applications than commonly used LP metrics (V.D. Milman and G. Schechtman (1986)).

Related Works: Effective spacing functions have been used in many data mining problems, including finding nearby neighbors.

Gaussian Distributions: They pass to a Gaussian distribution based on the same general and equal probability measures in a large volume region. Consequently, normal L2 should complete the event of concentration in a multidimensional Euclidean space equipped with a measure of the standard Gaussian potential. In addition, the Hamming value will be centered around the average value of a multidimensional ingot cube equipped with a measure of the probability of distance measurement (V. Pestov ((1999))).

Shrinkage-Divergence Proximity: Based on this distance function, we develop a significant distance function called compression diversion distance (SDP). SDP has been shown experimentally to be more important than other indicators in terms of stability in a multidimensional data space and is therefore more suitable for inter-based applications (Tamhane A, and Dunlop ((2000))).

SDP's intention to develop our dimensional static external SDP function is based on the following aspects:

1. SDP uses an exponential function to resist the occurrence of concentration in the multidimensional space.
2. Too much proliferation can be considered a different type of instability. To create a sound insensitive proximity function and prevent further increase in distance change, SDP defines optimized proximity for a single feature of two data points.

Advantages of SDP:

1. SDP describes an adaptive nearness for a single characteristic of two data points, in order to build a proximity function that is insensitive to noise and avoids overstating the variation in distance.
2. SDP is an adaptive distance task that integrates the same and different attribute features between two data points.
3. SDP proposes weighted attribute parameters to use aggregate data behaviors in terms of interactive correlations.

CONCLUSION

SDP suggestively outperforms other stabilization processes in large data volumes, making it ideal for distance-based clustering applications.

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Mobile Ad-Hoc Network Qos Improving Based On Whale Optimized Aodv Routing Protocol

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ABSTRACT

In MANET, the routing problem is resolved by the nodes themselves, which reduces computing and resource prices. The whale optimization procedure is used in the search to select the appropriate parameter value for a special on-demand vector routing protocol (RP) to recover the quality of service (QoS) in MANET. The RP is resolved if agents are used as entities of the insect community as a metaphor when optimizing whales. Routing-based swarm agents explain the rules that participating nodes must follow. Swarm employees exchange information about their behavior in an adaptive and effectual manner in order to successfully complete the assigned tasks. Whale's optimization procedure uses the extreme target flow to favor the best places where agents can accumulate at every stage of the network. MATLAB is used to implement whale optimization. The results are used to model the AODV RP in the QUALNET software. Whale optimization is used to improve AODV performance with the QoS options: jitter, performance, and average latency.

KEY WORDS: MOBILE AD-HOC NETWORK (MANET), WALE OPTIMIZATION ALGORITHM (WOA), AD-HOC ON-DEMAND DISTANCE VECTOR (AODV), AND QUALITY OF SERVICE.

INTRODUCTION

MANET exhibits a active topology that does not contain any fixed infrastructure, with each node having host and router functionalities (Siva, R. and Manoj, B. (2004)). The most critical features of a MANET include autonomy and the absence of infrastructure, limited physical security, device heterogeneity, and variable capacity links with constrained bandwidth (Liu, S et.al). The attributes of a MANET have various applications even with numerous constraints. These attributes include high ability in

circumstances where a fixed infrastructure does not exist (Bai, R., and Singhal, M (2006)). The second feature is that a MANET does not have to operate on its own because it can be attached to the Internet and be incorporated in various devices, making its respective services available to the rest of the users (Rath, M et.al (2016)).

MANETs have been used in numerous applications in the past (Wang, W et.al (2009)). Establishing the path from source to endpoint is crucial when using MANETs to deliver a data packet that satisfies the QoS standards, such as the end-to-end delay, throughput, and energy (Abbas, A and Kure, O (2008)). Nevertheless, the algorithm designed in this study should be comparable with the QoS-based method in relations of the average delay. However, the proposed algorithm is more actual in terms of node lifespan and PDR (Mieghem, P and Kuipers, F (2004)).

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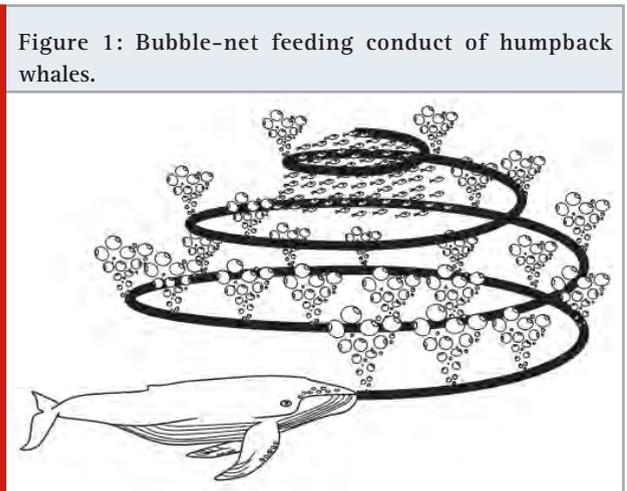
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Wale optimization algorithm (WOA) constitutes an effort to develop a convenient, reliable, efficient, effective, and easily implementable procedure that will exhibit outstanding ability in exploring and exploiting the search space. The hybrid algorithm will be integrated with the AODV directing convention to improve the QoS. Various fake and heuristic QoS directing calculations have been recommended for application in MANETs steering. Basically, steering is separated into a few classes: single and multi-course directing; source steering and subsequent stage, progressive and level directing; unified and conveyed directing; steering centers around information and headings; QoS-based directing with most extreme exertion; line and occasion based directing; and force based directing. Numerous articles examined this subject and utilized different strategies that were frequently heuristic and brilliant apparatuses.

2.Overview

2.1 Introduction of AODV Protocol: The origin-based RP uses an on-demand method to find ways to establish the interaction between the source node AODV and the endpoint node. Information on the data package is provided through intermediate channels. The source node is populated with the REREU package, where the target node cannot be accessed. Check the routing table in the routing table, where direct RREQ packets can reach intermediate or target nodes, then send RREP to the source node or continue to populate RREQ on the network. Local AODV connection is supported by sending greetings over the network. Send an EROR routing message to the transmission nodes in case of connection breakdown; In the meantime, the damaged records are corrected.

2.2. Wale optimization



The paths from the basis node to the endpoint node are dynamically identified during Wells optimization. First, the nodes are recognized by sending the request signal in the rreq way. After receiving the route application, each node uses the concept of whale optimization relative to the speed and position the sword starts with the particles. With whale optimization, shoals move in

3-D space in search of the optimal route. Particles are considered as entities and are known as swarms of the entire population. The primary clusters are created first and the particle population is easily distributed in the search space. The process is recurrent many times; Each particle is efficient according to two "best" values called pebest (single best rear location) and gibest (best cold rear location). The steps of the algorithm are as follows:

Table 1. Pseudo-code of the WOA algorithm

```

Initialize the whales population  $X (i = 1, 2, \dots, n)$ 
Calculate the fitness of each search agent
 $X^* = \text{the best search agent}$ 
While( $t < \text{maximum number of iterations}$ )
for
each search agent
Update  $a, A, C, l$  and  $p$ 
if1
( $p < 0.5$ )
if2
( $|A| < 1$ )
Update the position of the current search agent
else if2
( $|A| > 1$ )
Select a random search agent  $X_{\text{rand}}$ 
Update the position of the current search agent
end if2
end if1
 $p > 0.5$ 
Update the position of the current search agent
end if1
end for
Check if any search agent goes beyond the search space and amend
Calculate the fitness of each search agent
Update  $X^*$  if there is a better solution
 $t = t + 1$ 
end while
return  $X^*$ 
    
```

2.3 QoS: QoS can be defined as "The combined effect of the service that calculates the level of gratification of a user of a service." This implies the impartial of QoS is to accomplish increasingly adequate system conduct regarding information conveyance and asset use. Making QoS at MANET is a test. Contingent upon the particular application, the system ought to have the option to give an endorsed degree of administration. The deliberate QoS boundary is chosen relying upon the prerequisites of the application. Instances of QoS boundaries are jitter, data transmission accessibility, bundle misfortune likelihood, normal deferral, and so on. The quantity of issues refreshing QoS is because of the one of a kind properties of MANET.

There are a few issues: ... (1) The system geography is evolving quickly. In this way, it is hard to make an arrangement that gives evidence of the nature of administration required by a specific application. (2) Due to the limited use of device sources, a lighting circuit must be provided. Well-optimized algorithms are used to recover the QoS for the network situation and to lessen the sum of control messages in the network. This means that QoS can be improved if optimized in terms of performance. The basic principle of optimizing network paths is to control the flow of data. The study focuses on QoS in MANET. The proposed study relates to the Manet RP and the optimization algorithm improves the quality of the service. Performance is measured by the subsequent QoS indicators:

1. Average delay: average time essential to transmit data from the basis node to the destination node.

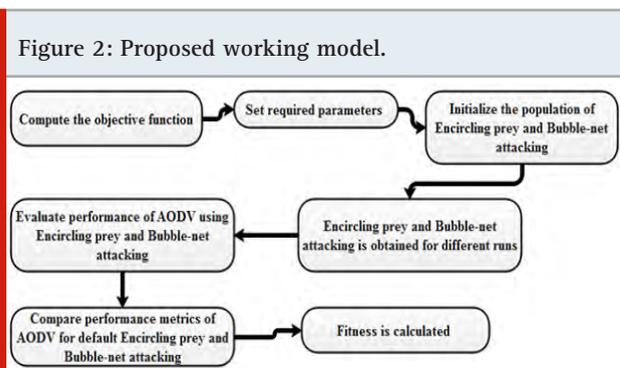
2. Throughput: this is the total amount of data received from the source node of the destination node, while the destination node is required to receive the final packet tracking. Bit rate is the sum of infected bits/sec.

3. Jitter: The average time among the two packages has changed. The delay in packets must be less than the obligatory threshold value.

In this case, the impartial is to strategy a network with supreme efficiency, low average delay and a low speed jumper. Well, the optimization algorithm is useful for improving Adva Green.3 Proposed Methodology.

The direct route is set when creating a route in the AODV route. AODV service quality change method is proposed in Mana. AODV analysis without AODV is calculated with VEL optimization with setpoints. AODV-like QoS has been improved with moderate latency, throughput and good optimization. There are two types of scientific papers. The first and second categories are used to optimize and evaluate solutions, respectively. The speed is then used to evaluate the AODV solution and then to test the performance of the optimized routing protocol using QUALNET. Protocol performance is assessed in QUALNET by adjusting MANET and adjusting it with AODV. Overall network performance improves in terms of key presentation parameters, such as average latency, AODV throughput and interference. The presentation of AODV is considered by the use of the fitness function, which is described as shadows:

$$\text{Fitness} = W1 \text{ throughput} - (W2 \text{ delay} + W3 \text{ jitter}) \quad (1)$$



The fundamental objective of the wellness work is to build profitability and decrease normal postponement and jitter. Condition 1 is an amplification work on the grounds that the positive sign is for the real speed and the negative sign is for the normal postponement and jitter. The factors W1, W2 and W3 are weight factors that decide the impact of execution measurements on the last wellness metric. For demonstrating purposes, W1, W2 and W3 are 0.5, 0.25 and 0.2 individually.

RESULTS AND DISCUSSION

The projected scheme was tested with Matlab (version 2018a) with an Intel i3 processor with a frequency of 3.0 GHz, a hard disk with a capacity of 1 TB and 8 GB RAM. Vaze's optimized program codes have been effectively clarified in the Matlab setting, which defines the functions of the procedure. Matlab needs two script files to write the Wale optimization algorithm code. First, the target function is determined, but the optimization program for the main bore is developed in the second file. Maximum redirects and maximum runs vary in the same proportions as 10, 20, 30, 40, 50, 60 and 70 or 5, 10 and 15.

Table 2. the simulation parameters are summarized.

Parameters	Metrics
Packet size	512 bytes
Transmission rate	2 mbps
Simulation time taken	300 s
Maximum node speed	10 mps
Pause time	30 s

Figure 3 displays the delay for AODV when the velocity increases from 10 to 15 m / s. The AODV RP is analyzed with and without Wale optimization. For a fixed sum of nodes and pause times, Wale with delayed Wale optimization without VOD optimization are smaller than AODVs.

Figure 3: Average Delay

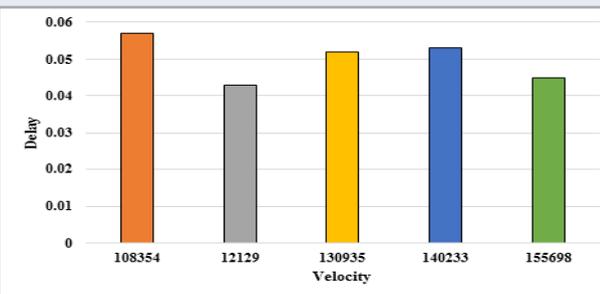


Figure 4: Throughput.

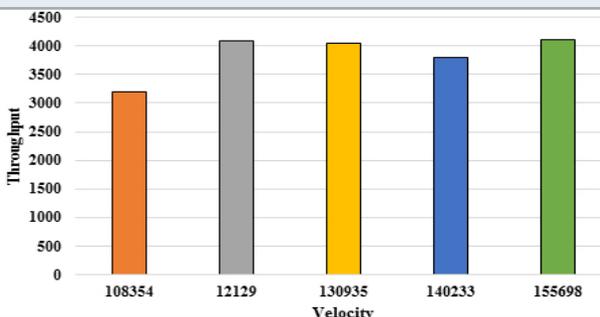
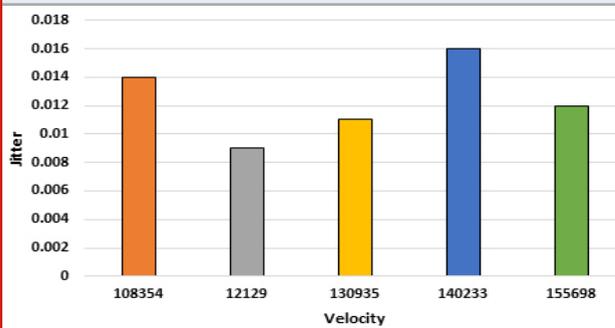


Figure 5: Jitter



CONCLUSION

In this article, we model AODV routing algorithms based on wave optimization and get results. Performance value QoS measures play a significant part in MANET since the RP be contingent on performance measures. The Wave optimization procedure is used to select the optimization value of the variables to improve the resulting outcome. Here we compare the presentation of AODV and AODV based on three performance indicators based on wave optimization, namely actual speed, average delay and shaking. After analyzing the simulation results, AODV performance based on Wave optimization covers the existing AODV routing algorithm. Routing algorithms based on Wave optimization are more suited to the specific quality of a given network. It violates practical environmental conditions and makes the network

protocol useful and efficient for a dedicated network. Other research can be developed by applying wave-optimization algorithms to other active and reactive RP and analyzing low presentation indicators.

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Investigation on Automated Surveillance Monitoring for Human Identification and Recognition using Face and Iris Biometric

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ABSTRACT

Biometric system identifies automatically the unique feature of an individual for better evaluation and verification in recognition systems. Face and iris recognition in biometric identification systems is considered as most accurate procedure with higher recognition rate. CCTV surveillance plays a major role in human recognition and identification with the help of intelligent systems. The biometric system combined with CCTV output analyzes the data with/without human intervention. This paper presents an approach of human identification and recognition using facial and iris biometric from lower resolution images. Lower resolution in image clarity is a major constraint in recognizing the individuals from distance with biometric values. The use of log-Gabor filter improves the recognition pattern of face and iris in multi-spectral images. Hence, a framework comprising of feature recognition using log-Gabor filter and similarity comparison using score level fusion is proposed. A series of stages enhances well the recognition performances using the proposed solution. Experiments established the validity against existing linear techniques for facial and iris image recognition pattern from CCTV cameras for automated human identification and verification.

KEY WORDS: LOG-GABOR FILTER, FACE AND IRIS, RECOGNITION, IDENTIFICATION, SURVEILLANCE MONITORING.

INTRODUCTION

Due to increased need of human recognition and verification schemes, the automated verification identity systems have become widespread. Since, each area is

equipped with surveillance cameras, the use of biometric identify systems is made inbuilt in such systems to improve the automated verifications (Pravinthraja, S et.al (2011)). Iris and facial recognition are considered as the best choices since facial recognition is non-invasive and iris recognition is most accurate one (A.K. Jain et.al (1999) and T. Mansfield et.al (2001)). On the other hand, the issue in resolving the biometric recognition is still needs to be addressed, since the accuracy of face is affected mostly by illumination, expression and pose (W. Zhao et.al (2000)). Facial recognition in many applications seems robust with all these variations. The iris recognition is considered to be less accurate, since the user has to be

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co-operative. In advance, the image of iris should be of high quality, since iris image with larger pupil and off center (Kumar, V.N. and Srinivasan, B (2013)) is rejected at the acquisition phase. Consequently, many attempts are made for acquiring the iris that should not delay the recognition and verification and not to irritate the user. The accuracy of iris recognition is also affected by change in shape of iris due to disease. This results in poor identification of iris in automated identification systems. The enroll failure rate or the rejection rate of poor quality image would tend to increase in these cases.

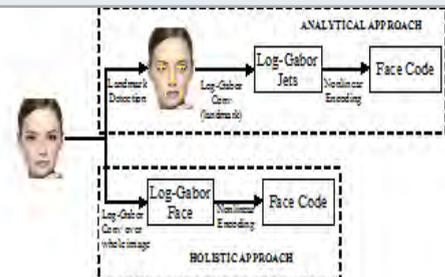
These problems are resolved or the impact of these problems can be reduced through fusion of several biometric recognition systems. This includes iris and face recognition in the proposed system. The overall error rate is reduced due to fusion of several classified results (L. Hong and A.K. Jain (1998)). Therefore, spoof attacks can be reduced using this fusion process. The population coverage of the fused method gets larger coverage than standalone recognition systems. The people with several disabilities are captured with other biometric identities. The combining of classifier uses increases the processing speed of the recognizing systems. However, combining classifier further makes the user to be captured with more biometric identities. This identity has to be captured previously in the database for accurate classification. The acquisition stage with more biometric identities increases the processing duration and space. The combination of iris and face helps in simultaneous acquisition of these biometric images. This combination creates no additional inconvenience. The face recognition with iris reduces the enroll failure rate, though either the iris or the facial are dissimilar and not the both images.

The combination of the biometric identities increases the work done to classify the instances (Josef Kittler et.al (1998) and M. Skurichina (2002)). Hence, to improve the work done by the system, additionally, the use of Log-Gabor filter is employed during the phase of acquisition. Gabor features is effective in extracting the discriminant information for a biometric system that includes iris (J. Daugman (2007)) and face (A. Serrano et.al (2010)). This achieves a trade-off between the spectral and spatial resolution during brain cortex mimics (J. Daugman (2002)). The typical recognition approach of Log-Gabor iris recognition is shown in figure 1. The region of iris is segmented from the eye and then normalized to form a rectangle of fixed size. This is done usually before the encoding phase that creates iris code (J. Daugman (2004)) using phase-quadrant wavelet Log-Gabor encoding technique.

Figure 1: Iris Recognition



Figure 2: Face Recognition



Log-Gabor face recognition system is done through analytical and holistic approaches as shown in figure 2. While the analytical approach computes local response of iris image using discrete wavelet - Log-Gabor filter in a discrete set of locations. The holistic approach uses global response characteristics processed subsequently using encoding techniques (K. Nguyen Thanh et.al (2011)). This paper uses holistic approach as they relate closely with the aligned iris techniques that makes the proposed technique a more practical one.

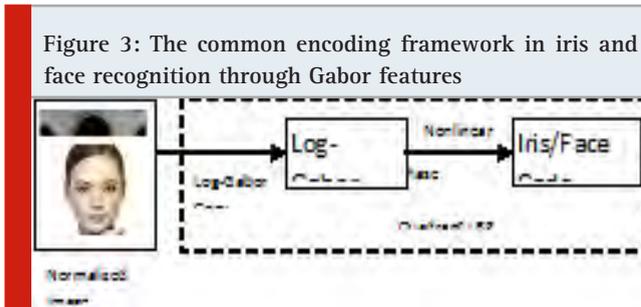
In spite of the superior performance in recognition process than linear methods like PCA and LDA (J. Daugman (2007) and A. Serrano et.al (2010)), the Log-Gabor-based filters are not conventionally deployed for feature domain high resolution. The main confrontation that avoids feature high resolution domain that contains the iris and facial image in applying successfully over Log-Gabor encoding is the nature of non-linearity during encoding procedure. This includes phase-quadrant technique (J. Daugman (2004)) for iris and Local Gabor Binary Pattern Histogram Sequence technique (C. Liu and H. Wechsler (2002)), Gabor Fisher Classifier technique (C. Liu and H. Wechsler (2002)) and Kernel PCA technique (C. Liu (2004)) for face.

The conventional feature high resolution domain framework in (B. Gunturk et.al (2003) and K. Nguyen et.al (2011) and K. Jia and S. Gong (2005)) unable to resolve the nonlinear features of Gabor features. The proposed method improves further the performance of recognizing the feature high resolution domain approaches applied over biometrics. Thus, a framework is proposed that enable the features of high resolution domain in nonlinear features such as Gabor phase quadrant for iris and LGBPHS (C. Liu and H. Wechsler (2002)) for face. In this paper a framework is developed that fused face and iris verification system at final stage that overcomes the inherent difficulties in standalone classifiers. The results of the proposed combined classifier are compared with the individual classifier results of face and iris. To avoid non-linearity in the encoding, Log-Gabor features for both iris and LGBPHS (C. Liu and H. Wechsler (2002)) for face is deployed in the proposed technique.

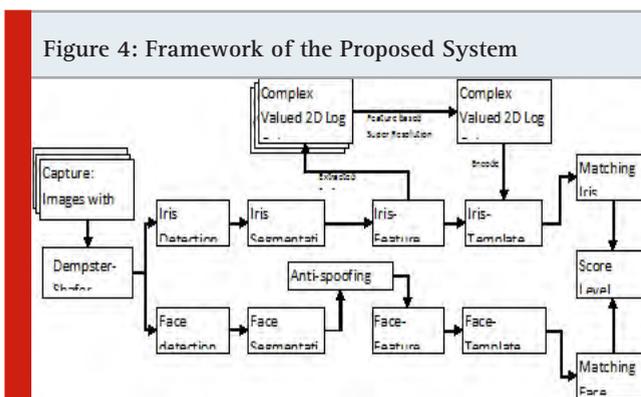
The outline of the paper is as follows: section 2 includes the proposed framework for automated surveillance. Section 3 evaluates the proposed method with existing

technique and section 4 concludes the paper with future work.

Proposed Log-Gabor Framework: During the investigation of Gabor – iris and face recognition, it is observed that there exist a common framework at high level. Gabor-iris methods and holistic Gabor-face methods are considered to be a common framework as shown in Figure 3.



Here, the iris and face systems uses Log-Gabor filter that computes the global response by convolving entire image with the filter. The Log-Gabor images are encoded further using non-linear methods such as phase-quadrant approach for iris recognition and LGBPHS approach for face recognition. The non-linear approaches computes the global response values of normalized iris and facial image using Log-Gabor wavelet filters before encoding with phase quadrant and LGBPHS. The global Log-Gabor filter is linear and nonlinearity of encoding techniques results from phase quadrant method for iris and LGBPHS method for face. Hence, feature HR domain is carried out in global Log-Gabor response than final encoding features. The Log-Gabor response represents a complex 2DLog-Gabor form. The observation on the non-linear origin, a framework is proposed and applied over feature HR domain through nonlinear Log-Gabor features as shown in Figure 4.



A. Face Recognition

Acquisition and segmentation: The face detection module locates the reference points and presents a pseudo-front pose. Viola-Jones algorithm (M. De Marsico et.al 2010) is implemented for localization of pertinent regions in facial image. The pose of the face is corrected before it proceeds with recognition process. Here, illumination correction is done through smoothening filters and the ratio between the corrected and smoothened image is

computed. This provides a light-invariant representation of facial image. The pixel value of each image is divided using neighborhood mean value or square mask (nxn) size. The correction process produces quality indices that reject the biometric samples that poor support recognition.

Anti-Spoofing Detection: 3D geometric invariants are adopted for facial structure estimation. Once this is done, the technique finds the distance between the reference points of the face. Though the reference points might subject to change, however, certain points tend to remain the same. These geometric invariants are applied with anti-spoofing technique that applies the principle in reverse direction. A set of 5 points are exploited from the face that includes right eye, left eye, nose tip and extreme right and left of the lips. The co-planarity constraint for these five sets is strongly violated. The spoofing technique estimates the invariants when the face position changes. When the face position is changed, the spoofing detection estimates the geometric invariants invariant relative to reference points identified. If invariant holds, point corresponds to the co-planarity and if this is not the case, then the face is said to be spoofed. Otherwise if the reference points are coplanar and the facial points are guaranteed, the captured image is said to be real. The anti-spoofing determines the matrix determinants ration that is fast and a straightforward technique.

Template Selection: The CCTV camera captures maximum number of frames for maximum recognition accuracy. Here, the selection strategy is based on entropy selection that saves the computational complexity. The normalization procedure is avoided and that improves the frame quality after the face localization. The correlation between the all facial pairs are acquired from frames and the correlation index over interval [-1,1] is normalized to [0,1] that sum up to unity. The difference algorithm in (M. DeMarsico et.al 2012) for best facial selection is treated as a localized correlation index version and this is used for similarity measurement.

Probability distribution on whole sample set calculates the entropy. Then, the module for selection removes an individual sample at a time over entire set and recalculates the remaining set is calculated for its entropy. A difference value between the entropy (before) and entropy (after) is taken for sample elimination. Entire samples in the set is captured and extracted to produce minimum difference. This is removed permanently and then the process repeats. The sample that is remaining at final is considered as best sample and submitted over to the next stage.

Feature Extraction and Matching: The spatial correlation between two images with its mean value M1 and M2 for each pixel intensities is calculated as:

$$s(M_1, M_2) = \frac{\sum_{i=0}^{n-1} \sum_{j=0}^{m-1} (M_1(i, j) - \bar{M}_1)(M_2(i, j) - \bar{M}_2)}{\sqrt{\sum_{i=0}^{n-1} \sum_{j=0}^{m-1} (M_1(i, j) - \bar{M}_1)^2 \sum_{i=0}^{n-1} \sum_{j=0}^{m-1} (M_2(i, j) - \bar{M}_2)^2}} \tag{1}$$

In recognition procedure, correlation is adopted locally over the sub-regions of M_1 and M_2 . Each sub-region maximizes the correlated coefficient s , i.e. searched and that extends to a narrow window over M_2 . The global correlation, S is the sum of local maxima and that achieves better accuracy during recognition.

$(M_1(i,j) - \bar{M}_1)$ - Difference between the located sample locations of \bar{M}_1 sub-region.

$(M_2(i,j) - \bar{M}_2)$ - Difference between the located sample locations of M_2 sub-region

To improve the recognition performance, pre-calculation is taken place. During verification, the user with a specific identity is claimed using an identification protocol. This matches the facial image matched against the stored images in gallery. For registered user identity in gallery stores more images. When a query image is complied, a comparison of all images is done and that calculates the correlation indices. The final values are arranged in descending order and the identity with more images is retained in the first positions. If gallery possesses only a single image per user, the first identity retrieved is returned.

Consistently, global spatial correlation value/similarity measured value is then normalized to [0, 1] range and then subtracted from 1 to get transformed to a distance in the equivalent range.

B.IRIS Recognition

Acquisition and segmentation: In eye images, the acquisition capture procedure includes maintaining the frontal pose that avoids off-axis problem. The user is captured until he/she reaches the camera at the closest. The segmentation algorithm is devised to under-control the acquisition conditions and computational time.

Preprocessing: The eye image with many details like pores, lashes etc. interfere negatively and hinders segmentation. A pasteurization filter, which moves the entire image into a square window is applied. The image is applied pixel by pixel and then the histogram is computed for the iris region contained and the maximum frequency value is then substituted.

- Pupil location: Canny filtering is applied on preprocessed image with 10 different thresholds. A fixed step is chosen that explore uniformly in its permissible range. Adaptive threshold technique is applied over other specific range that completely explores the iris region. This forms a circular region with the threshold values and the iris is perfectly circular. If the pupil are not perfect circle then approaches search for possible elliptical shapes and the same techniques is applied over it.

The noise erroneously affects the results of elliptical fitting algorithms and fast circle detection is carried out with Taubin's algorithm (G. Taubin (1991)). The extraction of real pupil boundary is done through voting

procedure that includes summing up the two different measures in (M. De Marsico et.al (2010)) i.e. separability and homogeneity. The circle possessing the uppermost score is treated as the perfectly circular that approximates better hepupil.

Linearization: This is done in order of performing limbus location, where the image is transformed first to polar from Cartesian coordinates. Pixel with maximum distance from the center of pupil circle is the starting point for he transformation no fan image.

Limbus location: For the polar image, a median filter is applied and weighted difference is calculated for the columns corresponding to θ_1 on horizontal axis that ranges over ρ_j on the vertical axis.

$$\Delta(\rho_j, \theta_i) = \gamma(\dot{M}, \rho_j, \theta_i) \cdot \ddot{M} \tag{2}$$

$$\ddot{M} = (\dot{M}(\rho_j + \delta, \theta_i) - \dot{M}(\rho_j - \delta, \theta_i))$$

Where,
is the polar co-ordinate.

$$\gamma(\dot{M}, \rho_j, \theta_i) = \begin{cases} 1 & \text{if } \dot{M}(\rho_j + \delta, \theta_i) - \dot{M}(\rho_j - \delta, \theta_i) > 0 \\ \text{and} \\ \min(\dot{M}(\rho_j + \delta, \theta_i) - \dot{M}(\rho_j - \delta, \theta_i)) > g \\ 0 & \text{otherwise} \end{cases} \tag{3}$$

The points are identified with greater positive variation indicating the transition from darker to lighter zone. The first inequality chooses the point with positive gradient and the next one prescribes darker pixel by ruling out the points between iris and pupil by. This exceed the threshold level of $g \in [0, 255]$ or ($g = 50$). Points that exploit (2) over θ_i in Mstructures the limbs. The outliers are discarded in polar space and the limbus point lies on line and has a constant ρ component.

Feature Extraction and matching: The extraction is done through Cumulative SUM algorithm (J.-G. Ko et.al). The method analysis the local gray levels variations and robust under controlled iris conditions. The algorithm is then applied over polar image and involves the following procedure:

Step 1. Normalized iris image is dividing to cell regions, where cumulative sum is calculated.

Cell region with 3×10 pixels with mean gray value is treated as the typical value for the cell region with subsequent calculations.

Step 2. Vertical and Horizontal grouping of cell regions (4 cells);

The representative values are computed over each groups.

Step 3. Cumulative sums calculation over each group: Thus by comparing, iris code for each group is obtained with 2 cumulative sums.

IF Value 1 or 2 is assigned for a cell: value contributes for an upward or downward slope.

Else value 0 assigned

Iris code Matching is calculated through hamming distance

C. Feature high resolution domain approach: This section gives the observation in spatial domain since it uses, D, B and W parameters, here, x be the HR facial image and y be the iris image, hence the relation between x and y is defined as:

$$y(i) = [D(i)B(i)W(i)x + n(i)]$$

The observation model is transformed from spatial to feature domain. The nonlinear Log-Gabor features that includes phase-quadrant Log-Gabor features for iris and LGBPHS technique for face of HR image, H and LR image h , is signified as,

$$\begin{aligned} H_{Re,Im} &= \text{sign}(G_{Re,Im}) \\ \text{Face: } h_{Re,Im}^{(i)} &= \text{sign}\left(\left(g_{Re,Im}^{(i)}\right)\right) \end{aligned} \quad (4)$$

$$\begin{aligned} H_{Re,Im} &= L^*(G_{Re,Im}) \\ \text{Iris: } h_{Re,Im}^{(i)} &= L^*\left(\left(g_{Re,Im}^{(i)}\right)\right) \end{aligned} \quad (5)$$

Where, $G_{Re,Im}$ and $g_{Re,Im}^{(i)}$ are considered as the complex-2D Log-Gabor features of HR iris and faces.

The Low Resolution iris and faces details are given by,

$$G = x \left(\exp\left(-\left[\log\left(\frac{\rho}{f_0}\right)\right]^2 / 2\sigma_p^2\right) \cdot \exp\left(-\left[(\theta - \theta_0)^2\right] / 2\sigma_\theta^2\right) \right) \quad (6)$$

$$g_{Re,Im}^{(i)} = x_{Re,Im}^{(i)} \left(\exp\left(-\left[\log\left(\frac{\rho}{f_0}\right)\right]^2 / 2\sigma_p^2\right) \cdot \exp\left(-\left[(\theta - \theta_0)^2\right] / 2\sigma_\theta^2\right) \right) \quad (7)$$

where p and θ - polar coordinates, f_0 - Filter center frequency, θ_0 - orientation angle, σ_p - scale bandwidth and σ_θ - angular bandwidth.

From, Eq.(7), it is observed that the log-Gabor function is symmetrical with log-axis in spite of the linear frequency. This yields much more effective image representation. In fact, the tail is featured in the linear axis higher frequency, which is correlated with the amplitude fall-out of images. The lower frequency redundancy in reduced further and that achieves effective frequency spectrum

coverage. Also, the DC-component of Log-Gabor filter is considered zero and hence each filter bank's bandwidth is enlarged. The required total number of overall filters is reduced w.r.t to standard Gabor filters.

Assume that the spatial observation model is made inbuilt in the feature HR domain,

$$g_{Re,Im}^{(i)} = [D(i)B(i)W(i) + n(i)] x_{Re,Im}^{(i)} \left(\exp\left(-\left[\log\left(\frac{\rho}{f_0}\right)\right]^2 / 2\sigma_p^2\right) \cdot \exp\left(-\left[(\theta - \theta_0)^2\right] / 2\sigma_\theta^2\right) \right) \quad (8)$$

where, D - Down sampling, B - Blur, W - Wrap and n - noise degradation. This filter helps in providing HR pixels in feature domain and once this is formed, the iris image is sent further for other process.

D. Fusion matching: The fusion matching adopts confidence values between the iris and face systems that fuses the respective returned distances. The two returned values for face is θ_f and for iris it is ϕ_i .

$$d = \frac{\phi_f}{\phi_f + \phi_i} \cdot d_f + \frac{\phi_i}{\phi_f + \phi_i} \cdot d_i \quad (9)$$

where,

$$\frac{\phi_f}{\phi_f + \phi_i} \cdot d_f$$

$$\frac{\phi_i}{\phi_f + \phi_i} \cdot d_i$$

represents the confident value of the facial image.
represents the confident value of the iris image.

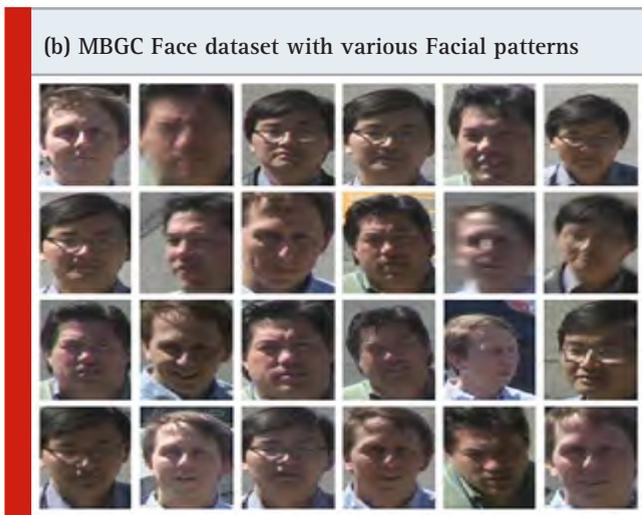
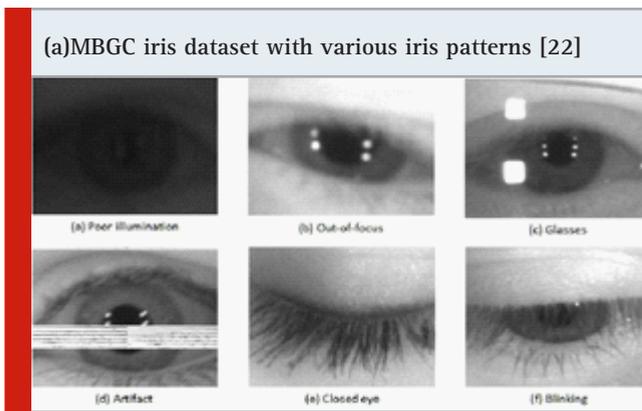
ϕ_f and ϕ_i indicates the function applied over the galleries. These are considered as the weights assigned over the distances for producing the weighted sum corresponding to global distance.

Dataset: Experimental verification for face and iris is conducted on MBGC dataset (P. Phillips et.al (2009)). This evaluates the proposed framework validity over 628 NIR iris video of 129 individuals against 8589 NIR HR iris images. The resolution of iris (still) image is 220 pixels across the iris boundary diameter and resolution of portal videos is only 90 pixels a cross iris diameter. The figure 5 shows the degradation factors that reduces the iris image quality. The training dataset has 10 iris still images and a single video sequence. Also, for testing remaining nine video sequences over each identity is matched with the high resolution image.

The frames of each video are evaluated for quality purpose. The quality metrics (K. Nguyen et.al (2011)) evaluate each frame quality that includes illumination

variation, focus, motion blur and offangle appearance. These are fused together with the help of Dumpster-Shafer theory. This theory improves the overall score of quality (K. Nguyen et.al) of each individual frame. However, the optimal frames may vary for a different database.

For face, videos over MBGC dataset focus on confined eyes for recognizing the iris. The faces in videos contain facial images very rarely and it is ideal to use low resolution (LR) imagery. The entire dataset has 3482 HR images for 129 individuals. The face images (visible) at high quality (2616x3904) are captured. The facial image (high quality) is set as a reference image, while other 10 visible facial (high quality) images of each identity is degraded using Gaussian blurring, warping and then down sampled to 40x40 pixels. Thus 10 LR sequences of 32 frames are formed. Initial five images are used for training and other 5 are used for testing.



For both face and iris images, Log-Gabor features are extracted from each image sequence with a single identity. The identities are extracted using global convolution of normalized image in sync with Log-Gabor filter. The Log-Gabor features are combined with feature HR domain approach that generates HR feature. Consequently, the HR resolved features of iris images are

encoded through nonlinear techniques. In this paper, phase-quadrant for iris image, and LGBPFS for facial image is used.

The final features are matched with the HR images in database and the similarity scores of different points of face and iris patterns are noted. Detection Error Trade Off plots from the similarity scores are used to prove the effectiveness of iris and facial recognition of different approaches. Experiments are conducted in order to compare the performance of the proposed framework based feature HR domain using linear features with pixel domain techniques. The experimental results are presented in following sections.

Iv. Evaluation of Log-Gabor Framework

A. Linear vs. Nonlinear features: The linear features include PCA and LDA for iris (K. Nguyen et.al) and face (B. Gunturk et.al (2003)) is employed over feature HR domain. An advantage of retaining non-linear Log-Gabor features over linear techniques like PCA and LDA is established. With neglecting the HR features, Log-Gabor outperforms the features of LDA and PCA in its recognition performance for both face and iris. This is shown in figure 5. An improvement could be seen in the recognition performance of all the three techniques in terms of feature HR domain.

A superior discrimination of the Log-Gabor features are clearly evident from the fact that non-HR Log-Gabor technique performs well when compared with HR-PCA and HR-LDA for both face and iris modalities. Further, the performance is improved by adding HR pixels to the Log-Gabor filter that benefits the recognition performance of Log-Gabor features that provides more discriminative results than LDA and PCA approaches.

Table 1. False Rejection Rate (in %) of iris

2D gabor	FRR (%) - *in log scale				
	LDA	PCA	2D Log-Gabor SR	LDA HR	PCA HR
10	25	42	1.4	14.5	24
6.5	21	36	1	9	20
4	16.8	31	0.45	5	15
1.95	11.2	24	0.35	3.59	10
1	7.89	18.9	0.2	2.5	7.5
0.5	3.64	15.5	0	1.5	3.5
0.35	2.1	10.2	0	0.8	1.9
0.2	1	6.1	0	0.4	0.85

Employing nonlinear Log-Gabor based feature in featured HR domain framework capitalizes the boosting performance in recognition pattern that is obtained through the discriminant property and featured HR domain approach of Log-Gabor filter.

The figure 5 illustrated the comparison between the linear and non-linear features in Feature HR domain. The linear feature include LDA and PCA (K. Nguyen et.al (2011)) and non-linear Log-Gabor phase quadrant for (a) Eyes and LLGBPHS for (b) Face.

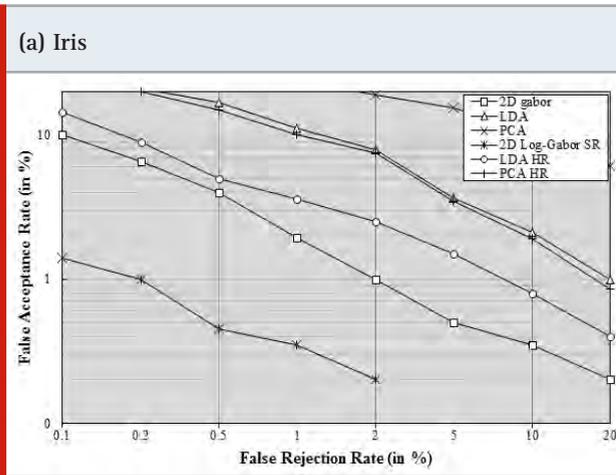
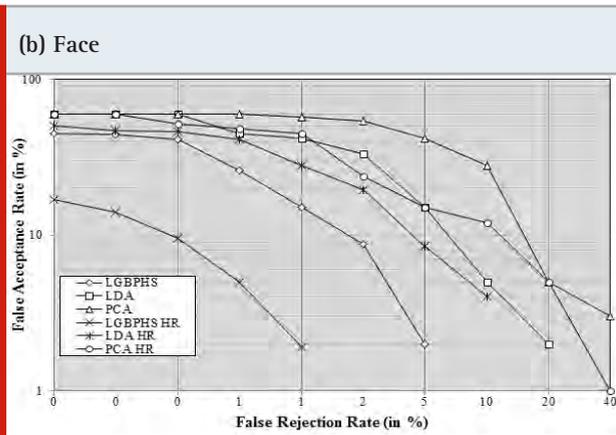


Table 2. False Rejection Rate (in %) of Face

LGBPHS	FRR (%) - *in log scale				
	LDA	PCA	LGBPHS HR	LDA HR	PCA HR
45	60	60	17	50	60
44	60	60	14	47	60
41	60	60	9.5	46	52
26	45	60	5	41	48
15	42	57	1.9	28	45
8.7	33	54	0	19.5	24
2	15	42	0	8.5	15
0	5	28	0	4	12
0	2	5	0	0	5
0	0	3	0	0	1



B.Comparison to pixel domain SR: A comparison between the proposed feature high resolution (HR) domain framework and other pixel HR domain is taken place in this section. This includes conventional interpolation HR

technique, bicubic technique (J. Daugman (2004)), and pixel domain HR technique for iris (K. Nguyen et.al) and face (F. Lin (2007)).

The features are encoded with the help of non-linear Log-Gabor filter for all the pixel domain technique that includes phase quadrant for iris and LBPGHS for face. From the figure 6, it could be inferred that the bicubic interpolation HR technique (conventional) has low recognition performance and it does not improves further. The pixel HR domain technique in (K. Nguyen et.al (2011) and F. Lin (2007)) provides fusion of information through multi-low resolution image. Considerably a HR image is generated and features are extracted out from it that improves the performance of recognition capability.

The framework i.e. proposed provides an improved recognition performance using HR processing performed over feature domain and incorporating the existing knowledge of face and iris model. The technique proposed out from it is illustrated in terms of the results from the graph and the benefits of HR image that resolves the information is best fit for recognition.

Table 3. Comparison of Recognition Performance using False Rejection Rate (in %) of iris

No HR	FRR (%) - *in log scale		
	Bicubic HR	Pixel domain HR	Log-Gabor Features
14	7	5.1	1.4
7.5	4.8	2.7	1
4	2.4	1.3	0.45
2.4	2	0.95	0.29
1.25	1.3	0.55	0.19
0.75	0.45	0.35	0

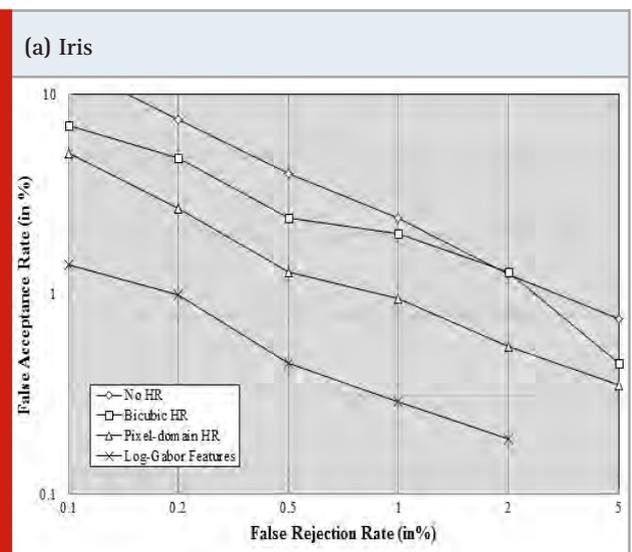
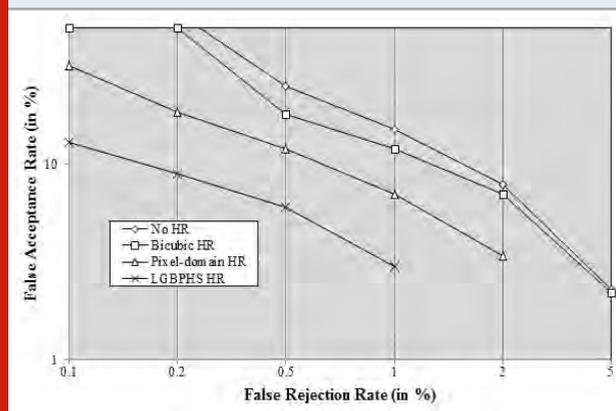


Table 4. Comparison of Recognition Performance using False Rejection Rate (in %) of eyes

FRR (%) - *in log scale			
No HR	Bicubic HR	Pixel-domain HR	LGBPMS HR
60	50	32	13
60	50	18.5	9
25	18	12	6
15	12	7	3
7.9	7	3.4	0
2.3	2.2	0	0

(b) Face Figure 8: Comparison of Recognition Performance between the proposed feature HR domain and other pixel-domain that incorporates the information from (a) Iris and (b) Face model



CONCLUSION

Feature HR domain is presented for improving the performance of recognition in biometric automated systems in comparison with existing pixel HR domain. The proposed technique uses direct high resolution features for classification and incorporates specific biometric model knowledge of iris and face. The proposed method improves further the performance of feature HR domain through framework that enable feature HR domain with nonlinear/ Log-Gabor discriminant features. Thus, by employing nonlinear Log-Gabor features, the framework boosts the performance of recognition by capitalizing the recognition performance using feature HR domain approach and high discriminant Log-Gabor features property. Finally, the paper demonstrated the framework over two biometrics i.e. iris and face that demonstrated parallel recognition performance in both biometric modalities. In future, the research can be applied over recognition and identification in real time streaming systems. Also, further enhancement can be carried out based on noise reduction while applying filters.

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Cloud Computing Task Scheduling Based on Pigeon Inspired Optimization

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ABSTRACT

An important step in cloud computing (CC) is task planning. It is important to plan the work for the virtual machine while minimizing the time and cost in the work planning process. Different scheduling procedures are offered by different researchers to schedule tasks in a CC environment. This article suggests that the work schedule is based on a general-purpose model and pigeon inspired optimization (PIO) procedure. The general purpose model first computes the compatibility value by manipulative CPU (central processing unit) function and memory cost. The correlation value is considered by adding the component function and the economic value. The projected work planning procedure using pigeon-based optimization procedures enables optimal planning of tasks for virtual machines with minimal cost and coil effort.

KEY WORDS: TASK SCHEDULING (TS), CLOUD COMPUTING, MULTIOBJECTIVE MODEL • PIGEON INSPIRED OPTIMIZATION (PIO) PROCEDURE.

INTRODUCTION

The need for CC has in many sectors of the economy increased due to the obtainability of large amounts of data and in recent years CC has an on-demand process are. CC (Mell P et.al (2009) and JoSEPn et.al (2010)) permits users to access assets such as storage and submissions over the Internet (He H et.al (2016) and Lin X et.al (2014)). Cloud deals many services to users. The platform-of-Service (PaaS) (Navimipour NJ et.al) and service as a software (SAS) (Keshanchi, B et.al (2017)) are the main services. Cloud users have different jobs and these jobs are

achieved instantaneously with the resources obtainable in the cloud. CC enactment can be improved by assigning job resources in an optimal manner. One of the critical lessons in CC (Rimal BP et.al (2011)) is to create tasks. Task Scheduler has a huge impact on the entire cloud as it affects the QoS. The work planning process preserves a balance between user needs and resources. Each task requires different tiers of storage, computing response time, and the CC situation has different geographic resources that are dispersed via the cloud organically. The work planning process is artificial by the over worked cause cloud system.

This document suggests the planner to schedule tasks for virtual machines in the CC environment. The projected job scheduling technique is based on the multi-target model and inspires the optimization method of Pigeon. The general-purpose processor model computes the cost and the memory function of all add through the processor and memory cost function. The authorization

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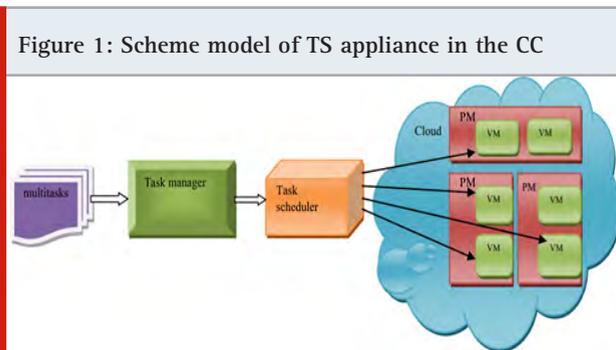
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is then calculated by totaling the marker area and the budget cost function. Depending on the fitness value jobs are assigned to virtual mechanisms. The Whale optimization procedure starts with the set of random clarifications. First, the current solution is believed to be the best solution and the search is performed on the current solution based. This practice is common, is to be the best solution achieved.

The main influences of this article are:

- The main involvement of this effort is the development of multi-purpose models for the calculation of fitness value.
- A second contribution to this effort is the development of a project planner based on the BAT optimization process. Project planners better distribute actions on a virtual machine while maintaining minimal design margins and costs.

3 System ideal: This segment defines the system perfect of the activity planning system projected into the cloud setting. Figure 1 shows a systematic perfect of the activity planning mechanism within the central committee. Task Manager (TM) collects the actions of different users. Users send activity requests to activity managers.



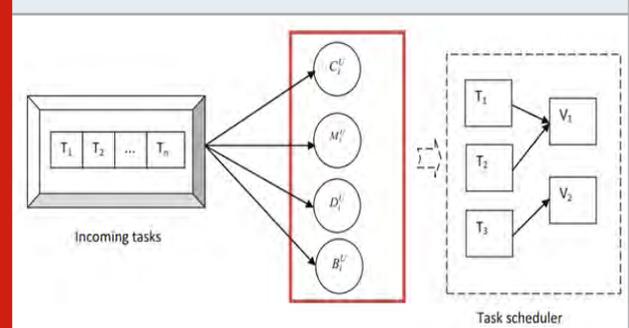
The TM database to archive this request of the user. TM organized user activity and provides activity status. The TM provides info about the status of the virtual machine. The TM makes this task requests to the scheduler are available. The scheduler is prioritized a device that incoming activities. The planner examines the memory requirements, cost, time and budget for activities required. Cloud environments contain several physical machines. A virtual machine to a physical machine can do many things. The scheduler assigns tasks to the virtual machine in the cloud appears. which has 10 virtual machines. It can be as shown follows,

$$\text{Task} = \{T_1, T_2, \dots, T_i, \dots, T_{100}\}$$

Where, T1, T2 are respectively the first and second responsibilities. Ti signifies the sum of activities i and T100 represents the number of activities 100. Figure 2 illustrates how the scheduler works. The TM provides the activities to the planner. Each activity provided by the user comprises the subsequent constraints, memory requirements, costs, times and budgets necessary. Founded on this setting, the scheduler orders the task and plans consequently. In figure 2, the memory

requirements, cost, time and budget required for the Ti activity are analyzed by the scheduler and supplied consequently to the virtual machine.

Figure 2: Scheduling of the task Ti.



In Fig. 2, the term CUi represents the CPU cost of the Ti activity that has been defined by the users, MUi is the cost of the Ti activity memory distinct by the users, DUi signifies the limit for the activity of Ti and BUi It is the budgetary cost. To optimize activities for effective planning, the research study uses the PIO procedure that describes the following:

4. Projected TS method based on pigeon inspired optimization (PIO): This segment defines the projected action planning method for planning actions on a virtual machine in a CC environment. The projected activity planning method is based on a multipurpose model and an optimization procedure inspired by pigeons. Figure 3 shows the projected flowchart for planning actions on a virtual machine in a cloud environment. Then calculate your fitness by adding cosmetics and labor costs to your budget. Assign actions to the virtual machine based on the suitability value. The pigeon-induced optimization procedure begins with a group of random solutions. Primarily, it was assumed that the solution was a solution and performed a search procedure based on the present solution. This course repeats itself until a better solution. The goal of activity planning is to better plan resource activities while achieving minimal and minimal costs.

4.1. Multi-objective model for TS: Here we describe a multi-purpose model for scheduling tasks in a virtual machine. Initially, a model with multiple lenses calculates the cost and memory of the processor for all the virtual machines represented in the cloud and computes the cost of the budget. The budget cost function is designed by totaling the processor and memory cost function. Eligibility is measured by combining budget spending work and planning process duration.

4.2. Pigeon inspired optimization: PIO procedures have recently proven to be effective in solving various optimization problems, including aerial robot trajectory planning, three-dimensional trajectory planning, an automatic landing system and a PID development controller. In this article, we adopt the activity planning method based on an optimization inspired by pigeons. This device offers two forms of PIO. The first version or

procedure uses a sigmoid function to sample the speed of the pigeons, the second form offers an updated binary modified version of the basic PIO, which uses the cosine parallel to determine the speed of the pigeons. Both versions use an equal fitness function, on the other hand, each version has methods that represent a pigeon or a solution. The process for comparing IOP optimization activities is presented in Table 1.

Table 1. PIO optimization

PIO Concept
Number of Pigeons N_p
Position of Each Pigeon X_p
Pigeon or solution (X_p) length
Best Pigeon
The velocity of each Pigeon V_p
Fitness Function
N_c

A. Fitness Function: The adequacy function or the objective or cost function are the terms of a process to evaluate the suitability of the solutions. Which is a subset of the functions selected according to the actual positive velocity (TPR), the false positive velocity (FPR), and the sum of the functions. The sum of the functions is involved in the adaptive function, so if there are functions that do not disturb the TPR or the FPR, we want to avoid it. Eq. 6 shows the formula used to calculate the flavor of a pigeon or a solution. Here is the sum of the chosen objects, the total number of objects in SF and NF is $w_1 + w_2 + w_3 = 1$. The weight is adjusted as follows: $w_1 = 0.1$, $w_2 = w_3 = 0.45$, because TPR and RPF They are equal.

$$FF = w_1 * \frac{SF}{NF} + w_2 * FPR + w_3 * \frac{1}{TPR} \tag{1}$$

B. Sigmoid PIO for FS: Defines a solution or a dove vector of length equal to the sum of the PIO FS key. In the case of STC data, the length of the vector or pigeon solution is 19. Since the basic PIO procedure continuously processes the position of the pigeon, the specific PIO solution of FS is defined as a vector whose velocity and position vectors they are randomly set between the initials [0, 1]. The traditional method is used to measure the speed of each pigeon according to Equ. (1), then the sigmoid

function is used to translate the speed into a binary version according to equation 7.

For cluster intelligence procedure binary files, the position of each pigeon is updated according to the value of the sigmoid function and the probability of a uniform random number between [0, 1] according to Equation 8. The procedure, it will act from the previous PIO, with the exception of updating the operator's position on the ground. Also, the sigmoid function will be used to transfer speed, so the positions will be efficient accordingly. Figure 3 shows the general design of the sigmoid PIO FS.

$$s(V_i(t)) = \frac{1}{1 + e^{-\frac{V_i}{\sigma}}} \tag{7}$$

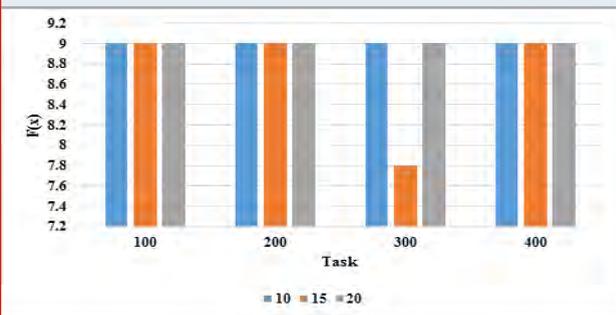
$$X(t)_{(i,p)}[i] = \begin{cases} 1, & \text{if } (s(V_i(t)) > r) \\ 0, & \text{otherwise} \end{cases} \tag{9}$$

Finally, the optimal PIO values are obtained according to the fitness function. Using optimal values, activities are planned and production is reduced. The following section will discuss the experimental section of the projected method.

RESULTS AND DISCUSSION

This section offerings a comparative conversation of the projected technique with the experimental results of existing planners and existing methods for planning activities for virtual machines in a cloud situation. The test of the projected planning process is 2 GB of memory on a personal computer that uses an Intel Core i3 processor and the Windows 8 OS. Implemented the projected technique using Java with cloud simulation and evaluated the performance. Depending on the duration and costs.

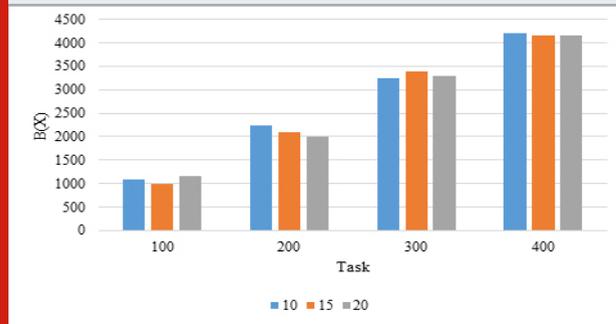
Figure 3: Makespan



5.1 Evaluation metrics: The evaluation parameters considered to analyze the performance of the projected programmer procedure are the scope and the cost.

A. Make span: Make span signifies the total time required to complete all activities. The duration of the programmer must be minimal.

Figure 4: The budget cost of the projected Scheduler



B. Cost: The cost characterizes the overall cost needed for scheduling the tasks to the virtual machines. 5.2.

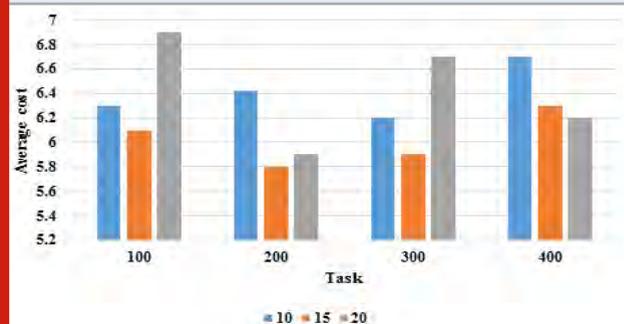
Experimental results: The trial outcomes of the projected programmer are deliberated here. The projected system is assessed on the basis of the assessment parameters it covers and the average cost.

5.2.1 Makespan: Figure 3 shows the general description of the projected method in iterations 25 and 50. The preview of the projected planner in the 25th iteration for population sizes 10, 15 and 20. When the number of activities is 100, 200 and 400, the scope of the projected Scheduler is nine for the population size of 10, 15, and 20.

5.2.2 Budget cost: Figure 4 displays the design of the programmer's budget cost projected in iterations 25 and 50 for the population size of $R = 10, 15$ and 20 . Figure 6a shows the programmer's budget cost projected in Iteration 25. When the figure the cost of the projected programmer's budget is 1143 776, 894 and 1160 486 for the populations of $R = 10, 15$ and 20 respectively. If the population size is $R = 10$, the projected programmer's budget cost is 2255.188, 3415.382 and 4360.186 when the sum of jobs is 200, 300 and 400 correspondingly. If the projected programmer's budget is 2217.96, 3418.542 and 4578.832 when the sum of jobs is 200, 300 and 400 correspondingly. When the sum of jobs is 200, 300 and 400, the cost of the projected programmer's budget is 2,059,852, 3,284,734 and 4,449,676 for a population of $R = 20$.

5.2.3 Average cost: Figure 5 shows the representation of the average cost of the planner projected in iterations 25 and 50 for the population size of $R = 10, 15$ and 20 . The average cost of the planner in projected iteration 25. If the sum of jobs 100, are the average cost of the projected plan 6.28, 6.17 and 6.88 correspondingly to the population size of $R = 10, R = 15$ and $R =$ twentieth. If the population size is $R = 10$, the average costs of the projected plan 6.47, and 6.67 6.2033333 if the number of jobs 200, 300 and 400 individually. The population is $R = 15$, are the average cost of the projected planner 5.8, 6.0033333 6.3525 and if the sum of jobs 200, 300 and 400, respectively. If the number of jobs 200, 300 and 400, the average costs for the projected plan 5.93, 6.723333.

Figure 5: The average cost of the projected Scheduler.



CONCLUSION

This document provides planning measures in a virtual machine in a planning process CC-setting action based on a model of multi-purpose and an optimization method based on the dove. Initially, the multiple lens model calculates the value of compatibility by the processor and the storage cost function is calculated. The cost function estimate is then considered by totaling the cost function for both the processor and memory. Lastly, the fitness value is considered by totaling and cost functions makepan home. Have been introduced optimization methods then a dove is based for better planning of actions in the virtual machine. The optimization method based on the best to discover the optimal solution in the best agent based search.

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AI based Classification of Chest Xray for COVID-19 Diagnosis: A Study

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ABSTRACT

The Covid-19 pandemic has locked down the entire world by suspending all commercial, agricultural, educational, religious and social activities. The rapid spreading of this virus made it difficult for the health care workers to deliver proper care, due to constraints in resources. The major issue is diagnosing Covid-19 infection. The requirement of large number of testing kits, personal protection equipment, ventilators and hospital beds were some of the major challenges faced. This resource constraints lead the researchers to work for alternate rapid diagnosis methods using the existing infrastructure. Classification of chest Xray is one of the possible methods to diagnose Covid-19 infection. AI based solutions to diagnose Covid-19 from Chest Xray images is identified as a potential solution. In this study, some of the recent work on deep neural network-based classification of Covid-19 infected cases from chest Xray are reviewed.

KEY WORDS: COVID-19, DEEP NEURAL NETWORK, CLASSIFICATION, CORONAVIRUS, DIAGNOSES.

INTRODUCTION

Coronavirus Disease 2019 or in short COVID-19, the recent pandemic not only created chaos in the entire world but also fear in the minds of every individual. As per the World Health Organization(2020) report the novel pulmonary infection due to the Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) has had a devastating effect on human life across the world. A total

of 10,237,542 cases reported with 5,480,877 recovered and 501,868 death as on 29th June 2020 at 0:0 GMT (5.30 IST). Figures 1 and 2 show country wise reported cases of Covid-19 as on 29th June 2020. Figure 3 shows how fast the infection is spreading across the world. Figure 4 gives insight to the closed cases as on 29th June 2020. The data and graphs are based on worldometers(2020).

The patients came to the hospital with symptoms like fever, shortness of breath, cough, chills, repeated shaking with chills, muscle pain, headache, sore throat, and/or loss of taste or smell. Covid-19 is an upper respiratory infection hence it effects the lung in a very drastic way. Covid-19 pandemic has disrupted delivery of health care due to critical resource constraints in testing, ventilators, hospital beds, health care manpower and their protective equipment. Early detection and adoption of timely

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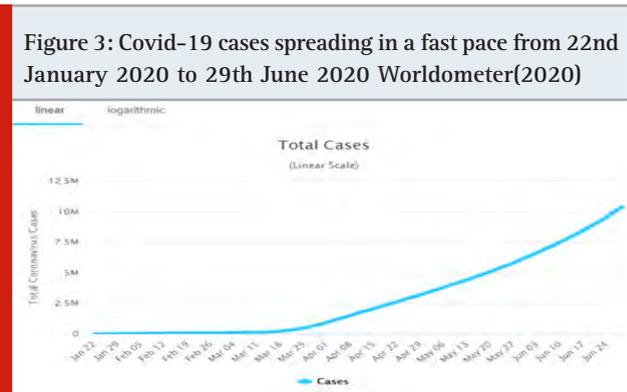
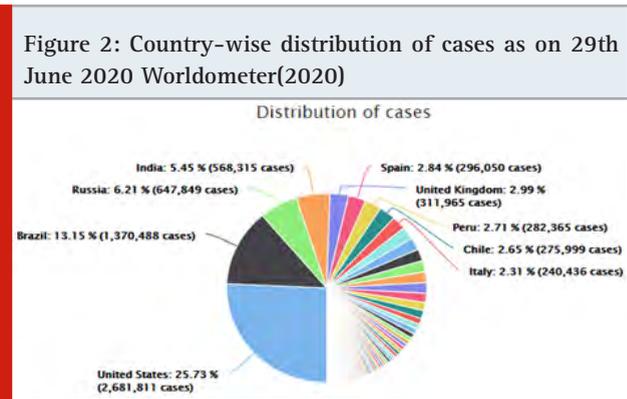
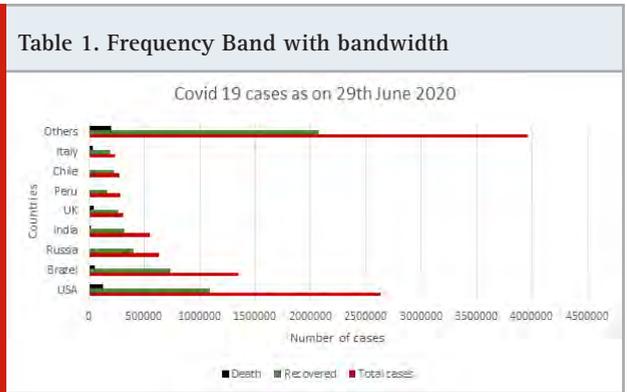
quarantine measures are the right way to reduce the virus spread as well as to carry out appropriate patient care Rubin et al., (2020). Approved clinically proved protocols and tests are essential for accurate diagnosis of COVID-19.

Reverse transcriptase-polymerase chain reaction (RT-PCR) based nucleic acid tests using specimens collected via nasopharyngeal swab are the standard test to diagnose Covid-19 infection. The high turnaround time and inadequate supply of test kits forced the researchers to find more ways to diagnose the infection. The turnaround time was calculated as the difference in time between each collection and reporting timestamp. Ward et al., (2020) point out another drawback of RT-PCR test is the results show that the positive detection rate in clinical and epidemiological suspected COVID-19 cases is about 50% due to some factors such as sample quality, virus infection site and sampling time, etc. This situation demanded point-of-care serological tests.

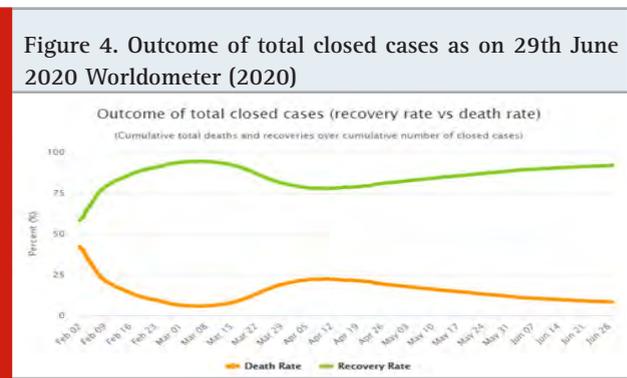
Serological tests can be used to identify whether the person has been exposed to a particular pathogen by looking for the presence of antibodies that are produced in response to infections. Serological test has the advantages of convenient and stable sample collection, easy realization of high throughput and small workload compared to RT-PCR Ward et al. The availability of adequate test kits are still an issue, since the virus is spreading at a very high rate. This leads to find other ways such as chest imaging to identify the possible infection of Covid-19 Yang et al., (2019).

With a chest Xray a doctor can find out if the patient has pneumonia, heart failure, lung cancer, sarcoidosis, tuberculosis, lung tissue scarring known as fibroids. The lung is the organ that is most effected with the SARS-CoV-2. This virus infects the lung causing multiple fibroids. Some studies already proved the radiographic abnormalities in CXR images of majority of the COVID-19 positive cases Huang et al., (2020) and Guan et al., (2020).

Moreover, a multidisciplinary panel comprised of radiologists and pulmonologists from 10 countries with experience in managing patients with COVID-19 across a spectrum of health care environments recommended CXR also known as chest radiography and CT scan to address the critical resource constraints in the management of COVID-19. They have considered three concerns viz. varying risk factors, community conditions, and resource constraints Rubin et al., (2020)



Chest Xray (CXR) and Computed Tomography (CT) scan are the standard tools for pulmonary disease diagnosis and management. CT scan is more precise and accurate than CXR. However, CXR is popular and the primary radiographic exam to evaluate chest abnormalities, because it is useful, cost efficient, faster and radiation exposure to the patient is minimal. Therefore, the first and most important imaging modality used is a Chest Xray Rubin et al., (2020) and Self et al., (2013). Chest Xray is the oldest method of evaluating the chest. The two major organs that resides in a chest is the lung and heart. Chest Xray which is very easy, fast and simple test has the ability to give many important information about the patient to the doctor.



METHODOLOGY

Wang, L., & Wong, A introduced a novel architecture called COVID-Net, one of the open source network designs for COVID-19 detection from CXR images. They have applied transfer learning concept (pre-trained on a large dataset) and combined five popular open source datasets, to overcome the small dataset issue Wang & Wong (2020). Three transfer learning convolutional neural network-based models (ResNet50, InceptionV3 and Inception- ResNetV2) have been proposed for the diagnosis of Covid-19 infected patient using chest X-ray radiographs in another study Narin et al (2020). Zhang et al., (2020) also suggested a deep learning method based on transfer learning. Ghoshal et al (2020) came up with a novel idea to estimate the uncertainty in deep learning-based classification of Chest Xray for Covid-19 infected patients to improve the diagnostic performance. It establishes a correlation between the estimated uncertainty and the classification accuracy, thus enabling the identification of unknown cases.

Figure 5: a. Normal, b. Infected with Covid-19. Images are from COVIDx (Wang, L., & Wong, A. (2020)



Interpretable or explainable AI is the emerging Artificial Intelligence research area. Visualization along with estimated uncertainty is an additional insight to the prediction, which improves the understanding of deep learning. This understanding about the process facilitates more informed decision making Ghoshal et al., (2020) It is observed that the majority of studies used knowledge transfer using transfer learning techniques to address the small and imbalanced dataset issues in the classification of chest Xray for the diagnosis Covid-19. In this method the model is pre-trained on large benchmarked datasets such as ImageNet of Deng et al., (2009) and fine-tuned on the chest Xray image dataset.

Challenges: Limited dataset is one of the major challenges that we face in the classification of Xray images for the preliminary diagnosis of Covid-19. The researchers are trying to overcome this issue by combining various publicly available datasets and knowledge transfer (Transfer Learning). In transfer learning the classification network is partially trained on a large dataset for feature extraction and then fine-tuned with the problem dataset. Xray has to be taken at the point of care in large numbers as the suspected cases increasing drastically.

Dataset: Wang, L., & Wong, A. (2020) introduced a new open source dataset COVIDx is introduced by combining five datasets. Figure 5 shows representative samples of normal(5a) and infected with Covid 19(5b).

Various data sources such as repositories of Github Cohen et al., (2020), Kaggle and other publicly available datasets are used for training and testing models.

Table 1. Comparing various Chest Xray image classification models

Methodology	Dataset	Result	Literature
Covid-Net: a deep convolutional neural network (CNN) design.	Covidx	Accuracy: 93.3% Sensitivity: 91.0% Positive Predictive Value: 98.9%	Wang et al.
Deep Transfer Learning (CNN based) Compared 3 models : InceptionV3, ResNet50, and Inception-ResNetV2	50 Covid-19 infected samples from a GitHub repository and 50 normal samples from Kaggle	ResNet50 yielded highest accuracy= 98% Precision: 100 Sensitivity: 96	Narin et al.
Deep Learning with Anomaly Detection	Covid-19 cases from Github repository and pneumonia cases from the ChestXrayDataset	Sensitivity: 90.00% and Specificity:87.84% (when T = 0:25) Sensitivity: 96.00% and Specificity: 70.65% (when T = 0:15) T is the threshold that controls the trade-off between sensitivity and specificity	Zhang et al.
Dropweights based Bayesian Convolutional	68 Covid-19 infected samples from a GitHub		

Neural Networks (BCNN)	repository and normal and viral pneumonia samples from Kaggle dataset	Measure of uncertainty is used to further improve the classification accuracy.	Ghoshal et al.
COVID-MobileXpert: Deep neural network based mobile application using Transfer Learning - DenseNet-121	Private data	DenseNet-121 has the highest AUROC more than 0.98 in all cases	Li et al
COVID-CAPS-A Capsule Network (CNN)-based Framework- Transfer Learning	Covidx	Accuracy of 95:7%, Sensitivity of 90%, Specificity of 95:8%, and Area Under the Curve (AUC) of 0:97	Afshar et al
Deep-COVID using deep transfer learning - knowledge transfer from pretrained models- ResNet18, ResNet50, SqueezeNet, and Dense Net-121	COVID-Xray-5k, contains 2,031 training images, and 3,040 test images- Covid-19 cases are from GitHub repository	Average sensitivity: 97.5% Average specificity: 90%	Minaee et al
CNN and EfficientNets based model - Transfer Learning	Combination of Radiological Society of North America (RSNA) Pneumonia Detection Challenge dataset and Github	Sensitivity: 90% Positive prediction: 100%	Luz et al
CoroNet - Task-Base Feature Extraction Network (TFEN) and Covid-19 Identification Network (CIN)	COIVDx and other sources such as RSNA	Accuracy: 93:50 Precision: 93:63 Recall: 93:50 F1-score: 93:51	Khobahi et al

Performance Evaluation Measures: Confusion matrix and measures such as accuracy, sensitivity, Positive Predictive value (PPV), ROC curve and Area under ROC curve are generally used to evaluate the performance of classification.

TP = True Positive, correctly predicted positive cases
 TN= True Negative, correctly predicted negative cases
 FP = False Positive, wrongly predicted positive cases
 FN = False Negative, wrongly predicted negative cases
 Accuracy = $(TN + TP) / (TN + TP + FN + FP)$
 Recall (Sensitivity) = $TP / (TP + FN)$
 Specificity = $TN / (TN + FP)$
 Precision = $TP / (TP + FP)$
 F1-Score = $2 \times ((Precision \times Recall) / (Precision + Recall))$

The performance of various models was assessed by the sensitivity, specificity, and area under the receiver operator curve (AUC). Proportion of Correctly identified positives and negatives are measured by sensitivity and specificity respectively. The overall classification performance, which is sensitive to the class imbalance, is measured by AUC.

Table 1 describes a performance comparison of various methodologies under study. Knowledge transfer using

partially pre-trained model and fine tuning on the available training set is a common technique adopted by various researchers to overcome the training dataset availability. The Artificial Intelligence based, in fact deep learning-based classification models are best replace of radiologists at this time of crisis, since number of patients are enormous.

CONCLUSION

Covid-19 pandemic still continues to be a threat and is spreading in a very fast pace across the world. Researchers and healthcare providers are working hard to overcome the resource constraints due to sudden outbreak of patients. Artificial Intelligence based medical diagnosis and care systems can be used to overcome the resource scarcity to an extent. Even though diagnosis based on image classification is not a confirmation test, chest Xray image classification can be used for preliminary diagnosis of Covid-19 infection. This preliminary diagnosis can start immediate medical treatment and initiate the process of contamination. Various methods and techniques of chest Xray classification is discussed to provide better awareness of the problem and to find an ideal solution. Transfer learning based classification models based on Chest Xray images are showing remarkably good prediction

accuracy of the true positive cases. With the help of Artificial Intelligence, the problems of scarce resources can not only be eliminated during this pandemic but as well for future outbursts too.

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Literature Review on High Dimensional Data Clustering Techniques

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ABSTRACT

Clustering methods look for data groups with low internal similarities and high intercluster similarities. Due to the widespread use of multi-dimensional data in various fields, the need for multi-dimensional data clustering has become a complex problem. Conventional clustering methods do not meet the requirements of large data due to a dimensional curse problem. This had led to the development of various approaches that are used for solving the problem from its own perspective. This paper focuses on dimension reduction and subspace clustering algorithms for dealing with high dimensional data.

KEY WORDS: CLUSTERING, HIGH DIMENSIONAL DATA, SUBSPACE CLUSTERING, DIMENSION REDUCTION.

INTRODUCTION

Clustering is an significant function of data mining (Jiawei Han and M. Kamber (2001)). In clustering, also known as automatic classification, there is no tagged data. The purpose of a cluster is to identify data groups that are similar in the same group, but differ from objects that exist in different groups (A. Jain et.al (1999)) Different clustering algorithms are available to process different data. However, if the number of data measurements becomes too large (greater than 3), traditional clustering algorithms cannot effectively solve this problem. Measurements of data are "constant" (also called "attributes" or "features") measured by each

observation. As the sum of measurements in the dataset rises, clustering algorithms suffer a dimensional curse that affects the quality of the results. (S. Goil et.al (1999)). Extensive surveys in (Pavel Berkhin (2002)) show that high dimensional data problem had been addressed using dimensionality reduction algorithms and subspace clustering algorithms to some extent.

2. Dimension Reduction: It is the search for a smaller set of features to describe a larger set of observation parameters. The goal of downsizing is to convert multidimensional data into a low-dimensional space while maintaining maximum of the underlying data structure. Size reduction methods are divided into two categories, linear and non-linear. Linear amplitude reduction technology draws elements based on the linear functions of the input elements in the data set. Linear methods are easy to recognize and very easy to implement, but the concept of linearity has not given good outcomes. In order to solve the above problem, a linear reduction method is proposed.

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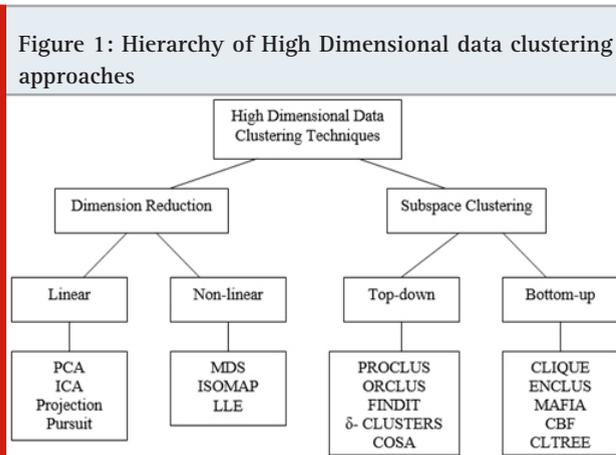
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2.1. Linear Dimension Reduction Systems: The linear dimension method takes into account only the linear dependences between variables i.e., all data is in a linear space. Linear methods such as PCA, ICA, and projection tracking are discussed in the next topic.

2.1.1. PCA: PCA ((Imola K. Fodor (2002)) and (I. T. Jolliffe (1986))) is a technique widely used for scaling. The goal of the PCA is to lessen the dimensionality of the data by selecting only the dimensions with the greatest deviation. The dimensions are reduced by linear conversion from multidimensional to low-dimensional space while retaining the properties of the original dataset. The PCA method offers many advantages. First, it offers greater accuracy of results (Deegalla et.al (2006)). Secondly, noise can be reduced because the data contained in the main components are mainly due to noise. Third, the computational complexity of the subsequent processing is reduced.



2.1.2. ICA: ICA ((Imola K. Fodor (2002)) and (A. Hyvarinen 1999)) is a high-order technique that adopts linear method for reducing the dimension space. The main goal of ICA is to find a transformation from each other. Independence implies uncorrelatedness of the data. ICA in the sense that it focuses only on the statistical independence of features present in the high dimensional data.

2.1.3. Projection Pursuit: It (Imola K. Fodor (2002)) is a linear reduction technique that is developed for finding the interesting projections in the high dimensional data. These projections are used for optimal visualization of the clustering assembly of the data. The main focus of projection pursuit is visualization of the data in addition to dimension reduction. Projection pursuit differs from PCA in the sense that the former reduce the dimension by preserving the interesting features of the data whereas the latter performs the dimension reduction by representing in the mean-square sense.

2.2. Non-linear Dimension Reduction

METHODS

In which data lie on a locally linear subspace (A. Hyvarinen 1999). Non-linear methods use non-linear objective functions to determine the maximum weight, but the resulting components are still linear combinations of actual variables. Various non-linear methods namely MDS, ISOMAP, LLE are cited below.

2.2.1. Multidimensional Scaling (MDS): Multi-dimensional scaling is a non-linear projection technique. The simple knowledge of MDS is to display data points in a smaller space and try to maintain the distances between data points (A. Jain et.al (1999)). MDS was used to convert data in 2-D or 3-D dimensions and visualize the result to identify a hidden organization in the data. This method uses distance measurement, which claims that the more two objects are similar, the smaller their distance. The MDS results are uncertain in terms of movement, rotation and reflection. The advantages of MDS are that it is relatively easy to implement, very useful for viewing, and able to see the structure hidden in the data. The disadvantages of using MDS are the difficulty in selecting a suitable map size and the difficulty in displaying small distances according to the local structure.

2.2.2. ISOMAP: Isometric feature mapping (ISOMAP) algorithm is an extension to MDS (A. Jain et.al (1999)). The ISOMAP algorithm consists of three stages: creating a neighborhood graph based on observations in multidimensional space, calculating the matrix of geodesic distances, and applying the MDS method. ISOMAP is one of the easy to understand and implement algorithm if the data is severely nonlinear and it preserves "true" relationship between the data points. On the negative side, ISOMAP fails to handle more complex domains such as nontrivial curvature or topology.

2.2.3. Locally Linear Embedding: Local linear embedding contains many data points finding a good linear reconstruction of a small area. LLE deals with the problem of nonlinear compression from the second starting point. This indicates that the spatial line is significant and that spatial relationships in the unique data space are stored in the expected low-dimensional space. The LLE algorithm consists of three phases:

Determining the based neighborhood point: The distance among the pairs of ideas in the input space, the calculation of the best restored weight from each neighboring point to each data point, the calculation of the vector by weight (Pavel Berkhin (2002)). LLE algorithm is more efficient compared to ISOMAP while it preserves only the local structure by introducing unpredictable distortions (J. W. Chang and D. S. Jin (2002)).

3.Subspace Clustering Methods: Secondary space clustering methods find clusters in different secondary spaces in the dataset. Most likely these methods locate their search for corresponding parameters by finding clusters in preferably overlapping subspaces. Secondary space clustering algorithms also define a subset of related functionality for each cluster. They are scalable in terms of the size of the sub-region in which the clusters are

located. The two types of secondary space clustering methods are top-down and bottom-up subspace search approaches. Appraise functionality on a subset of data using only a subspace cluster localization solution. The difference between the two types of secondary space clustering procedures depends on how the locale is measured to evaluate the secondary space.

3.1. Bottom-up Subspace Search Systems: In the upstream subspace method, the search space is used using the down closure property, for example, H. APRIORI approach, abbreviated. The close down property indicates that dense units in k dimensions have dense units in all dimensions ($k-1$). Using these dimensions, which contain dense units, possible subspaces can be formed by reducing the search space. The methods below determine the position by creating containers for each dimension and creating a multidimensional network using these containers. There are two methods for positioning. The first group uses a static size grid to distribute each dimension into a cell such as Click and NCLUS, while the second group consists of Mafia, CBF, CLTree and DOC, which define the intersection of cells in each dimension.

Clique: CLIQUE (R. Aggarwal (1998)) was the first bottom-up subspace search algorithms. The procedure works in three steps: identifying subspaces that contain clusters by combining density and grid-based clustering, generation of clusters and the minimal descriptions in the form of Disjunctive Normal Form (DNF) expressions. The advantages of CLIQUE lie in its ability to find clusters of arbitrary shape and in any number of dimensions. The performance of the algorithm deteriorates as there are large amounts of dimensions.

3.1.2. Enclus: ENCLUS (C. H. Cheng (1999)), a subspace clustering scheme is based on CLIQUE. The procedure measures entropy using coverage, density and correlation. ENCLUS algorithm also uses APRIORI approach for mining subspaces. Look for interesting sub-areas in terms of interest income and find sub-areas above the entropy threshold. After identifying the interesting sub-regions, the clusters are found using the click of the second algorithm. ENCLUS algorithm finds overlapping clusters of random shapes and variable sizes but scalability is a major issue as with the CLIQUE algorithm.

3.1.3. Mafia: The MAFIA ((S. Goil et.al (1999)) and , Imola K. Fodor (2002)) algorithm is an extension to CLIQUE. The algorithm uses an adaptive grid to split the size according to the distance of the data to increase the efficiency and quality of the cluster. First, a histogram was created to determine the number of large sections. By combining cells of approximately the same density, larger cells form. The parameters differentiate depending on the dispersal of data, and the resulting cell boundaries ensure the quality of the cluster in a network of certain sizes. When cells are repaired, lists with grouped subspaces are created using the APRORI method. It also uses parallelism for the clustering process. The MAFIA algorithm results in improved efficiency and quality of

the cluster. Parallelization results in faster processing of data when compared to CLIQUE.

3.1.4. Cell-based Clustering Method (CBF): CBF (J. W. Chang and D. S. Jin (2002)) uses cell creation algorithms to create optimal partitions by frequently tracking the minimum and supreme values in a given size, which reduces the number of compartments. Then the cells are stored in an effective filter-based index structure. CBF discovered clusters of several shapes and sizes. This also agrees well with the sum of instances in the dataset. Cluster building and data recovery were faster. CBF accuracy low.

3.1.5. CLTree: CLTree (Jiawei Han and M. Kamber (2001)) algorithm evaluates every dimension repeatedly and then uses only those dimensions with areas of great density for further processing. The areas of high density are separated from areas of low density by adaptively partitioning each dimension into bins using a modified decision tree algorithm. CLTree scales linearly with number of instances and dimensions of the subspace. The tree construction is an expensive task.

3.1.6. (DOC) Density-based optimal projective clustering: DOC (C. C. Aggarwal et.al (2000)) is a hybrid method that combines grid-based and iterative processes from bottom to top and bottom to bottom. The algorithm proposes a mathematical structure to represent the optimal projected cluster in relation to the density of points in the subdivision.

3.2. Top-down Subspace Search Methods: In top-down subspace search method, an initial approximation of the clusters is found. For each cluster in the dimension, a weight is then assigned. Using the updated weights, the clusters are regenerated. The top-down subspace methods include PROCLUS, ORCLUS, FINDIT, δ - clusters and COSA.

Since projected clustering is a subspace first bottom clustering algorithm, it combines the greedy method with the Clarns algorithm for clustering in full-dimensional space. The Proclus algorithm runs in three phases: an initial phase, a repetition phase and a perfecting phase of the cluster. In the first phase, the representative points are selected by each group. Numerous medioids were found in the second movement. In the final stage, cluster finishing is performed to improve the quality of the cluster. Proclus provides accurate results with respect to clicks. Draw linearly well with the size of the entire room. With few representative points, the prologue can completely lose some clusters. If the sum of dimensions is not selected properly, the information it contains will be lost.

3.2.2. Orclus: The objective of the ORCLS algorithm (C. C. Aggarwal et.al (2000)) is to find clusters of low-level estimates for high-volume data. This is an extension of the Proclus algorithm (C. C. Aggarwal et.al (1999)). The algorithm has three stages: assignment, subfield definition, and merge. During the assignment phase, data

points are allotted to the nearest cluster center. The next phase is to calculate the covariance matrix and select the orthogonal eigenvectors with the smallest eigenvalues for each cluster. In the merger phase, the number of clusters is reduced by integrating the closest pairs of existing clusters, respectively.

3.2.3. Findit: With the help of Dimension Voting (FINDIT) (C. C. Aggarwal et al. (2000)), a fast and intuitive subspace clustering algorithm uses a unique distance measurement called dimension oriented distance (DOD). The measurement in a certain amount increases the number of dimensions of the two dimensions. In higher dimensions it is assumed that the two examples are very close to each other compared to some dimensions. The FINDIT algorithm uses three phases, namely the sampling phase, the clustering phase and the data allocation phase. In the sampling phase, two small sets are selected that are generated by randomly sampling data. The initial representative mediods are then created using this sentence. In the next step, appropriate dimensions are determined for each Meadoid using distance measurements. Mediods are given based on the subspaces found in the data assignment phase. Improve performance with sampling algorithms.

3.2.4. δ – Clusters: The goal of δ – Cluster is a set of a set of objects and a set of dimensions / attributes, so that objects represent strict consistency for a set of dimensions / attributes. The algorithm begins with the initial clusters, and then random attributes and data points improve the quality of the entire cluster and the quality of individual clusters by repeating. The iteration process ends when an individual improvement occurs in each cluster.

3.2.5. COSA: (Jerome H et al. (2002)) When clustering through a subset of attributes, a iteration algorithm assigns weights to each component for each dimension, but not to each cluster. The algorithm begins by examining the K-NN of each component, which is used to measure the measurements for each component. The atmosphere of each element is enriched by the events of its cluster. The weights are compared after clustering and the total value of each dimension for each cluster is calculated.

CONCLUSION

High dimensional data had found a wide use in various fields. The different approach to handle high dimensional data uses different strategies for solving the curse of dimensionality problem. Dimension reduction techniques attempts to provide the solution by transforming the data from high dimensional space into a low dimensional space. While the dimensions are reduced, it has certain drawbacks because they are ineffective in handling a large number of irrelevant attributes. The dimension reduction techniques would result in inevitable loss of information and distort the real clusters (Domeniconi et al. (2004)). With bottom-up subspace search algorithms, a high degree of scalability could be achieved. When

both these techniques are combined it would likely to produce expected results.

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Quality of Life and Mobile with Internet Addiction Among Engineering College Students: A Correlation Study

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ABSTRACT

Internet and Mobile are the communication technology that helps people to communicate easily. But at the same time most of the students are spending their valuable time in Mobile with Internet. They are wasting their time in the mobile by playing game and watching social media etc. This is known as mobile or internet addiction. Without mobile with internet, they cannot able to live in a single day. This kind of addition creates mental and physical health problem to the adolescents. The aim of this research is to study level of addition and how it affects the behavior and quality of life among the students. The study involves 200 (100 male and 100 female) undergraduate engineering college students. The data is analyzed by SPSS software tool. The questionnaire includes age, gender, monthly income, own computer, own Smartphone, average time of using internet, preferred place to use internet, preferred website and average number of sleeping time etc., and Internet Addiction test (IAT) was used to identify internet addiction followed by WHO Quality of Life Scale BREF (WHOQOL BREF). From the result analysis there is no significant difference between the mobile with internet addiction among young adults male and female. Also, the proposed study shows that the internet addiction affects the quality of life which may clinically significant. Thus, it can be noted that internet use is major influencing factor to determine the adolescents' quality of life.

KEY WORDS: MOBILE ADDICTION, INTERNET ADDICTION, QUALITY OF LIFE, ADOLESCENTS.

ARTICLE INFORMATION

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INTRODUCTION

Internet is generally defined as a global network connecting millions of computers. With the help of the mobile, internet can be accessed for communication and use the information available in the internet. Uses of mobile with internet in our daily life are depending on desires and goals. There are many productive things we can do on the internet in mobile eg: uses of internet in students daily life, it increases the speed of daily tasks, for business promotion and innovation, shopping, Research and Development, Free communication, in Money management, Politics, Teaching and sharing knowledge with others, solving problems, in cashless economy, in environmental development, in Tour and Travel etc. The mobile internet is used by some to facilitate research, to seek information, for interpersonal communication, and for business transactions. On the other hand, it can be used by some to indulge in pornography, excessive gaming, chatting for long hours, and even gambling.

The term "Internet Addiction" was proposed by Dr. Ivan Goldberg in 1995 for pathological Compulsive internet use. Internet used by more and more people and has many positive aspects of human life, but they are also causing addiction enough to interfere with everyday life. Especially children and adolescents are indulged in internet use, and adults also have many side effects of excessive use of internet, such as neglect of work, relationship problems, and attention seeking behavior. The huge number of young students living in India, use of mobile with Internet. There is a direct relationship between Mobile with Internet addiction and physical and mental health. Hence, it is necessary to study the usage of Mobile with Internet in engineering college students in India. With this background, we undertook the present study to take a close look on this issue of health related quality of life. The widespread use of internet has caused psychological, social and quality of life. Quality of life is the general well-being of individuals and societies, outlining negative and positive features of life. It observes life satisfaction, including everything from physical health, family, education, employment, wealth religious beliefs, finance and the environment. Internet addiction was negatively related to every aspect educational problems for the students and also effects on their personalities.

Effects of overuse of mobile internet in quality of life: Overuse of mobile, results in personal, family, academic, financial, and occupational problems that are characteristic of other addictions. Real life relationships are disrupted as of excessive use of the mobile. Individual suffering from excessive mobile use, spend more time in solitary seclusion, spend less time with real people in their lives, and are often viewed as socially awkward. Many people who attempt to quit their mobile with internet use experience withdrawal including: anger, anxiety, depression, relief, mood swings, fear, irritability, sadness, loneliness, boredom, restlessness and upset stomach. Quality of life deteriorates day by day. Being excessive mobile use can also cause physical discomfort

or medical problems such as Carpal Tunnel Syndrome, dry eyes, severe headaches, eating irregularities, (such as skipping meals), failure to attend personal hygiene, and sleep disturbance. Self Esteem refers self in social, academic, family, and personal areas of experience. It also refers to the evaluation a person makes, and customarily maintains, of him- or herself; that is, overall self-esteem is an expression of approval or disapproval, indicating the extent to which a person believes him- or herself competent, successful, significant, and worthy.

1.1 Internet Addiction: In 1998, Dr. Jonathan J. Kandell defined Internet addiction a "a psychological dependence on the Internet, regardless of the type of activity once logged on." The term internet addiction was proposed by Dr. Ivan Goldberg in 1996 for pathological compulsive internet use. Internet addiction is very serious problem in today's time. Internet influences the life style of adolescents. Mobile with Internet influenced daily life, sleeping pattern, eating habits, living of standard, also influenced social relationship, interpersonal relationship, communication problems. Internet addiction causes the problems in adolescent's life.

Mobile with Internet addiction is not like use of alcohol or durgs but it is an impulse control disorder like a gambling. Some of mobile user, their feeling shear with online friends. They are very close with them. They also create online activity on their screen of computer. Also internet user enjoy with internet use. Internets allow them to exchanging ideas and meet by using char room, socialize web sites of social network and also virtual communities. Some users also spend more time on internet to searching interested topic online or for reading blogs. Internet addiction is more like other addiction the addicted person rumores in the virtual fantasy world. They may get connected to the real world, meet the real peoples at far distances which is not possible normally in life.

1.2 Quality of Life: Quality of life is considered to be the central aspect of human life and welfare. It's an important concern and the ultimate goal of modern life which human beings strive to achieve throughout their lives and are strongly motivated to attain it. Till date there exists no consensus to what quality of life actually is. It is often taken as the behavioral process by which humans maintain balance among their various needs or between their needs and the obstacles of their environments. It also has been defined as the value assigned to duration of life as modified by the impairments, functional states, perceptions and social opportunities that arte influenced by disease, injury, treatment or policy (Patrick & Ericson, 1993), a personal statement of the positivity or negativity of attributes that characterize one's life (Grant et al., 1990).

Quality of life depends upon the degree and the extent to which the person feels he is leading a meaningful life. It consists of two components. The first is a physical aspect which includes health, diet, as well as protection against pain and disease. The second component is

psychological in nature. This aspect includes stress, worry, pleasure and other positive or negative emotional states. It can refer to aspects of a person's well-being (physical, psychological, social), as well as aspects of the environment and a person's standard of living (Harding, 2001).

1.3 Back Ground Concept of Adolescent: Adolescents form a major portion of countries population and development of the country depends upon healthy youth. Adolescence is critical growth spurt in one's life. This is an age when adolescence is critical growth spurt in one's life. This is an age when adolescents are unaware and very men to know about their sexuality. Consequently get involved in different sexual activates. They may face many problems related to sexual issues and rights as they lack knowledge about physical, psychological changes accompanying their growth and development.

The adolescents rising interest and curiosity about sex are a motivation factor to acquire information about it. Confronting face to face with the urge to explore sexuality are the present social norms and taboos. This leads to many misconceptions and mal-information resulting in adolescence boys and girls trying to experiment sex and especially girls become more vulnerable to teenage pregnancy or have to bear the brunt of sexually transmitted disease. This is because they hesitate and lack communication with their parents, teachers or elders to have open frank discussions regarding sexual issues. In Indian families parents are not open with their youngsters to talk about sexual issues and rights, which ultimately affect the curiosity, knowledge as well as perception regarding these issues.

2. Review of the Related Literature: Excessive use to interfere with social and occupational functioning leads to an addiction, whether it is a substance, or an action. Recently Facebook has been actively researched to the extent that the term "iDisorder" has been created (Rosen et al., 2012). The study shows side effects of the overuse of SNS (overuse of internet) are very common in Korea. In some studies, the term "addiction tendency" is used rather than the term "addiction" (Kim et al., 2017). Cerniglia et al., (2016), conducted study for adolescents that Internet addition creates psychological, social, school and work problems and difficulties in person's life. Munno et al. (2015), the study suggested that excessive use of internet or excessive online activities is associated with high emotional instability, social introversion, aggressiveness which facilities the expression deregulated and even violent reaction to stressful situations. Kodvanji, et al. (2014).

Investigated the impact of internet use on lifestyle. There were two groups addicted and non-addicted were compared for environmental stressors and lifestyle factors. Aquavit, et al. (2014) examine that people came from warm family were unlikely addicted to internet and kindness was a preventive factor for problematic internet use.

Table 1. Socio-demography and information on technology-related variables (N=200)

Variables	Frequency	Percentage (%)
Gender		
Female	100	50%
Male	100	50%
Do you have Own computer / laptop?		
Yes	178	89%
No	22	11%
Do you have Smartphone?		
Yes	192	96%
No	8	4%
Have you used internet before?		
Yes	200	100%
No	0	0%
Average duration of Internet use per day (hours)		
2 hours or less	4	4%
Between 2 to 3 hours	54	27%
Between 4 to 5 hours	70	35%
More than 5 hours	68	34%
Preferred place for using internet		
Home	56	28%
Internet Cafe	16	8%
School/College	148	74%
Others	200	100%
Variables	Frequency	Percentage (%)
Parents know about my internet activities		
Never	76	38%
Rarely	56	28%
Sometimes	36	18%
Most of the times	24	12%
Always	8	4%
Preferred website		
Education	130	65%
E-mailing	190	95%
Entertainment	174	87%
Chatting	164	82%
General websites	44	22%
Social Networking	164	82%
Games	146	73%
Blogs	154	77%
Others	90	45%
No. of sleeping hours/day		
<3 hours	0	0%
3-4 hours	84	42%
>4-6 hours	74	37%
>6 hours	42	21%

WHO (2014), According to the World Health Organization the popularity of online activities and the implications of an excessive use of the Internet is a growing concern

for public health. Internet is very popular in our society and its use has enlarged. Ho et al. (2014),

The study of scientific community indicate the negative impact of an excessive use of the internet on psychological health. Schimmenti et al., (2014), The study was conducted about Korean adolescents who were in college, on the relationship between attachment type, Smartphone addiction, excessive internet use at that time they were occupied in online activities rather than face to face interaction. These traits are generally found on them. According to this study people with anxiety attachment tend to be more immersed in smart phones or the internet to meet their attachment needs. Allen et al., (2014) conducted study on cognitive behavioral model of Pathological Internet use. Kim (2011) did a study on boys and girls , girls were more likely to use the internet to watch online education classes whereas boys were more likely to use the internet for playing internet games. Ryan & Xenos, (2011) did a study that people who are engaged every time in online interactions rather than actual face-to-face encounters because of loneliness, lack of social skills and social anxiety. In most of the cases we have seen psychological and social problems lead to usage of social networking sites.

2.2 Data Analysis And Interpretations: The investigator applied both descriptive and inferential statistics. The study results are analysed, tabulated and presented in this section based on the data collected from the adolescents. The obtained data were classified in the following sections.

Descriptive Analysis: The mean, standard deviations of the entire sample are computed.

Differential Analysis: Differential analysis is an important procedure by which the researcher is able to make inferences involving in the determination of the statistical significance of difference between group with reference to selected variables. It involves the use of 't test. A 't' test is a numerical procedure that takes into account that the difference between means of two groups, the number of subjects in each group and the amount of variation of spread present in the score. Thus the 't' test is used to determine whether the performance of two groups is significant or not.

A total of 200 undergraduate students aged between 17 to 20 years were invited to participate in this study. The socio-demographic characteristics and information on technology-related variables are shown in Table 1. About 50% were female and 50% were male reflecting the gender equality distribution favoring females in Erode. The majority was of Engineering students of various year of study. The most popular information technology gadget owned by the respondents was the Smartphone (96%), followed by laptop (89%). The result shows that 74 (37%) of the respondents spent between four to six hours a day on Internet, while 42 (21%) respondents reported using the internet for more than six hours a day.

Figure 1 shows the online activities frequented by the respondents. The commonest activities that were engaged on E-mailing (95%), Entertainment (87%), social networking (82%), followed by Blogs (77%) and using the internet for educational purposes (65%). While 73% reported using the internet for online gaming, none reported using the internet for gambling. Further questioning on social networking revealed that the two most common network being used by the respondents were Facebook (80%) and Youtube (74%).

Figure 1: Percentage (%) of respondents according to activities engaged during Internet use

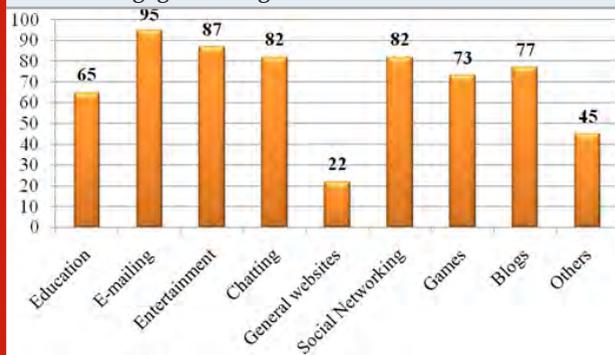
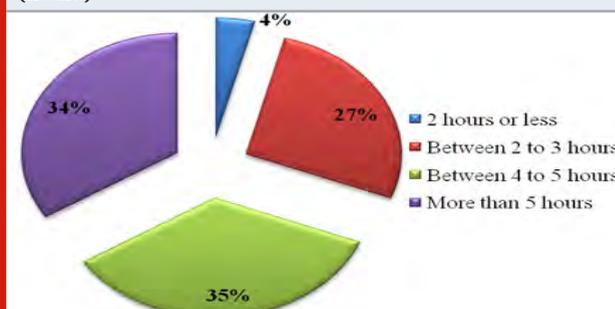


Figure 2: Average duration of Internet use per day (hours)



The average duration of Internet usage per day is shown in Figure 2. 35% of the students were using the Internet more than 5 hours. Only 4% were using less than 2 hours. Figure 3 shows the preferred place to using the Internet. 100% of the students are preferred to use the Internet other than home and college. All were interested to use the Internet outside places.

Figure 3: Preferred place for using internet

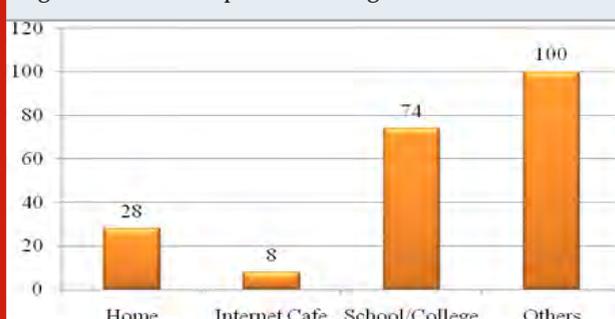


Figure 4 show the percentage of students using the Internet with the knowledge of their parents. 38% of the students using the Internet without the knowledge of the parents. And 28% were rarely known to the parents. Only 4% of students using the Internet with the knowledge of parents. Figure 5 shows the average sleeping time of the students. 42% of students were sleeping only 3-4 hours per day because of using Internet and 37% of students sleeping 4-6 hours per day.

Figure 4: Parents know about my internet activities

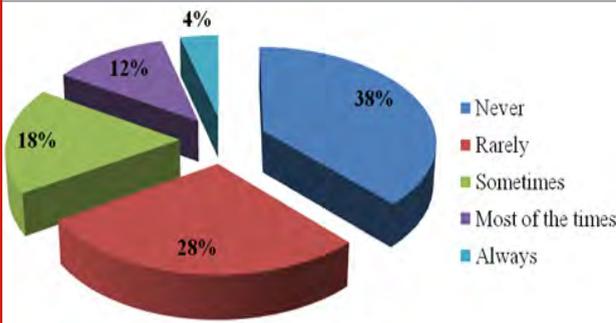
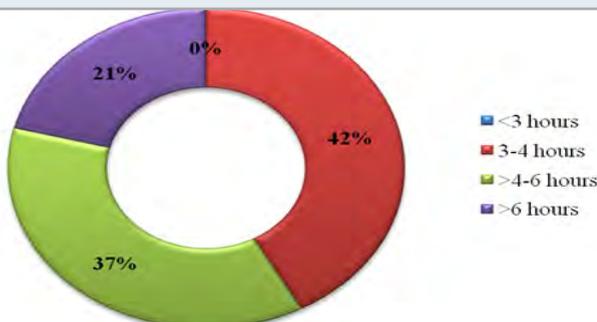


Figure 5: No. of sleeping hours/day



The general description on internet use according to the score respondents obtained from the Internet Addiction Test (IAT) is described in Table 2.

Table 2. General description of internet use patterns according to IAT-defined categories (N=200)

Variables	Frequency	Prevalence (%)
Average	32	16
Problematic	78	39
Addictive	90	45

3.1 Testing Of Hypotheses: Hypothesis 1: There is no significant relationship between Quality of Life and Internet Addiction. Correlation analysis is used to find out the relationship between two variables. The correlation coefficient is valued in the field of education as the measure of relationship between test scores and other measures of performance. In the present study, the correlation analysis is used to find out the strength

of relationship between internet addiction and quality of life.

Figure 6: General description of internet use patterns according to IAT-defined categories

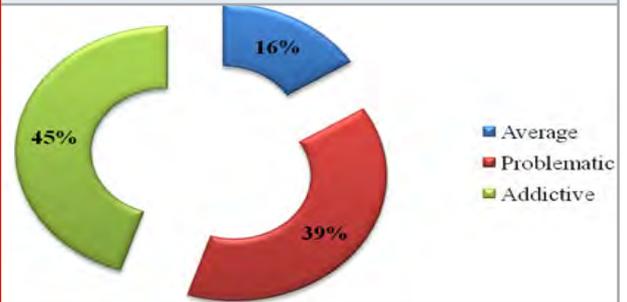
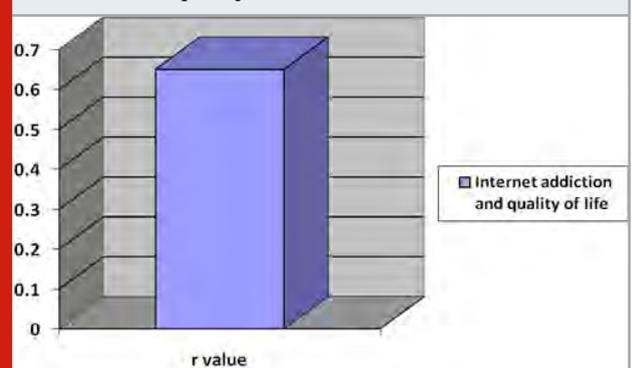


Table 3. Relationship between quality of life and internet addiction

Variable	N	Df	Calculated value of 'r'	Level of significance
Quality of life	200	98	0.65	Significant
Internet Addiction				

2.3 Interpretation: It is inferred from the above table that there is a positive significant statistical relationship at (0.05 level of significance) between quality of life and internet addiction. Through presenting the result of the first Hypothesis, it indicates the existence of positive statistical linking relationship between quality of life and internet addiction among adolescent in Erode, Tamil Nadu. The calculated r value for quality of life and internet addiction is 0.65. Thus, hypothesis 1 which read as there is a significant relationship between Quality of Life and Internet Addiction is accepted.

Graph 1: Shwoing the relationship between interent addiction and quality of life

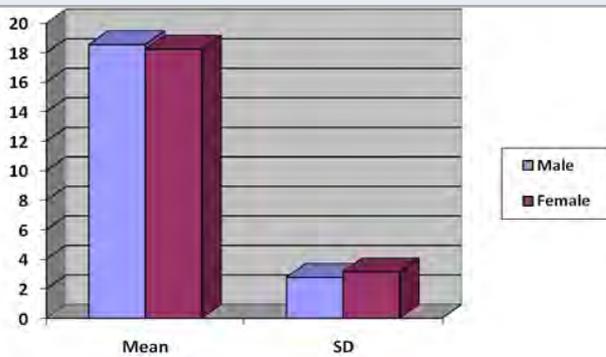


Hypothesis 2: Gender difference exist with regard to Quality of Life The differential analysis provides inference involving determination of statistical significance of difference between categories with reference to the selected variables. In the present investigation the investigator applied t-test.

Table 4. Mean, Standard deviation and t-value to find significance gender difference with regards to quality of life

Quality of Life	Gender	N	Mean	S.D	t-value	Level of Significance
	Male	100	18.54	2.77	0.68	Significant
	Female	100	18.23	3.144		

Graph 2: Shwoing the Mean and Standard deviation of male and female with regards to quality of life



Graph 3: Shwoing the Mean and Standard deviation of male and female with regards to interent addiction

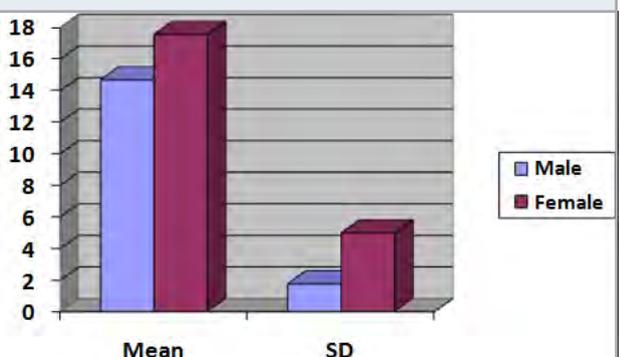


Table 5. Mean, Standard deviation and t-value to find significant gender difference exist with regards to Internet Addiction

Internet Addiction	Gender	N	Mean	S.D	t-value	Level of Significance
	Male	100	14.68	1.75896	0.72	Significant
	Female	100	17.56	4.9866		

3.3 Gender Difference Exist With Regards To Quality Of Life: From table 4, it is clear that there exist no significant difference is found in mean scores of male and female adolescents with regards to quality of life. The mean score of quality of life of male adolescents was 18.54 and the mean score of quality of life of female adolescents was 18.23. As shown in the table the computed t-ratio of the sample was 0.68, which is significant at any level. Thus the second hypothesis, “gender difference exist with regard to Quality of Life” is accepted.

Hypothesis 3: Gender difference exist with regard to Internet Addiction

Gender Difference Exist With Regards To Internet Addiction: From table 5, it is clear that there existed no significant difference is found in the mean scores of male and female adolescents in their Internet Addiction. The mean score of Internet Addiction among male adolescents was 14.68 and the mean score of Internet Addiction of female adolescents was 17.56. As shown in the table the computed t-ratio of the sample was 0.72, which is also significant at any level. Thus the third hypothesis, “gender difference exists with regards to internet addiction” is accepted.

CONCLUSION

Internet addiction is a worldwide problem among students, employees, business people and housewives. Mostly adolescent students are easily preyed to internet addiction. It affects and worsens the psychology of the students. So teachers and parents should know the psychological effects of internet addiction to protect the students from internet addiction. Preparing students to use internet is the responsibility of teachers. But their major role is making the students for modern world with discipline, self control and balance when using internet. Providing peer group relationship, real life social support, promotion of self-esteem and building intrapersonal skills will stimulate the spirit of enthusiasm and at the same time, can lead the students to achieve great things in life. There is a positive significant statistical relationship between quality of life and internet addiction.

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Hybrid Machine Learning Algorithm and Principle Component Analysis based Face Recognition Attendance System

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ABSTRACT

An intelligent presence system is usually performed using biometrics. One of the biometric methods of improving this system is facial recognition. As the main function of biometric verification, identity verification is extensively used in several applications such as video surveillance and video surveillance schemes, the interaction between computers and people, home access systems and network security. Most of the implementation phases used in these systems involve the recognition of faces and the detection of detected faces. This study proposes an introduction model of an automated attendance management system for college students in this category using a facial recognition method using a hybrid approach. Next, the relationship between identifiable faces in relation to the student faces database should be understood. This model is a successful technique for managing the presence and records of scientists.

INTRODUCTION

In image processing, the idea of feature sourcing refers to methods that aim to calculate image information fractions and make local decisions on each point of the image, regardless of whether a particular image is characteristic or not. At that moment the subsequent features will be subsets of the image field, often in the form of discrete points, continuous curves or linked fields. Many word-based image classification methods rely primarily on low-level local-level functionality. However, combining multiple prompts, such as color, texture or shape, has

been shown to be a promising task that can improve classification accuracy.

Image processing refers to computer graphics and artificial vision. In graphics, images are created manually from physical models of objects, surroundings and lighting and are not purchased as image films from imaging strategies such as cameras from natural scenes. In contrast, computer-aided vision is often seen as a high-level image process through which a machine, software image or sequence of objects, e.g. He wants to determine the 3D magnetic resonance scan or video on the whole body. In modern science and technology, the growing significance of scientific visibility of large-scale difficult investigational data also offers a much broader scope.

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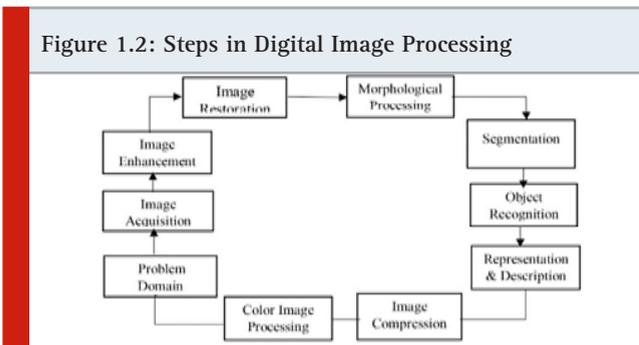
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- Examples include real-time multi-asset portfolio trading in micro data or finance in genetic research.
- The image processing purpose is allocated into 5

- sets. They are:
- Visualization: Observe objects that are not detectible.
- Sharpening and restoring the image - to make an enhanced image.
- Image Recovery: Find the image you are interested in.
- Sample measurement: Measures various objects in an image.
- Image recognition: Allows you to distinguish between objects in an image.

Two types of approaches are used for image processing: analog and DIP. Both can be used for hard copies, such as printouts and photographs. Image analysts use different principles of reasoning when using these visual methods. Image processing is not limited to the field of study, but also to the knowledge of the analyst. Pairing is another significant tool for image processing using visual methods. Therefore, analysts use a grouping of personal knowledge and secondary data to process images.

II. Digital Image Processing: Use of computer procedures for digital image processing, as shown in Fig. 1.2. As a sub-category or area of DSP, DIP has many advantages over analog image processing. This allows you to use sophisticated algorithms for data entry and avoid problems such as sound accumulation and signal distortion during the process. By defining two-dimensional images, digital image processing can be a model in the form of multidimensional schemes.



DIP includes digital image processing through a digital computer. This is a sub-domain of signals and systems, but focuses on images only. DIP focuses on rising computer systems capable of processing images. The input of this system is digital image, and the system processes this image using efficient algorithms and provides an output image. The most common example is Adobe Photoshop. This application is widely used for DIP. A grayscale image given, a histogram is a gray level histogram; I.e. how many times does the image display the amount of gray on each level. We can derive much from the appearance of the image from its histogram, as the following examples show:

- In the deep dark image, the gray level and so the lower end of the histogram will be grouped:
- In a bright uniform image, the gray level will be divided at the top:

- Cont In a good contrast image, the gray layers will be well distributed in many categories.

Local filters can be used to sharpen and sharpen the edges of the image, resulting in a more pleasing image for the human eye in general. The operation is in some way known as edge sharpening, sharp edge or serpentine mask. The latter term comes from the printing industry. Linear filters are easy to describe as we saw in previous articles and can be applied very quickly and efficiently from Matt Lab. The non-linear filter is obtained from the non-linear function of the gray scale standards in the mask.

Simple instances are the extreme filter, which gets the most value under the mask, and the corresponding minimum filter, which gets the minimum value under the mask. Maximum and minimum filters are examples of classification filters. In this filter, the components under the mask are sorted and given a specific value as output. Therefore, if the values are displayed in ascending order, the minimum filter is a sort order filter to which the first component is returned and the maximum filter is a sorting filter for which the last component is returned. Applying a non-conventional linear filter in Matt Lab, the function used is an N1 filter, which is applied.

Filter an image by default function. If the function is not already defined, you should create an M file that defines it. Image enhancement techniques are widely used in many image processing applications where the excellence of the subjective image is important for human expression. The difference between the brightness shown by the two adjacent surfaces creates a contrast. That is, contrast is the difference between visual properties that distinguish objects from other objects and backgrounds. Contrast visual perception determines the difference in color and brightness of an object compared to other objects. The problem is optimizing the contrast of the image to reflect all the info in the input image.

The partitioning process splits an image into elements or objects. Autonomous partitioning in general is one of the maximum tough tasks in the digital image process. An approximate segmentation process offers a long way to successfully solve an imaging problem that requires identification of individual objects. Partition is a classifier that helps break down each character of a word into a particular image or page. The purpose of the partition is to remove all the characters from the text in the image. A method derived from the concepts used in artificial vision to identify visual objects. An overall process identifies the whole word as a unit. Almost all the outputs of the segmentation phase, which represent the boundaries of the region or all points in the region, are generally represented and described as raw pixel data. The solution is the option to convert raw data into a module suitable for subsequent computer processing.

The report has some features to extract from which some quantitative information is interesting or which is fundamental to distinguish objects from one class to

another. In image processing, removing functions is a special type of dimensional reduction. Converting input data into a feature set is named feature extraction. If the extracted features are carefully selected, the expected information should be extracted from the input data from the set-in functions to achieve the desired function using these minor representations instead of full-size inputs.

Literature Survey: The facial recognition approach relies on the PCA for the Egan value method and processing and cleaning of images, respectively. This was done using Euclidean spacing between new images captured in the same coded interface developed in the face characters and meanings stored in the database. They expose a data reduction method to be match, and incorporate a face detection system using image processing (Arun Mozhi Devan P et.al (2017)). The face recognition application using fisher face method by using GUI application and database in the form of Papuan facial method. Here they depend upon PCA and FDL or LDA. The linear subspace that maximize the separation of two pattern classes according to their criterion. This method is not only capable with performing a test face image with different colour components. Normalization of image input to training dataset by finding average value of dataset image. Here they occur 93% accuracy of the face (Bhumika Agrawal et.al (2017)).

Real-time face detection and tracking is a problem in many application. The work implements a robust method using Supervised Descent Method based Viola-Jones and Skin color based on segmentation, which can locate various faces at the same time under the different environment of illumination and complex background in real time by using face detection and tracking in conjunction with depth data. The detection and tracking method is designed to get better from the loss of points due to tracking drift or temporary occlusion. Tracking and detection methods may use rigid representation to illustrate the facial region, thus it can be said that they can neither exploited nor captured the no n-rigid facial deformations (MustaminAnggo and La Arapu (2018)).

This task has become more complex, and it is difficult to identify faces due to external and internal factors such as aging, posture fluctuations, emotional fluctuations and uncontrolled environmental conditions. Therefore, face recognition or identification and comparative analysis of various methods are required. There are many technologies that have been developed and used. Each technology has its own characteristics, advantages, disadvantages, performance, and representative function. In this article, we present a comparative study of various methods, such as face recognition using PCA, DCT transform, LDA and neural networks. Various parameters are examined, including the quality and effectiveness of all methods, to determine which method will be most useful in the future. (Dr. Naveen Kumar Gondhi, Er. NavleenKour (2017)).

The recent expansion of video surveillance systems has led to research in the field of soft biometric data which

leads to the unconditional recognition of human faces. Comparative soft biometrics shows greater identification efficiency than hierarchical soft biometrics and has been the subject of numerous studies that have emphasized their ability to identify and recover under restricted and unlimited conditions. In this article, we propose an approach to automated comparative marking of soft biometric features on the face. Furthermore, we explore the unlimited identification of the human face using these relatively soft biometric data in a gallery marked by an individual (Nawaf Yousef Almudhahka et.al (2017)).

CNN, a kind of deep network, has proven successful for FR. For real-time systems, some pre-processing, such as sampling, must be performed before using Covenates. But then the image must also be completed so that all pixel values are set as input for conventions, and the entire selection of functions, removal of functions, is performed from the training network. That is why the implementation of the Agreements is sometimes difficult and time-consuming. The covenants are in their infancy, and the accuracy achieved is very high, so they still have a long way to go. The article proposes a new way to use deep neural networks for face recognition. From this point of view, instead of providing the raw pixel value as input, only drawn face elements are provided. This reduces complications and provides 97.05% accuracy for the Yale Face dataset. (Dr. Priya Gupta et.al (2018)).

Automatic facial recognition is currently widely used in applications, from duplication of identity data to authentication of mobile payments. With multiple SVM classifiers designed for different attacks using a false face, the combined classifier is used to distinguish between real and false faces. The proposed approach extends to the detection of fake faces in videos through multi-frame detection through a voting scheme. We also build a database of fake faces, MSU EFAD (Priyanka P. Raut et.al (2017)).

Graphic processing unit for quick and efficient calculations. It has a parallel multi-threaded environment, a parallel task can be solved in less time. NVIDIA has released a parallel programming framework CUDA, supports popular programming languages with CUDA extension for GPU programming. A parallel version of Eigen face approach for face recognition is developed using CUDA framework. An Nvidia graphics card with Kepler architecture solves the data migration problems in the identification phase and will improve in the detection phase (Richard Mejía-Campos et.al (2017)).

IoT has seen steady growth in recent years: smart devices, smart personal devices, personal assistants and much more. The same applies to the field of biometrics where the development of fingerprint and face recognition systems found on most smartphones and similar portable devices requires automated and secure identification systems. Devices used in the Internet of Things are often low-powered with limited computational resources. This means that biometric recognition pipelines aimed at IoT need to be streamlined and as efficient as possible.

Towards this end, we describe in this paper how image-based biometrics can be leveraged in an IoT environment using a Raspberry Pi (RokNovosel et.al (2017)).

The current facial image features and archived facial image features were extracted by Viola Jones algorithm and trained using artificial neural techniques. The proposed mechanism is to develop an effective face recognition system by improving the efficiency of the existing face recognition system and safe presence process. Integrating future video streaming services could improve multiple face recognition. It is found in color and grayscale images under different conditions (Sandeep Kumar et.al (2017)).

The home security sector is growing. Face recognition system can be used to protect the home. A standard foot camera captures images to identify a person. This is a sample visitor identification. Once the door is identified by the guest, the door will be unlocked and opened. If they are not identified, the door is locked. The system will speed up the search and identification in real time. This project is used to create a door using a regular P-camera and an Internet connection that unlocks through face recognition. The system requires the user to have access to locked / unlocked houses. When an outsider tries to log in, that person is caught and sent to Gmail as an attachment. The system should also support remote home control (Sandesh Kulkarni et.al (2018))

In this technique the information contains some features like gender, age, beard, height and some facial features. Biometrics based upon automatic recognizing an individual features and behavioural characteristics. The intrusive property success depends on biometrics system on user cooperation but face recognition does not require any intrusive system. This analysis will give a right direction to analyse the facial feature based upon gender classification (Satbir Kaur and Er. AayushiChadha (2017)).

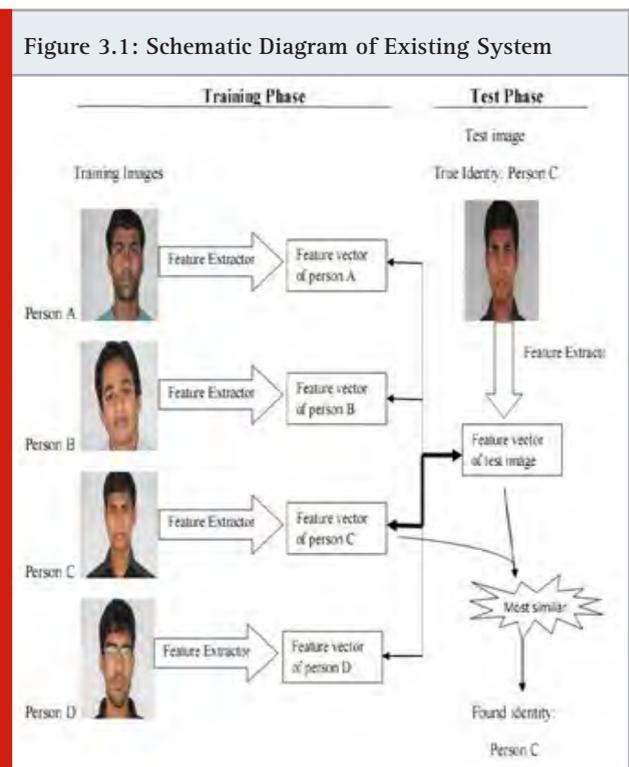
Applications include face detection and localization systems and identities integrated with gesture analysis. The first step in a practical face analysis system is to identify the face in a series of frames consisting of complex face and background shapes. In this document, a mechanism is proposed for detecting human faces and identifying them in the video. Efforts are being made to reduce the time for the search and identification process. The system is divided into three phases: motion detection, face recognition and identification to minimize human interference and increase system efficiency. The detection area of the motion detection system reduces the complexity of the process (S. V. Tathe et.al (2016)).

The face is an important part of human anatomy, which reflects the basic topography of a person. Face recognition has become a popular biometric feature recently due to its importance in security monitoring applications. This document proposes a human face detection system that uses necklace functions and identification using Eagen and Haber filters in a video. Efforts are being made to

reduce processing time for search and identification. Although the Egan Face method works well in terms of computer complexity, the Gaber filters are strong enough to replace (S. V. Tathe et.al (2016)).

V. Existing System: Existing methods based on images and videos are considered, divided into manually created and in-depth studied systems. Fails to simultaneously utilize the rich information and relationship between the still images, as shown in fig 3.1. Performance is less at the time of face recognition. The disadvantage is that it needs large number of datasets, hardware systems and its estimations are inaccurate. Fails to simultaneously utilize the rich information and relationship between still images. Only implement image to image matching. Performance is less at the time of face recognition. Need large number of datasets. Need hardware system. Fisher's face approach is also one of the most used methods for highlighting objects in facial images. This approach tries to find the direction of the projection in which the images of different classes are widely separated. According to Shang-hoon Ling, Fisher's face algorithm has perfected its face algorithm under changing lighting conditions.

Figure 3.1: Schematic Diagram of Existing System



This approach requires several training images for each face. Therefore, this cannot be applied to facial recognition applications where only one sample image per person is available for training.

VI. Proposed System: The proposed system consist of hybrid face recognition approaches, as shown in fig 6.1. Face recognition with PCA and ICA turns faces into smaller sets of core functions, specifically faces, which are key components of the initial set of training images. The face is identified by projecting a new image

into the sub-region. The person is then classified by comparing the positions of famous people in the area of Eigen's face. The benefit of this attitude compared to other face recognition systems is the simplicity, speed and insensitivity to small or gradual changes in its facial features. The problem is limited to files that can be used to identify faces. That is, the image should have vertical frontal views of the human face.

Figure 3.2: PCA Flow diagram



This describes the face recognition using PCA and ICA for analysing the facial images and also result will send to the control block via E-mail. This article describes how to build face recognition systems using PCA and ICA algorithms. PCA is a statistical approach that reduces the number of variables in face recognition (see Figure 3.2). In the training set, each image is represented as a linear combination of lighter eigenvectors, known as eigenfaces. These eigenvectors come from the covariance matrix of a set of training images. Weight is determined after selecting a set of the most relevant areas. The independent component analysis algorithm randomly separates mixed auditory signals. Face recognition for images having face orientations and different illumination conditions this ICA algorithm gives better results when compared to other existing algorithms.

The LDA face recognition approach, also known as Fisher Face, is a look-based technique that reduces dimensionality and provides excellent face recognition features. This technique works on the same principle as the PCA method. This reduces the dimension and stores information about class differences as much as possible. The LDA uses the projection of the training image in a sub-space that is defined from the perspective of a fisherman and is called a simple space. The location of the fisherman is identified by a new face projection. The KNN algorithm is then used for identification.

Due to the nature of the problem, not only computer science, researchers are interested in it, but it is also being studied by some neuroscientists and psychologists. The ultimate goal is to implement a model for a specific person and separate it from previously saved large faces with some real-time change. This is an adequate way to find a lower level of space. In addition, it can be used to identify a person's gender and interpret his various facial expressions. Recognition includes broadly differing conditions but in the case of training data set it

covers only limited dimensions. This also includes real-time varying lighting conditions. This research aims to develop an effective MATLAB program with PCA, ICA and LDA for optimization and better accuracy.

The Initialization process involves the following operations:

- Get the first facial expressions called the training set.
- Keep only the highest eigenvalues and read your own values from the training set. These M pictures define the facial space. Owners can be updated or recalculated when new entities appear.
- Face Calculate the distribution in this M-dimensional space for each known person by displaying their face image in this face space.
- After starting the initial system, the following process involves the following steps:
- Calculate a series of weights based on the input image and the face images.

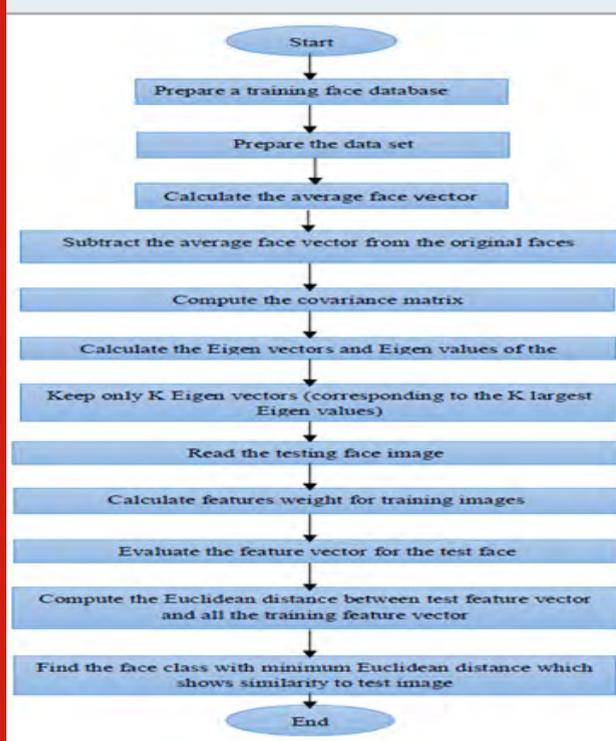
The face recognition system is a computer application that can identify or verify a person using a digital image or video frame from a video source. Facial recognition using images or videos is a popular topic in biometric research. Since the human face is a dynamic object with a high degree of variation in appearance, face recognition is a complex problem in computer approaches. In this area, the accuracy and speed of identification is a serious issue. In this image, the user can see the holy and normal light conditions directly without labor pains.

Using a person's visual features to identify faces, people can recognize faces from a great distance even if the details are vague. This means that symmetry is sufficient to identify properties. The human face consists of eyes, nose, mouth, chin, etc. These organs vary in size, shape, and structure, so faces differ in thousands of ways, and we can describe them using the shape and structure of the organs to find them. Facial features are removed in this module. During face registration, various data records are converted into a coordinate system. Facial features are saved with points. Image registration or alignment algorithms can be classified based on intensity and characteristics. The face recognition system identifies people based on their facial images. The face recognition scheme identifies the presence of an authorized person and checks whether a valid identification or a valid key is used, even if the user knows a secret personal identification number or password. The face recognition system directly compares the face image of the voter and does not use identification numbers to distinguish between them.

Attendance system: Facial photographs are also taken under natural conditions, such as facial surfaces and interior lighting. If the vectors of the objects do not match, they are considered as unknown faces. Create an alert for anonymous labeling. Complete the message with an image of an unknown person. The presence of known faces and symbols is considered if the vector of the object matches.

Principle Component Analysis: PCA, also called the Karuhunen-Low method, is one of the most popular methods for selecting features and reducing sizes. Human faces were first identified with PCA by the Turks and Pentlands, and human faces were reconstructed by Kirby and Sirovich. The identification method, known as the proprietary area method, defines a feature space that reduces the dimension of the original data space. This abbreviated data is used to identify the room. However, the poor ability to distinguish between class and large calculations is a known problem with the PCA method. This limit is exceeded by linear differential analysis.

Figure 8.1: Dataflow Diagram of PCA



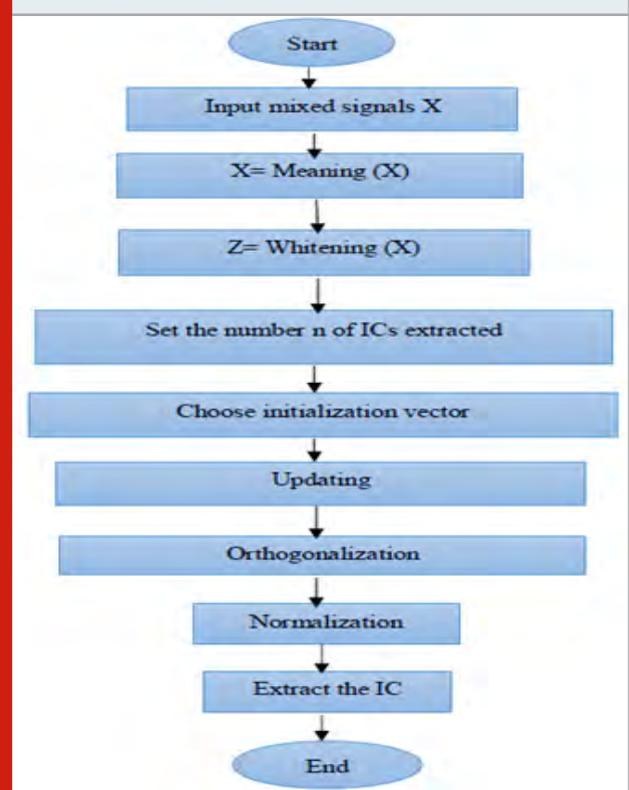
LDA is the most powerful algorithm for feature selection among scene-based methods. However, many LDA-based facial recognition systems first used PCAs to reduce size, and then LDAs to maximize the discriminability of feature selection. This is because LDM has a small sample size problem where the selected data set must contain large samples per class in order to get good differentiation properties. The implementation of the LDA thus led to the conclusion of directly discriminatory signs. The test image was converted to its own facial components. First we align our input image with our original image and multiply their difference by each eigenvector.

- Each value would represent a weight and would be saved on a vector
- To compute the average distance,

Experimental Results: The performance of face recognition system highly depends on the algorithms used. In general, if a person is moving then the performance gets affected. But here with the use of Independent

Component Analysis algorithm, we overcome those issues and also we can obtain a higher rate of accuracy. We calculate the Euclidean distance to obtain the most similar images and we provide an alert message along with the image of the unknown person. By analysing the performance of different algorithms it is reviewed that different accuracy rates can be achieved. Here we use Hybrid Machine Learning Algorithm including the fusion of Principle Component Analysis and Independent Component Analysis algorithms.

Figure 8.2: Dataflow Diagram of ICA



Datasets Used

- There are 400 images in size 92 * 112 of 40 people, 10 for each. They are stored as 40 classes with every 10 objects. The command FACES return a dataset of the same images.
- In case ORL is not available, it may be automatically downloaded and installed.
- This package applies the well-known PCA-based face recognition method, called "own face". The program is easy to use. An ORL training and test database is also included to show performance comparisons by runtime and search percentage, with different sized test and training data set by random image selection.

In table 9.1 shows that the performance analysis of different algorithm. In every algorithm, we takes 100 images to evaluate the result. In first PCA algorithm attained the precision value of 0.86%, recall of 1 and accuracy value of 90%. In another, LDA algorithm attained the better accuracy value of 95% and precision value of 0.76%. In next, ICA algorithm attained the

accuracy value of 91% and recall value of 0.58%. In last we used three algorithm to evaluate the performance of precision value of 0.89%, recall of 1% and accuracy of 97%. It achieved the better performance outcome values than other separate algorithm.

Table 9.2. ORL Dataset properties

Properties	Description
No. of subjects	40
No. of Images	400
Purpose	This database is primarily used for face recognition
Gray/Color	Gray
Format	.pgm
Resolution	92*112
Face Pose	Moderate pose variation
Facial Expression	Natural, Smiling, Closed eyes
Background	Dark Homogeneous
Accessories	Glasses

Table 9.1. Accuracy of different Algorithms

Images	Algorithms	Precision	Recall	Accuracy (%)
100	PCA	0.85714	1	90
100	LDA	0.76	0.85	95
100	ICA	0.62	0.58	91
100	PCA & ICA & LDA	0.892	1	97

CONCLUSION

The system successfully detected human faces and worked well in different face orientation conditions. This model implements a face recognition system using PCA, algorithms for analysing independent components, and linear differentiation analysis. The proposed system successfully identified human faces, and worked well with different face orientations and measurements of accuracy. The algorithm is very well integrated and works well with any type of image and video. Despite the large differences in image sizes at different poses and angles of the face, this technique provided a better classification of the face. Thus, the self-face method helps to solve the problem of face recognition.

Future Enhancement: In future work, can extend the framework to implement various algorithms to provide still to video face matching with improved accuracy rate. Video features provide an automated and efficient way to shoot. The algorithm for identifying data redundancy is presented much stronger. Similarities between feature sets in different videos.

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An IoT Based Integration of Smart Agro and Discernment of Leaf Canker Identification

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ABSTRACT

The characteristic items are cheap, non-dangerous, and have less symptom. Along these appearances, their interest in particularly herbs based medicinal items, wellbeing items, healthful enhancements, attractiveness care products and so forth are expanding. The nature of leaves characterizes the level of greatness or a condition of being open from deformities, shortfalls, and significant varieties. Also, the illnesses in leaves own threats to the economic, and manufacture status in the agricultural commerce. The distinguishing proof of illness in leaves utilizing computerized image handling, reduces the reliance on the farmers for the security of rural items. Along these, the leaf sickness location and arrangement is the inspiration of the projected work. In this study, a novel fuzzy set expanded structure neutrosophic rationale based division procedure is applied to assess the area of interest. The fragmented neutrosophic image is recognized by three enrollment components: genuine, false and middle district. In the view of divided locations, Also, they are utilized to screen demonstrate the insight power of joint feature effectiveness, where RF controls the other methods. The planned scheme is corroborated with 400 cases (200 healthy, 200 unhealthy). The estimated method could be utilized as apparatus for disease distinguishing proof in leaves. Another list of capabilities is talented and 98.4% arrangement exactness is accomplished.

KEY WORDS: AGRICULTURE, DISEASE, LEAF, REGION AND SEGMENTATION.

INTRODUCTION

Innovative tools can benefit most people. In recent years, IoTs have begun to play an important role in everyday life, improving our perception and ability to correct the soil around us (Al-Fuqaha A et.al (2015)). Mostly agro-modern and naturalistic areas use IoTs in diagnosis and control. In addition, he can provide data to the end customer / buyer about the starting

point and quality of the goods. Increased productivity and efficiency of farmers (Radiokomunikace C (2016)). The proposed agricultural methodology allows us to evaluate field factors, for example, soil conditions, aeration conditions, and biomass of plants and organisms (Jazayeri MA et.al (2015)). The proposed structure can be used to evaluate and control components, for example, temperature, humidity, vibration, or earthquake during product transportation. In addition, WSN can be used to screen and control factors affecting crop development and productivity (European Commission (2015)). They can also be used to determine the best time to collect data, which rancher is more suitable in what conditions, diagnoses diseases and manages equipment (European Commission (2016)).

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They focus on data that include soil temperature, humidity and soil moisture. Creating a legal framework requires a strategy for learning lessons from information collection and collective information, and in collaboration with clients((FarmBot (2016)) and (Fisher R et.al (2015))). The database design will be planned and executed as an electronic application. The information forwarded will be used as a basic guideline for monitoring programming crop irrigation (Gluhak, A et.al (2011)). It can be broken down to update agricultural information, change conditions and predict future water demand (Sivagnanasundaram J et.al (2019)). The use of data mining as one of the main commitments in this work was distinguished from the best prospectus to a specific degree using programmatic automated tools that examine the crop, land and environment. (Khan, R et.al (2012)).

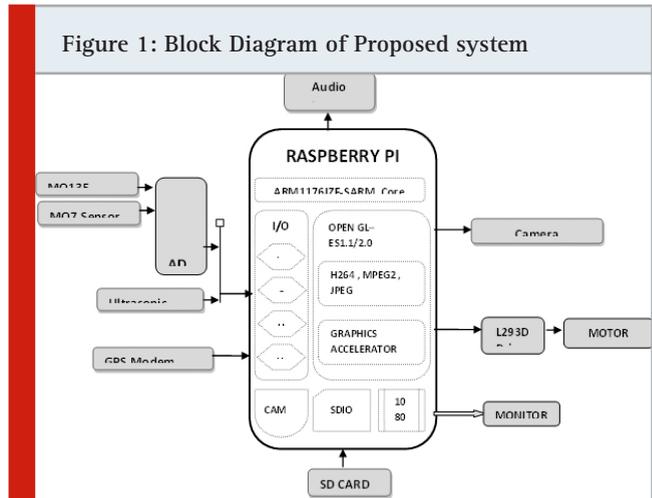
Literature Survey: In this unit we discuss previous research associated to both. The first includes the utilization of IoTs, while the subsequent viewpoint centers around farming information investigation dependent on IoTs appliances. (LoRa Alliance (2016)) Have applied IoT in the agro-mechanical design chain. They projected an inventive development dependent on the possibility of IoT, joining remote and scattered explicit sensor gadgets with the impersonation of climatic situations, so as to follow the advancement of grapes for wineries.

(Mesas-Carrascosa, F. J (2015)) displayed a data framework for agro industry depend on IoTs, with a dispersed engineering. In that review, following the entire rural production procedure were finished with dispersed IoTs servers. Besides, a data disclosure framework was intended to execute, catch, control, oversee and find the commercial information from gardening formation. (Ojha T (2015)) applied IoTs structure to evaluate natural product sparkle in web based occupational conveyances, which was a non-customary retail administration that faces special difficulties in transportation, because of item perishability and costly coordination's. Numerous examinations have endeavored to improve the usefulness of IoT. IoT for a real-time watching service in order to permit the tracing of goods from the end customer back to the arena. (Open Ag Data Alliance (2016)) developed and installed a natural system for monitoring IoT deficiencies, hybrid programming and parallel computing platforms and for combining and estimating irrigation costs. Collect basic data to improve water use and differentiate between soil water permeability and intelligence-based irrigation.

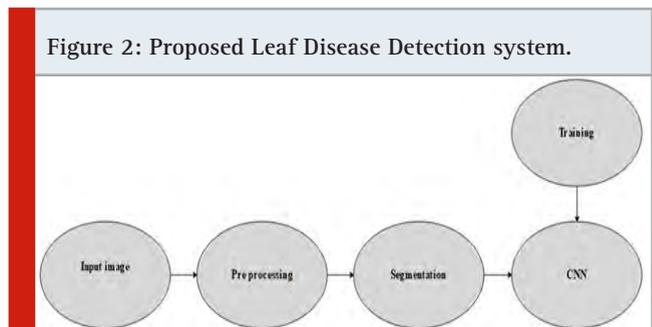
(Pospíšil, A. (2015)) checked on the control with an electronic gadget (Arduino) of temperature and soil dampness, and they utilized an Android-based cell phone application for adaptability and usefulness. They discovered rewards in minimal effort and adaptability for agribusiness control conversely with costly segments, for example, very good quality PCs.

Proposed system: The proposed framework succeeds the way toward monitoring and informing information of system used for environmental parameters with the idea

of IOT and Cloud Server Technology. The working model of The Design and Implementation system has designed with eight blocks such as Raspberry Pi, GPS Modem, Ultrasonic Sensor, Temperature Sensor, Humidity sensor, MQ7 and MQ135 Gas Sensors, DC Motor with L293D, Driver DC MCP3008 contains the accompanying units and sensors. The projected block diagrams are shown below figure 1.



The projected framework clarifies agriculture with IOT. This planned framework includes for the rural reason, here different sensor is utilized to screen. Particularly, under the present conditions, Temperature sensor used to language gadget having a simple yield voltage relative to the temperature, ultrasonic sensor used to decide the separation to the impediment, it transmit a heartbeat that reflects from the outside of the article and measures the time it takes for the reverberation to return. A humidity sensor (or hygrometer) recognizes, measures and reports both clamminess and air temperature. The extent of clamminess perceptible all around to the most raised proportion of suddenness' at a particular air temperature is called relative wetness. Air quality sensor (MQ135) Describe the air nature of the sensor for identifying a extensive scope of gases, including NOx, liquor, NH3, smoke, benzene, and CO2.MQ7 sensor utilized. This Carbon Monoxide (CO) gas sensor distinguishes the concentrations. Gps is utilized to follow the definite area. Camera is utilized to catch the leaf. The significant curiosity of the proposed framework is leaf diseases identification. The block drawing of the leaf disease detection is exposed below Fig.2.



Input image: Proposed framework will work in Real time. We use datasets to evaluate performance. Current work on the Leaf Dataset includes four types of sounds and a picture of a sick basil leaf. These are the maximum sanctuary (camphor basil), maximum teniflorum (ram and shyama's basil), maximum tulsi (celestial basil), and osmium gracissum (blessing of Vana). The research was collected by the Punjab Agricultural University, Institute of Pharmaceutical Education (Nipper Mohali and Punjabi University, Patiala, India, etc.) for research in Intelligent Medicine. The picture shows the statistics of the previously investigated location. The images are sent to the research laboratory for uniform distribution of debris and the leaves are taken to a background imaging station to satisfy the relative surface area of the entire classification of the leaves. Leaf purification and photographs of the leaves are provided. Four bright bulbs are used in light and direction with standard light fixtures, for example to simulate external conditions and to dodge components.

The leaves were carefully captured in the shade. Camera stands out from the experience in every department with several compatible lenses. The camera is fixed on the camera stand, which lessens hand development and provides unified photographs of the basil leaves. The degree of leaf damage varied between leaves. Images were shot under controlled field conditions to minimize the dangerous effects of changes in lighting conditions. Four cold white light bulbs with a power of 16 W (shading temperature of 4500 K) at a height of 30 cm on the surface of the image forming station for uniform illumination are characterized by light reflectors located at 45°. Figure 2 displays the exploratory configuration of the proposed structure. The database contains 400 images of 200 different types of leaves and 200 infected leaves, for example, the Osimum sanctuary (Kapoor basilica), Osimum tenuiflorum (Ram and Shyama basilicas), Osimum basilica (sacred basilica) and Osimum gratissimum (basil obtained from the forest), One Hundred examples are collected for each of the four types of leaves. Inspection of the studied leaves includes the manufacture of wool, aphids, an opaque appearance, the identification of bacterial leaves and narrowing of the Fusarium. Figure 3 shows a healthy and unhealthy basil.

Figure 3: Study sites of basil plants, from where diverse basil leaves were together.



Pre-processing: Nature of image is enhanced by changing the power of the copy so as to feature the objective territories for example sick visual territory after information accumulation is finished. Difference Partial Adaptive Histogram Equalization (CLAHE) calculation is sent for picture upgrade, it takes a shot at little areas of the picture rather than entire picture. As the name proposes CLAHE calculation put on the histogram adjustment after parcel the picture into logical locales. It kinds the concealed highlights of the picture unmistakably obvious and dissemination of utilized dark qualities. Bilinear addition is consumed to consolidate the adjoining tiles for end of falsely prompted limits. The complexity in homogeneous territories can be constrained to abstain from enhancing any appeal that may be available in the image.

Segmentation technique: Image division is a troublesome assignment because of the multifaceted nature and assorted variety of images. Factors, for example, enlightenment, difference, noise and so forth influence division results. The objective of division is to find the suspicious regions to analyze the sickness. We have projected novel Neutrosophic rationale attitude as a division strategy. A neutrosophic set is an all-encompassing type of the fuzzy set, repetitive set, dial theist set, conundrums set, intuitionistic set and standard steady set. A picture is spoken to utilizing three distinctive participation components act, (I) and (F). Where T characterizes reality scale, F as the size of false and I represent the scale of in-between. All components deliberated are free of one another. A pixel in the Neutrosophic rationale space is described as P t f g; I, f, in the path as it is t% valid, I% vague and f % as false.

Mapping T, F and I (Region of intrigue assessment). In the proposed technique, the ailing territory of leaf utilized as the genuine part (T), sound component spoke to as false part (F) and middle component (I) is characterized as neither solid (F) nor infected (T). Theneutrosophic area gives additional component as 'I' which gives increasingly proficient approach to deal with the level of vulnerability. To assess unhealthy portion, the first picture pixels are changed from RGB to CIE Lab shading space for better shading observation when contrasted with the standard RGB space. CIE Lab shading space comprises of 3 channels, as (a)*, (L), and (b)*, where (L) channel speaks to delicacy with qualities 0 (dark) to 100 (white), positive estimations of (a*) channel demonstrate measure of red while negative qualities show measure of green shading rival and (b*) channel, positive qualities show yellow and negative worth demonstrates measure of blue. After upgrade and shading change, T, I, F are mapped as follows:

1. To obtain harmful segment: Let the input image $I_{IS}(x,y)$ After contrast improvement, it is signified as $I_C(x,y)$, then diseased segment $T_{IS}(x,y)$ is formularized as

$$T_{IS}(x,y) = I_C(x,y) \times F_a \quad (1)$$

$F_a(x,y)$ is the binary mask gotten from (a^*) chromaticity layer where, the color falls along the red-green axis. Where $(*)$ after L, a, b noticeable star and it discriminates (x,y) CIE version from Hunter's version.

2. The healthy segment of leaf is assessed as

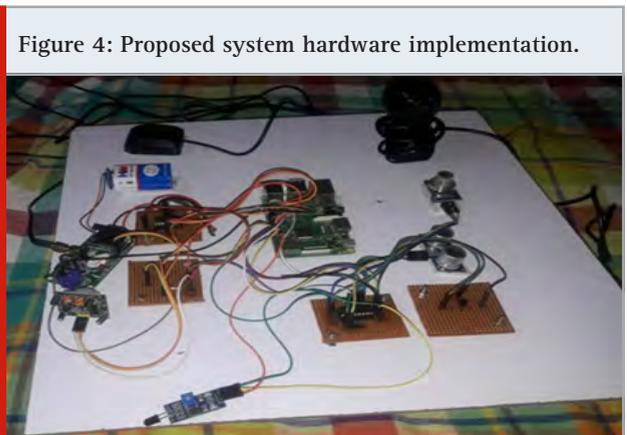
$$F_{IS}(x,y) = 1 - T_{IS}(x,y) \quad (2)$$

The central segment is considered to be a stage that is not even sick or healthy, we can think of it as a stage of the disease. Evaluate the original root of the middle part, $I_i(x,y)$ is transformed into CMYK color space $I_{cmlyk}(x,y)$ for extracting yellow color [50] denoted as $I_y(x,y)$ in the leaf which is experiential due to chemical changes, rust disease, and chlorophyll breakdown etc.

$$I_{IS}(x,y) = M_g(x,y) - M_y(x,y) \quad (3)$$

Further green color is removed from original images $I_i(x,y)$ as $I_{green}(x,y)$. Where, $M_g(x,y)$ and $M_y(x,y)$ are the masks that represent remaining portion of the leaf where yellow and green segment are not deliberated. So, $T_{IS}(x,y)$ signifies the degree of being a diseased segment, $F_{IS}(x,y)$ is the degree of being a healthy segment and $I_{IS}(x,y)$ is a degree of being not healthy or not unhealthy as well.

Convolutional Neural Networks: CNN is the deep learning construction and is broadly used in numerous computer vision applications such as image classification, sense labeling and so on. The conceptual structure of an image and the hierarchy are recognized. The image is divided into many fixed structure tiles and is fed into a small NN. Each extracted characteristic is represented in the form of a characteristic map, which is formed by the set of matrices. From the converted spectrogram, resize it to a 32x32 image. The converted input image is given to the CNN layers. In this effort, CNN is made up of three convolutional layers and three maximum pooling levels (Dawn, D.D. and Shaikh, S.H., (2016)).

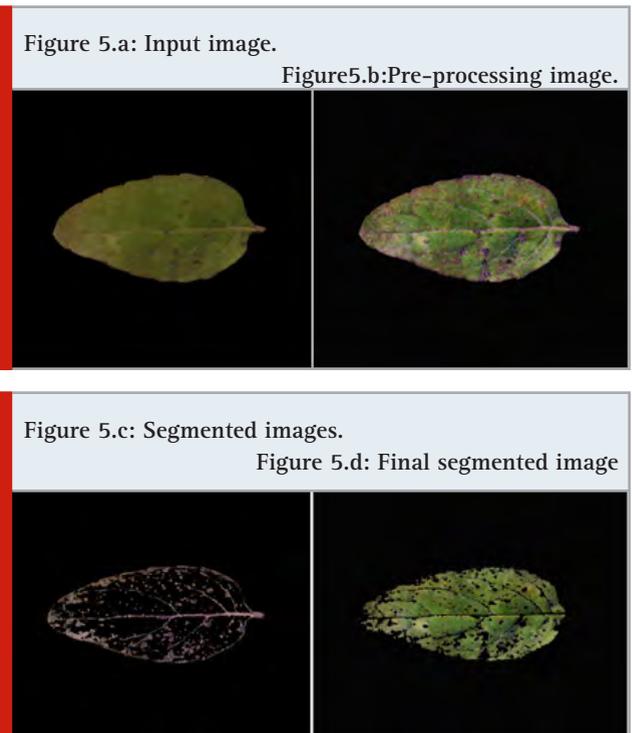


RESULTS AND DISCUSSION

The proposed system has validated in the two different ways such as hardware analysis and the software analysis.

For the hardware analysis the proposed system has been implemented with the help of Raspberry Pi with some sensor boards the hardware implementation is shown in the below figure.4. For the software performance analysis, the proposed system has system is experimented using Python with 3.0 GHZ Intel i3 processor, 1TB HDD and 8 GB RAM.

For determining the feasibility of the proposed framework the exhibition of the projected structure is distinguished and the current outlines on the supposed dataset leaf contamination distinguishing proof frameworks. To approve the proposed programming framework the database has considered, which comprise the database comprises of 400 pictures which incorporate 200 solid and 200 ailing leaves of various classifications of leaves for example *Ocimum sanctum*, *Ocimum tenuiflorum*, *Ocimum basilicas* and *Ocimum gratissimum*. A hundred examples each for the four classes of leaves are gathered. To approve the proposed framework execution some quality measurements are investigated which is mentioned below. The simulation images of the projected system is display in the below figure.5.



Performance Analysis: From the planned scheme have four diverse factors such as True Positive (TP), True Negative (TN), False Positive (FP) and False Negative (FN) are calculated. The performance considerations analyzed in this projected method are designated as trails.

Recall: Recall is the sum of True Positives (tp) distributed by the sum of (tp) and the sum of False Negatives(fn). Recall mathematical equations display as (4):

$$R = \frac{tp}{tp+fn} \quad (4)$$

Precision: Precision is the sum of tp distributed by the sum of (tp) and False Positives. It is also called the Positive Predictive (PP) Value. Precision mathematical equations display as (5):

$$Precision = \frac{tp+tn}{tp+tn+fp+fn} \tag{5}$$

Specificity: Provides the feature, how likely it is to return negative features to the test. Specificity is also called actual negative rate, according to mathematics, specific mathematical equations are expressed as (6):

$$Specificity = \frac{tn}{tn+fp} \tag{6}$$

Accuracy: The accuracy of the image is measured using specificity and sensitivity. Show the exact size of the image. Mathematical equations Mathematical equations are shown (7):

$$Accuracy = \frac{tp+tn}{tp+fp+tn+fn} \tag{7}$$

Performances analysis

The proposed system performance are evaluated in three different ways such as, Segmentation Performances analysis, Classification Performances analysis and comparative analysis the analysis. All the metrics are defined below sections.

Segmentation Performances analysis: To evaluate the proposed system segmentation performance, we have consider with the 5 different samples and the Dice, jaccard and Accuracy performances' are validated. The evaluated performances' are tabulated in table.1.

Sample	Dice-coefficient	Jaccard coefficient	Accuracy
Sample-1	0.4075	0.3041	96.4890
Sample-2	0.92380	0.88347	96.9931
Sample-3	0.7258	0.6010	98.8912
Sample-4	0.5847	0.3570	97.0235
Sample-5	0.4075	0.3041	96.4890

From table.1. Analysis displays that the proposed system provides much better outcomes. The average of the proposed method is average of Jaccard coefficient is 0.5962 and Dice coefficient is 0.6857. The HBCC-KFCM-BIM technique provides 97.4577 of average accuracy.

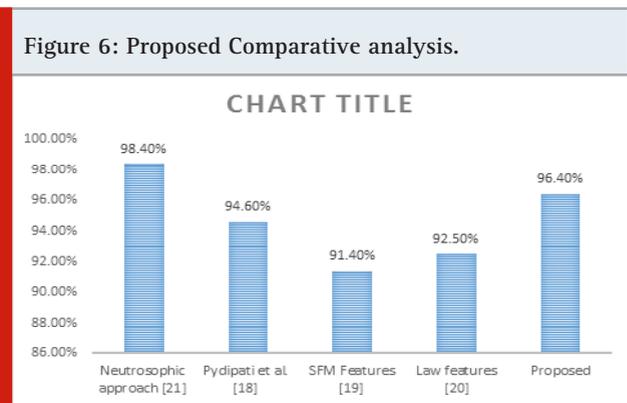
Classification Performances analysis: In this proposed system CNN is the deep learning architecture is used for classification purpose. To evaluate the proposed system classification performance the proposed classifier is also compared with some other classifiers.

Comparative analysis: The proposed system has been compared with 4 existing techniques such as

Neutrosophic approach based on Random Forest (RF) classifier (Dhingra, G et.al (2019)), Pydipati et al. Based on RF classifier (R. Pydipati et.al (2006)), SFM Features (C.M. Wu and Y.C. Chen (1992)) based on FRclassifier and Law features based on SVM classifier (A.S. Setiawan et.al (2015)). The comparative analysis are defined in the table.3. And figure.6.

Classification Method	Accuracy (%)	Sensitivity (%)	Specificity (%)
SVM	0.8600	0.7200	1.0000
Naïve Bayes	0.8400	0.6800	1.0000
Random forest	0.8500	0.7000	1.0000
CNN	0.9640	0.7400	1.0000

Technique	Accuracy
Neutrosophic approach (Dhingra, G et.al (2019)) (Random Forest)	95.4%
(R. Pydipati et.al (2006)) (Random Forest)	94.6%
(C.M. Wu and Y.C. Chen (1992)) (Random Forest)	91.4%
Law features (A.S. Setiawan et.al (2015)) SVM	92.5%
Proposed CNN	96.4%



CONCLUSION

The essential commitment of this document is to effectively create a new section policy with a set of highlights. The entire strategy was shown separately, from pictures of social events to sections. New highlights are separated by considering the sections. These highlights combine the strength and intensity of leaf surface division. The section is used to degree the accuracy of

the projected highlights. These projected highlights offer promising results and provide variants and techniques for removing existing components. The prepared model was likely to identify solid and diseased leaves. Considering the graphical test, RF AI models perform better than other AI models with other accuracy.

According to the perception, the most basic sensor information accumulation for the estimation is ecological temperature, natural moistness and furthermore there are some other such sensor information likewise assembled for IoT applications as soil dampness and soil pH. Wi-Fi has the most appeal of utilization in horticulture and cultivating industry, trailed by versatile innovation. Different advances as Zig Bee, RFID, and Raspberry pi, WSN, Bluetooth, Lora and GPRS have less request in the horticulture and cultivating areas. At the point when contrasted with the rural part, cultivating industry has a lesser rate sum utilizing IoT for the automation. This study could be valuable for analysts for finding new ways and answer for test in the current horticultural period and for rural and cultivating enterprises to make the computerization procedure increasingly compelling and productive, thus, to get the great organizations business outcome. Future examinations could concentrate on to stretch out proposed work to arrange every sickness classification independently and evaluation the seriousness of the recognized maladies. An unfamiliar amalgamation Feature extraction, Feature selection and learning techniques can likewise be investigated to improve the adequacy of sicknesses location and classification models.

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Review Analysis of Twitter Sentimental Data

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ABSTRACT

In present world, every people have full of emotion and sentimental feeling. People can communicate with other people all over the world with many short message in twitter is called tweets. Every social media or networking are generating infinite of data in every second. The infinite number of novel innovations are coming to the industry to develop new ways of communications between consumer and start-up business opportunity. Sentimental analysis (SA) is the best recent research in world. These is the greatest needs of every companies and business peoples. These are several section where people can advertise their product, company can analyses about their product, consumer may helped by their decision making to purchase a product. In this review study, we analysis with some recent existing techniques in SA of Twitter data.

KEY WORDS: TWITTER DATA, DATA MINING, DATASETS, CLASSIFICATIONS, SENTIMENTAL ANALYSIS, MACHINE LEARNING.

INTRODUCTION

In most popular studies of emotions can be divided into two main classes: physiological and con SA - this is a computational methodology for extracting moods from text, speech or a data set. It can classify emotions, attitude, opinion and subjective impression into polarity (Asghar MZ et.al (2018)). Classification plays a significant role in classifying unstructured data. On-line product review for positive and negative classes. In their test, they used various algorithms to calculate the various trade-offs of online reviews of product. Fang et al. addressed the

issue of categorizing frame of mind polarity in Amazon.com product reviews (Fang, X., Zhan, J (2015)). They classified their results into two levels; a) categorization at the proposal level, b) classification at the review level (Escalona T (2018)). In this script, we used the NRC lexicon of emotions, in which customer reviews were divided into several emotions and two feelings explore the possibilities of the future (Bhatt, A et.al (2015)).

The negative tweets are further analyzed to measure their intensity and how they can influence the selected public event. By computing the sum of person who tweeted negatively about this event and the total sum of people who tweeted about this event, we offer 3 levels of potential threat or anxiety about the event that is about to happen (Ruder S et.al (2016)). In twitter sentimental analysis more number of research person involve to analysis the review comments in different techniques such as machine learning, deep learning, big data , data mining and so on. This study features a Jordanian Arabic

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twitter where tweets are marked as positive or negative. Explore the various approaches of SA-controlled machine learning in relation to the Arab user's social networks in general subjects. In these works, they have to increase the dataset, add a third classification and consider hashtags (Alomari KM et.al (2017)).

The Hashtag investor is a system that can analyze data from Twitter to obtain useful information, including some predictions. For this study, machine learning methods related to data mining were used to archive SA to classify and identify tweets by content. These Twitter perceptual analysis experiments have shown that Twitter's keyword functions can be useful for microblogging perceptual analysis. More research is needed to determine if Tweet keyword functions are simply of good quality to analyze perceptions in this area (Kolambage S et.al (2017)). However Rao CS et al can consider the words, retweets, hash tags and emotions by using opinion mining on twitter data (Rao C. S et.al (2018)). Also the challenge of sentimental analysis is to Detection of spam and fake reviews. Bhelände M et al show controversial and fake news. It is great that such accuracy using Naïve Bayes will provide good analysis of news and thus would identify the controversial news. And also implemented output of that analysis would be displayed in a Web User Interface which will be implemented in Html, CSS, JavaScript and Bootstrap. Find that the news would be verified to be fake or real (Bhelände M et.al (2017)).

Social Networking: It is an internet based sharing their emotional with friends, customers and families. It can be for social, commercial, or both via websites such as Facebook, Twitter, Linked In, classmates.com, and Yelp. It is an important destination for sellers who want to attract users. The benefits of social networking are global connectivity, shared interests, real-time information sharing, and targeted advertising. The most important social networks are Twitter, Facebook, and Snap Chat, and so on

Figure 1: Twitter sample image



Twitter: In below figure. 1 signify the sample image of twitter. To send a message, picture, etc. to the social networking service twitter. A social networking site where the user can post a messages that can be visible by other users. These are called tweets and can be up to 140 characters long. Twitter had an estimated 4 to 5 million users and was the third famous social interacting site. Tweets are news, pictures, etc. posted on Twitter.

Introduction to sentimental Analysis: SA is a process of collecting and analyzing data based on a person's feelings, feedback and thoughts. Sentimental analysis is often referred to as extracting opinions because it distinguishes key characteristics from people's opinions. Sentimental analysis is performed using various machine learning methods, statistical models and natural language processing to extract functionality from big text data. SA can be done at the level of document, instruction and instruction. At the document level, a summary of the entire document is first performed and analyzed if the mood is positive, negative, or neutral. At the instruction level, we consider the propositions in the instruction to check for polarity. Every single sentence is divided into a separate class to ensure mood. Sentimental analysis has many uses. It is used by people from social networks to make comments by analyzing the feelings or thoughts they provide in text form.

Applications of Sentimental Analysis: SA has huge quantity of applications in the Natural Language Processing field. Because of the enhancement in the SA, social network data is on sky-scraping claim. Many companies have already approved the SA for the method of improvement. Some of most important applications are specified as below:

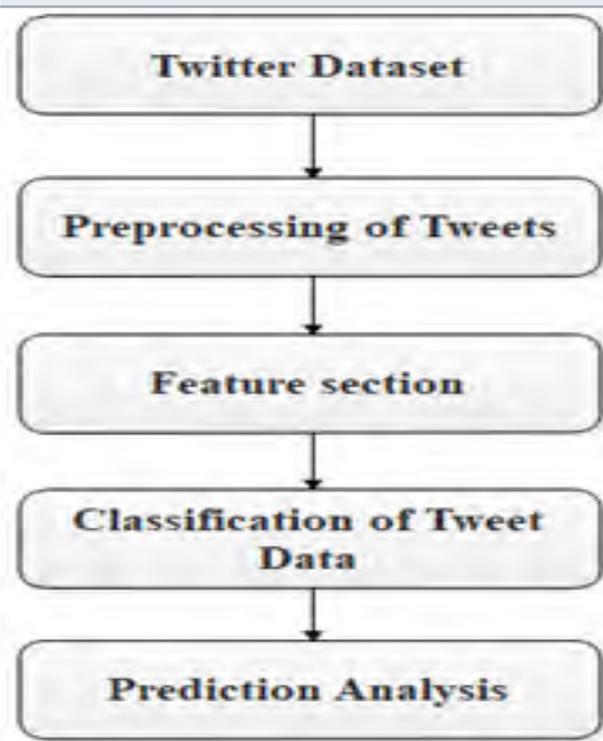
- Word of Mouth
- Voice of Voters
- Online Commerce
- Voice of the Market
- Brand Reputation Management
- Government

Article organization: In twitter sentimental analysis basic architecture is displayed in figure.1. Initial process of these method is gathering of data from the given dataset. The dataset is feed to the preprocessing process (Chawla S, and Mehrotra M. (2018)). One of the most data mining steps are Data preprocessing, which deals with data preparation and transformation of the dataset and seeks at the same time to make knowledge discovery more efficient.

Preprocessing include several techniques like cleaning, integration, transformation, and reduction. Identification of every caps letter Lower case, Removal of URL, Analysis of emotion, Punctuations and blank spaces removal, Word Compression. And then preprocessed data is given to the feature selection. It contain two main types there are wrapper and filter methods (Tsapatsoulis N, and Djouvas C (2017)). Selected feature is given to the classification process. These enquiry is the supervised

process of conveying items to categories/classes in order to improve the accuracy. In classification techniques, different types of algorithms are involved. Such as SVM, Kernel estimation, neural networks and Learning vector quantization and so on.

Figure 1: Basic architecture of twitter sentimental analysis



Techniques of analysis: SAs can be implemented using both restrictive and arbitrary classification methods. Limited methods work better than uncontrolled methods. However, unlimited methods are also important because restrictive methods require large amounts of tagged training data, which is expensive, while unlabeled data is easy to obtain..

Supervised Techniques: This method can be implemented by constructing a classifier. This classifier is trained by samples which can be labeled manually (Vilares D et.al (2017)). The popular supervised algorithms are SVM, Naive Bayes classifier and Maximum Entropy. Supervised Techniques proved that they provide efficient performance.

Unsupervised Techniques: In this method, classification is performed by associating the characteristics of a given text with vocabulary, the meaning of which is determined before their use (Al-Amrani Y et.al (2017)). For instance, start with positive and negative vocabulary words, analyze the article for which you need to find the mood. Then, if the document has more positive vocabulary words, it is positive, otherwise it is negative.

Challenges of Sentimental Analysis:

1. Fake reviews and spam Detection: The web holds both genuine and spam contents. For efficient Sentiment classification, this spam content is supposed to be eliminated before processing. This can be done by discovering duplicates, by perceiving outliers and by bearing in mind reputation of reviewer.

Table 1

Author & year	Method	Dataset	Advantages	Performance	limitation
Shah S et al. (2016)	SA of Twitter Data Using Classifier Algorithms	The Emoticon dataset can retrieve from twitter sentiment.appspot.com.	(1) for topic modeling, Hash Tag Classification are used; (2) for polarity classification) Naïve Bayes Classifier Algorithm are used; (3) Emoticon Analysis for Neutral polar data.	An average accuracy of 81%	Their approach only possible with limited data
Joshi S et al. (2016)	Target Dependent SA with Onto-Fuzzy Logic	AFFIN dataset	It enables users can be send and read messages with over 140 characters for compatibility with SMS messaging. A good SA of data of this huge platform can lead to realize many uses	Earlier, 30% positive(good), 20% positive(better), 10% positive (best), 20% negative (bad) and neutral.	Does not understand sarcasm

Continue Table

Gupta B et al. (2017)	Twitter SA using Machine Learning Algorithms on Python	The tweets are collected using Twitter's streaming API	Attain better Accuracy on the basis of five classes used for Classification of sentiments.	Efficiency of almost 85%-90%	Simulation time period is high.
Bilgin M et al. (2017)	SA on Twitter data with Semi Supervised Doc2Vec	Turkish dataset	Method improves the success rate of the system and prevents needless info from being dealt and reduce system cost.	Positive or negative with a success rate of 89%.	No emoticon analysis
Huq MR et al. (2017)	SA on Twitter Data using KNN and SVM	hash tagged dataset (HASH) and the emoticon dataset (EMOT)	sentiment label was classify perfectly in these system	An average accuracy of 90%	Dataset which contains a small number of tweets
Jianqiang Z et al, (2018)	Deep CNN for Twitter SA	Five different dataset (SSTd, SED, STSGd, SE2014, STSTd)	semantic relations and co-occurrence statistical between words in tweets are calculated by latent contextual in these method,	The highest accuracy is 87.62%,	Low accuracy result.
Zainuddin N, et al. (2018)	Hybrid sentiment classification on twitter aspect-based SA	STS, STC, HCTS	Twitter datasets to signify various domains classification.	Accuracy performance of 76.55, 71.62 and 74.24%	Some time did not identify sentiment of people towards assured issues
Ismail HM, et al.(2018)	Semantic Twitter SA based on a fuzzy thesaurus	STS-Gold	Tweets, word unigrams, word bigrams, hashtags as its nodes	Accuracies of 83 and 85%	Their approach only possible with limited data
Saura JR et al. (2019)	SA Using Text Data Mining	Twitter UGC dataset	These comments were identified and the key indicators for startup business success	Method predict positive and negative sentiment accurately.	The sample size is low.
Zhang B et al. (2019)	SA through critic learning for optimizing CNN with rules	MR, SST1, SST2, CR, AFFR	The n-gram initialization scheme can be effective polarity words in a sentence and make our model accurately focus on significant.	Attained baseline is enlarged from 0.4%, 0.2%, 0.5% to 1.9%, 1.0%, 1.7%. Also decreases from 100% to 10%.	Method not better in positive and negative Sentiment labels.

2. Classification filtering Limitation: There is a restriction in classification filtering while shaping most trendy thought or idea. For enhanced sentiment classification outcome this restriction should be condensed. The risk

of filter bubble gives immaterial opinion sets and its outcome is false accumulation of sentiment.

3. Domain-independence: The major confront faced

by opinion mining and SA is the area reliant scenery of sentiment words. One feature set may provide high-quality performance in one field, at the same time it carry out very worst in some other field.

6) NLP overheads: The natural language above your head like uncertainty, co-reference, obliqueness, conclusion etc. created difficulty in SA too.

Literature survey: In these section we discuss about some recent survey about twitter sentimental analysis. In these survey we discuss some pervious method performance and limitations.

Problem Statement: Users' informal conversations like chats, post, tags, comments etc. on online social media e.g. Twitter, Facebook. Educational experiences such as their opinions, feelings, and all related concerns about the knowledge activities process. Data from such un-instrumented surroundings can provide valuable knowledge to inform user communication process. Also less features will difficult to detect sentiment perfectly and find other sentiment labels, analyzing the undefined data, it can be risky task for researcher.

CONCLUSION AND FUTURE WORK

In these study we examined the some existing methods performance and outcome and also find out the problem statements. So that issue, in future we aimed to overcome that existing problems and enhance the output performance by introduce the new techniques in twitter sentimental analysis study, The approach in our proposed system includes four main stages; data collection, pre-processing, retrieval and classification of keywords. In the beginning, input was collected from the Twitter dataset. After data collection, pre-processing was performed to improve the quality of the data collected. The preprocessing phase consists of two systems; Lemmatizing and removing passwords and URLs. Consequently, an effective approach to modeling arguments has been applied to the Latent Dirichlet Allocation to extract keywords, and also helps to identify the topics in question. The extracted key-words were categorized into three forms by applying an effective ML classifier called as Decision Tree. In future our proposed method used to attain the better outcome performance in sentimental analysis.

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MANET Wormhole Attack Preventing Using Two-Phase Hybrid Cryptography Cryptograph Security Algorithms

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ABSTRACT

Mobile Ad hoc Network is a superior kind of wireless organization without a network, with no essential management, temporarily designed by a set of mobile nodes. With its benefits recognized, a number of MANET features are responsible for its fragile behavior, such as a lack of centralized administration, dynamic topology and limited means. Attacks cause various attack defense mechanisms (for example a worm hole) on the network stack and thus require a higher level of security during data exchange. This article proposes a novel security algorithm that uses a grouping of both asymmetric and symmetric cryptographic methods to deliver a high level of security without much key maintenance. This is guaranteed by cryptographic primacy, integrity, confidentiality, authenticity and AES are united to offer encryption. The XOR-DUAL RSA procedure is measured for authentication and (MD5) Message Digest-5 for integrity. The proposed system is also known as a two-phase hybrid encryption algorithm. It presents a new technique to combine symmetric and asymmetric methods by acting two similar steps. These steps eliminate the drawbacks of traditional hybrid procedures by attaining higher security without growing implementation time. The results showed that the projected hybrid procedure works well in positions of the time, encrypted text size, and power consumption in MANET. In the instance of image encryption, it resists various attacks.

KEY WORDS: MOBILE AD HOC NETWORK (MANET), CRYPTOGRAPHY, ADVANCED ENCRYPTION STANDARD (, ELLIPTIC CURVE, XOR-DUAL RSA, MESSAGE DIGEST-5 AND WORMHOLE ATTACK.

INTRODUCTION

A devices that are interconnected to exchange information, resources and protocol communication called network system. Due to the fast growth of wireless technology, various kinds of wireless networks have appeared. These networks can generally be classified as infrastructure-based networks and networks without infrastructure. Special networks are very popular due to their scalability

and simple implementation. Special networks are networks without infrastructure and do not have a central ability or an access point for managing and coordinating devices. A special network with mobile devices as client nodes is referred to as a MANET, and a special network with touch devices as client nodes is referred to as a WSN.

MANET is a standalone set of mobile or semi-mobile wireless nodes that converse via wireless connections. Nodes are interdependent when sending messages to remote sites. This requires choosing the most efficient, reliable and fastest route from source to destination. Mobile nodes in MANET often move, so it is important to keep in touch with the highest possible quality of communication. This Figure 1 displayed that the wireless network types, it is called a special mobile network, because in this network the nodes or client are mobile, unstable and fixed.

ARTICLE INFORMATION

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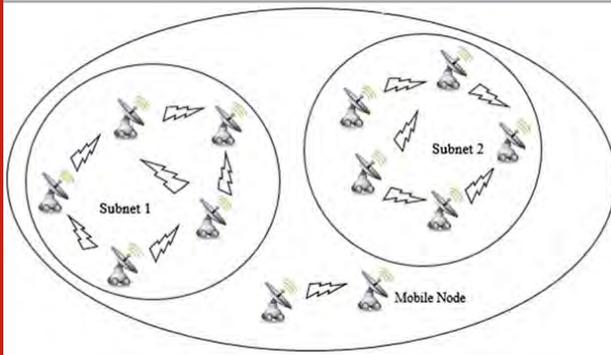
Thomson Reuters ISI Web of Science Clarivate Analytics USA and
Crossref Indexed Journal



NAAS Journal Score 2020 (4.31) SJIF: 2020 (7.728)
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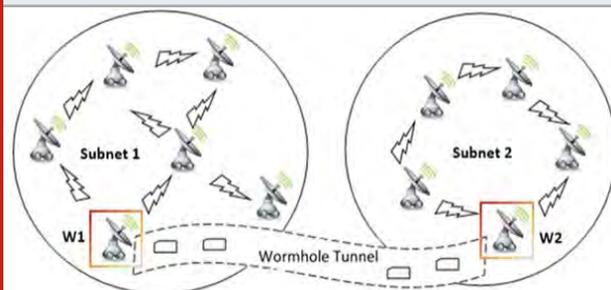
MANET without infrastructure is the dynamic formation of mobile nodules with a random and short-term topology. This system is also mentioned to as "Self-Configurable" and "Self-Managed Network". The node mobility causes unwanted problems that have to be overcome in demand to take advantage of Mobile Ad hoc Network (M. Ilyas (2002)).

Figure 1: MANET



Mobile nodes operate on battery power, so energy efficiency is paramount. Such energy savings could be a criterion for optimizing the design for development at Mobile Ad hoc Network. The battery life time of the nodes also disturbs the communication interval of the separate nodes in the network. A limited transmission interval needs the interaction of intermediate nodes to provision the transmission of data outside the interval, which enables probable security attacks (Aggelou G (2004)). Mobile Ad hoc Network uses the ad hoc routing-on-demand protocol (AODV) with the wireless standard IEEE802.11b for communiqué. AODV routes data to the endpoint and must therefore be reliable and adapt to network conditions such as traffic, topology and network dimension.

Figure 2: Wormhole attack in MANETs.



2. Security Issues in Routing Protocol: A special network delivers communication among wireless nodes. The nodes can freely move and leave or join the network at several time in MANET. As a self-configuring network, the separate nodes act as hosts and routers. Due to the imperfect transmission area, the network needs the cooperation of truthful middle nodes. If an intermediate host behaves badly, this affects network performance. Therefore, the two thing of security and routing are the

chief tasks of MANET. It uses the AODV routing protocol (Chakeres ID (2004)).

2.1 Wormhole Attack: This is an indirect and serious security attack that can partially disturb network appearance or affect access to the entire system. When attacking through a wormhole, the attacking node accepts the data from one end and tunnels it at a second position. MANET's AODV protocol uses a transmission machine to route to the endpoint and send data. Harmful nodes in the wormhole return the path response (RREP) to the target with greater residual power and fewer jumps (A. Patel et.al (2015)). This attack can be triggered in two methods: one in out-of-band mode (Figure 1), and the other in in-band mode (Figure 2). In the "one of the channels" channel, the attack node interrupts the data package with special devices with a high power level to transfer data directly to the other end with a longer delay, while the attack node in the other Mode detects good behavior and the node. Use it to send data to the destination.

To avoid choosing a different route for data transmission, the wormhole averts the finding of another middle node towards the destination. Wormhole attacks operate at the network level. Either special equipment or encapsulation technique is used to launch the attack. The assaulter summarizes the data packet on the sending side of the node and sends it to the tunnel. On the receiving side, the other attacking node decapitates the data. Due to encapsulation, middle nodes cannot adjustment the area of the transit counter of the data packet and can clearly come directly from the first malicious node with the number of transitions. In a wormhole, two malicious nodes are not straightly associated. This creates the illusion of a direct connection and makes the network feel like it is linked ((Sahu P et.al (2013)) and (Sharifi SA and Babamir SM (2016))).

3. Existing Cryptography Procedure Overview

4 Proposed Hybrid Algorithm: This section introduces the proposed THCA. A novel scheme of merging asymmetric and symmetric scheme is presented by execution of two parallel levels. These stages evade the drawbacks of traditional hybrid procedures by reaching a high level of security without prolonging the performance times.

4.1. Encryption process: During encryption, clear content is separated into n squares of B_i . Each square comprises of 128 bits. At that point it is isolated keen on two sections: squares M_i ($0: n/2-1$) blocks, and M_i ($n/2: n-1$). On the off chance that n isn't a whole number and has a small amount, the THCA calculation utilizes zero cushioning, so the last square is 128 bits. The encryption procedure is isolated into two stages. In step I, the intial block of $n/2$ are encrypted using an AES and ECC. The ECC procedure is used to protect the private key, as it is the algorithm with the highest secure public key. In addition, based on a scientific problematic in which ECC can be solved completely exponentially and not exponentially for other public key, ECC requires a lesser key size than other procedures, which denotes to

the size of the lower memory (Kodali RK and Sarma NN (2014)). Allows the host to process more needs with the least number of dropped packets. Since this ECC intake high power than the symmetric procedure, using the AES procedure lessens energy consumption and improves system enactment (Lenstra AK (2001)). If we use AES with ECC, we can save energy and achieve speeds of up to 25% for encryption and almost 20% for decryption (Tillich S, and Großschädl J (2005)). The first $n/2$ blocks are encrypted as the subsequent:

m_i is encrypted AES by the key k_i which is AES encryption algorithm secret key with size of 128 bits. k_i is encrypted by ECC to make k_j with length L .

$$m_i = \sum_{i=0}^{1-\frac{n}{2}-1} (Bi) \quad 0 \leq i \leq \frac{n}{2} - 1 \quad (1)$$

$$k_j = ECC_{enc}(TC_{PK}, k_j - 1) \quad 0 \leq j \leq L - 1 \quad (2)$$

Where Elliptic Curve encryption function is signified as ECC_{enc} .

$$C_i = E_{AES}(k_j, k_j) \quad (3)$$

Stage II is acted in corresponding with stage I to expand wellbeing without expanding conveyance times. In stage II, the rest of the $n/2$ squares are encoded utilizing the XOR-DUAL RSA calculation. Double RSA gives incredibly quick encryption and decoding, multiple times quicker than regular RSA. The XOR encryption calculation is a symmetric encryption calculation that utilizes a similar key for encryption and unscrambling. The XOR-DUAL RSA calculation promises the improvement of a more grounded calculation as trails:

$$M_i = \sum_{i=n/2}^{i=n-1} (Bi) \quad \frac{n}{2} \leq i \leq n - 1 \quad (4)$$

In this algorithm, p and q are two large prime number choose randomly. Then, $xp \times q, \phi(x) = (p-1) \times (q-1)$. A numeral relatively prime to ϕ is selected; d . Then, e is deliberate such that $e \times d = 1 \pmod{\phi(x)}$, and for encryption (e, x) Public key is used.

$$R_i = (Bi)^e \pmod{x} \quad (5)$$

ASCII for (Bi) is get and transformed to binary

$$L_i = ASCII(Bi) \quad (6)$$

Where L_i is a function used to transform message block to ASCII. R_i is a ciphered text using DUAL RSA.

$$C_i = (R_i) \text{XOR}(L_i) \quad (7)$$

MD5 is smeared to the cipher texts c_i and C_i . It is the best hashing function security performance (Tillich S, and Großschädl J (2005)).

$$d_i = MD5(c_i) \quad (8)$$

$$D_i = MD5(C_i) \quad (9)$$

In the final phase of the encryption course, both $n/2$ blocks are sent to the receiving node to create simple text, not two blocks. Each of the 128 associated hash values (d_i and D_i) is combined and simultaneously sent to the receiving node.

$$Q = c_i + C_i \quad (10)$$

$$H = d_i + D_i \quad (11)$$

4.2. Decryption process: During decryption, the ciphertext Q is separated into n blocks, each block consisting of 128 bits. Then, it is allocated into two parts c_i ($0: n/2-1$) blocks and C_i ($n/2: n-1$) blocks. Hashing is used to determine whether or not a sync node gets the same ciphertext. The hash values are compared in two steps. If they are identical, the algorithm decoding process continues. Otherwise, delete the message. If the hash values are the same in the source and sync nodes, the first $N/2$ block is decoded using the AES and ECC procedures as trails:

$$c_i = \sum_{i=0}^{i=\frac{n}{2}-1} (Bi) \quad 0 \leq i \leq \frac{n}{2} - 1 \quad (12)$$

$$k_i = ECC_{dec}(TC_{PK}, K_{j-1}) \quad \begin{matrix} 0 \leq i \leq \frac{n}{2} - 1 \\ 0 \leq j \leq L - 1 \end{matrix} \quad (13)$$

To create the key, the AES key K_j is decoded using the LET bit, which decodes the encrypted text using the AES decryption scheme through DAES,

$$m_i = D_{AES}(k_j, c_i) \quad (14)$$

m_i is the initial level of the plaintext. The residual $n/2$ blocks are decoded using the XNOR-DUAL RSA procedure as shadows:

$$C_i = \sum_{i=n/2}^{i=n-1} (Bi) \quad \frac{n}{2} \leq i \leq n - 1 \quad (15)$$

Private Key (d, p, q) is used for decryption. To make this process, first some factors are computed $d_p = d \pmod{(p-1)}$, $d_q = d \pmod{(q-1)}$, $R_{pi} = R_i \pmod{p}$, $R_{qi} = R_i \pmod{q}$,

$$S_0 = (R_{qi} - C_{pi}) p^{-1} \pmod{q} \quad (16)$$

$$S_i = R_{pi} + S_0 p \quad (17)$$

ASCII for (C_i) is converted to binary.

$$W_i = \text{ASCII}(C_i) \quad (18)$$

Where L_i is a function used to transform block of cipher text to ASCII.

$$M_i = L_i \text{ XOR } W_i \quad (19)$$

M_i is the next portion of the full text. In the last stage of the decoding process, two $n/2$ blocks are combined to create plain text from n blocks.

$$P = m_i + M_i \quad (20)$$

In THCA, straightforward content partition improves the quality of the proposed calculation. An aggressor couldn't figure out what sort of specific calculation is utilized to produce ciphertext. It is along these lines impractical to unscramble the ciphertext. Likewise, two parts of the plain content are encoded in equal, which abbreviates both the encryption and decoding times. When blending AES with ECC in the main portion of the plaintext, the encryption procedure is done by AES, which is quicker than a deviated calculation. Along these lines we spare time and vitality. These are the benefits of symmetric encryption practices just as the multifaceted nature, which is the fundamental bit of leeway of lopsided encryption strategies. By utilizing XOR-DUAL RSA in the second 50% of the plain content, our half and half calculation is progressively energetic and can't be effortlessly assaulted. What's more, hashing for information trustworthiness utilizing MD5 is utilized to guarantee that the source message on the correspondence medium doesn't change. At that point the proposed calculation has fast, high security execution and high common sense. That THCA is the genuine estimation of the crossover security calculation.

5 Experimentation and Results: To demonstrate the outcomes of the projected protocol, it is verified as a security protocol in MANET. The experiment is carried out using the NS2 tool.

5.1. Simulation environment: Manet's topology expect that it comprises of twenty hubs. The hubs are situated on the system. Various conditions are accepted for information move between various hubs. Every hub must contain data about different hubs in MANET. This data is at first transmitted as a little bundle. This bundle contains source address data. At the point when the focal hub gets the bundle, it sends it to the closest hub. At the point when this bundle arrives at the last hub, it checks all the addresses in this parcel and sends a reaction to the first hub. The parcel size bit by bit increments as the middle of the road hubs add their location to the bundle.

In the wake of sending the bundle, every sensor hub has a thought of where the other sensor hub is on the system. In this way, correspondence starting with one hub then onto the next hub may happen.

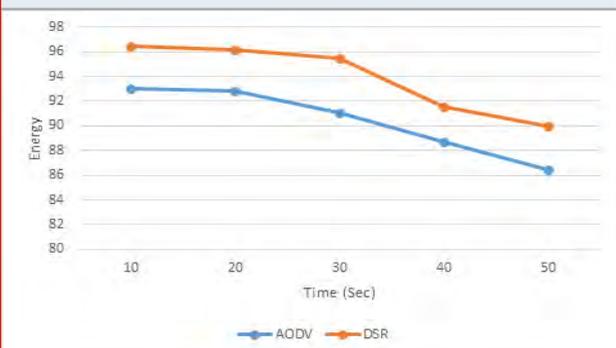
Now and again, the associations between the sensor hubs fall flat or the sensor hubs move from their unique position, making the association breakdown. In some different cases, inconsistent parcels can be traded by means of the association between any two hubs. Furthermore, a few bundles might be dropped because of execution delays (breaks). On the off chance that these unbound bundles are dismissed, the association won't be utilized for a predefined timeframe and the system will utilize a substitute way. The receptive conventions AODV and DSR have been tried in the reenactment condition for execution usefulness. The two conventions were recreated utilizing NS-2.35 with a hub number of 30, 60, 90 and 120 and an irregular waypoint versatility model more than $1000 * 1000$ with a hub speed of 5 m/s. The results are discussed below:

5.2. Simulation Performance Metrics: The simulation was performed to analyze network performance for several parameters. Several measures are used to evaluate network performance under a wormhole attack.

A. Energy: Energy plays an important role in AODV because several nodes are damaged due to lack of energy. The activities of diverse nodes has been studied using energy behavior simulations (Sharma A et.al (2014)).

B. Throughputs: Throughputs is defined as the sum of average successful message delivered successfully over the communication channel

Figure 3: Ad-hoc network energy comparison between AODV and DSR



C. Packet Delivery Ratio: In application layer the ratio among the sum of packets created by the CBR source and the sum of packets expected by the CBR drop at the last terminus (Sharma A et.al (2014)). Figure 3 shows the comparison between the two protocols, which vary in time between 10, 20, 30, 40 and 50 h. Regardless of

the period, the energy consumption in the DSR is low. On the other hand, in demand protocols such as DSR, an increase in the number of sources increases the routing packets, but the energy consumed by the AODV protocol follows a slower form. Figure 4 illustrates the performance effect of the DSR and AODV protocol. The results indicate that the throughput of the DSR protocol decreases rapidly with increasing time on AODV. Over time, the throughput in the DSR decreases rapidly.

Figure 4: Ad-hoc network Throughput comparison between AODV and DSR.

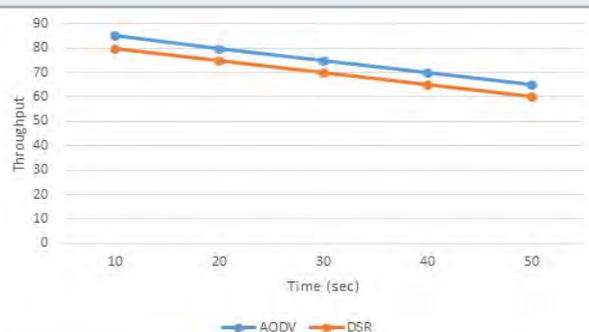
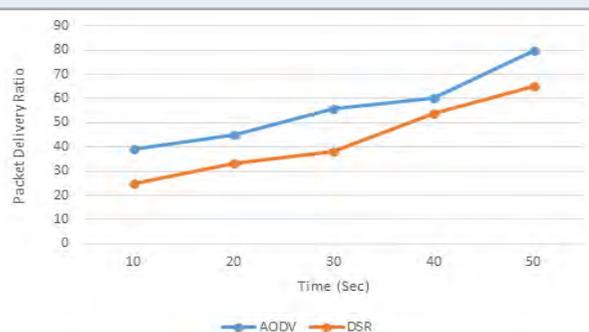


Figure 5: Ad-hoc network Packet Delivery Ratio comparison between AODV and DSR.



CONCLUSION AND FUTURE SCOPE

This article provides a powerful hybrid security algorithm for WSN. It is considered to solve various issues such as implementation, efficient computation, short response time and reliability of the cryptographic system. The proposed TSHCA splits the plain text and tries to catch the attacker, then uses two different methods. First, use a grouping of cryptographic methods that use the ECC and AES procedures. Next, XOR-DUAL uses RSA because it is more stable and easier to attack. In adding, hashing is used for data integrity with MD5 to ensure that the source text in the communication medium does not change. DSR protocol routes are cached during the

root creation phase and are used later in the event of a root error. This mechanism often reduces the number of path detection attempts performed by AODVs. Adequate wormhole attacks are treated using prophylactic methods such as the AODV and DSR protocols. This study can be expanded to protect other routing protocols, such as practical and hybrid protocols. Attacks can be analyzed using various network patterns.

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Big Data Analytics – an Influence of Deep Learning

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ABSTRACT

Recent technologies allow us to acquire more and several data. With the advent of mobile technologies and handling of data in long bytes, new science and intuition are developed from very descriptive and information focusing on particular domain which holds information about several issues like intelligence, security in cyber world, detection of frauds, trading in finance, issues and treatments in Medical field, information regarding personal and many more. Various Algorithms in Machine Learning especially in Deep Learning yielded from artificial neural networks plays a major role in the analysis of Big Data. Algorithms in Deep Learning pullout complex and high level abstractions by finding complex structures in huge data sets. In recent days, Techniques in Deep Learning are finding solutions to complicated problems in Machine Learning and problems in the recognition of patterns like recognizing image and speech, identifying data and retrieving information quickly. In this paper, we focus on several features of Big Data Analytics focusing on huge sets of data that are not well structured and evolve productive, systematic and structured learning algorithms.

KEY WORDS: BIG DATA, DEEP LEARNING, MACHINE LEARNING, BIG DATA ANALYTICS, ALGORITHMS..

INTRODUCTION

Various concerns including private and public are keen in acquiring large amounts of data focused on a particular domain for finding solutions to several problems in Marketing field, Medical field, detection of Fraud which is not quite easy to get these data and is tougher to analyze and handle those data ((J. Lin

et.al (2012))). Algorithms in Deep Learning focus on examining huge volumes of data that are not supervised. Besides deep learning algorithms devise new things for all sets of data that is handled hence the tools of deep learning becomes more appropriate for big data analytics (A. Smola et.al (2010)).

2. Application of Deep Learning in Big data analytics:

Veracity, Velocity, Variety and Volume summarize the concept of big data. Deep learning always deals of quite a very large volumes of data hence it is well appropriate for the Volume factor. It is also appropriate for examining raw data taken from various sources and in variety of formats. Deep learning thus provides solutions to several tough problems troubling big data analytics (J. Gantz et.al (2010)).

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A. Semantic Indexing: Cyber traffic monitoring, Shopping systems, Social media, Security systems etc produces various types of information in various forms like audio, video, image, text. These large volumes of information have different representations which cannot be stored as databit strings. With the advent of deep learning, storage and retrieval of such data has become easier and efficient which uses higher level of data representations for semantic indexing. This unique characteristic of deep learning allows search engines to work quicker and more efficiently. The presentation of data in semantic indexing makes it useful as a source for discovering and understanding knowledge (M. Nagwa et.al (2016)).

Figure 1: Deep Learning



B. Performing discriminative tasks on big data: The main purpose of big data analysis is to differentiate and discriminate between writings in documents, faces in images, voices in audios in order to increase the accessibility quickly and efficiently. We can apply the complex algorithms in deep learning to big data and take out the features that are nonlinear in it. We can then apply simple linear analytical models on these features which are extracted. In this way, Deep learning comes closer to artificial intelligence (M. Najafabadi et.al (2015)). Data analysts gets benefitted from the vast storage of knowledge in the pool of big data. Also, deep learning offers efficiency in computation by the application of simple linear analytics.

C. Semantic tagging: With the invention of Internet, Online users uses more digital content. This becomes true for videos and images acquired from various several sources and uploaded. With such huge volumes of archives of images, we cannot provide textual relationships of images for storage and retrieval. For searching improved images, the process of finding by going through the internet should be very easy to handle. For this to happen, we need a system of automation for tagging audios and videos. Deep learning provides convoluted representations of images and videos which is in the form of high level abstractions which can then be used for tagging of images of huge data.

D. Object Recognition: A Vision in computer is an art of creating useful decisions for the physical objects which are real based on images. Several examples of computer vision systems include modeling in 3D, recognition of objects, images of medical field and smart cars. The major challenge in recognition of large scale object is attaining expertise in the extraction of feature and classifier training without considering the performance. Rather than recognition of objects, detection of feature by using deep networks is highly powerful. Hinton and Nair presented a third order Boltzmann Machine (BM) as a new type of top-level deep belief. Generative and discriminative gradients are combined in a hybrid training algorithm and is used efficiently. Generative training provides accuracy in recognition of objects and extracts more abstract representation of images and training in discrimination provides accuracy in better classification. The model can be applied to NORB database (normalized uniform version) which contains pair of images of stereo objects presented in different lighting conditions and different viewpoints. The rate of error obtained is 5.4% is less than the state-of-the-art error rates. Hence it was proved that DBNs performed in an extraordinary manner than the shallow models such as Super Vector Machines (SVM).

The problem arises when classification of image should be made for large variance datasets having only limited data which are labeled. A solution to this problem is the Discriminative DBN (DDBN) algorithm which has been constructed using several RBMs. In the phase of Learning, the greedy layer wise unsupervised learning algorithm is applied to the network using the data which are labeled and limited and have more unlabeled data. In the phase of fine tuning, supervised learning algorithm based on gradient descent is applied to the entire network by the usage of exponential loss function in order to maximize the presence of the data which are labeled. DDBN is demonstrated on MNIST and CALTECH 101 standard artificial datasets and the performance is evaluated which resulted with very less error rates when compared with typical classifiers (J. Gantz et.al (2011)).

Krizhevsky formulated the Deep Convolution Neural Networks (DCNN) in order to classify Image Net LSVC-2010 consisting of 1.2 million images of high resolution which belongs to 1000 various image classes. Thus, a DCNN comprises of 550,000 neurons with 50 million parameters and seven layers. Out of which, four layers are convolution which can be followed by max-pooling layers and remaining layers are automatically connected with a final 1000-way SoftMax. In order to fasten the process of training, a rectified linear unit with efficient GPU implementation are used. An efficient 'dropout' regularization method can be applied for preventing fitting in the fully connected layers. The results portray that the frequency of error rates in the model of

DCNN is very low when compared to already existing state-of-the-art. But the performance of the network is directly proportional to the number of convolution layer leading to complex computations.

A Devis – Deep Visual Semantic Embedding model exists in order to overcome the weaknesses of modern visual recognition system which may be summarized in dealing with large scale images having limited set of training data. Asynchronous stochastic gradient descent algorithm trains Devis for working with only images that are labeled and huge dataset of semantic information from un-annotated text data. Hence we can easily observe the semantic relationships among the labels and we can map the images into rich semantic embedding space with very less limitations. This model is applied to 1000-class Image Net dataset and on observing the result, we see that semantic information did well in providing better predictions about tens of thousands of image labels which cannot be observed during training.

E. Social targeting: Deep learning has the ability to portray the unstated emotions and events present in a text. The future behavior of people can be predicted by this concept. Several features are made as hot property in various fields like sales, marketing, advertising and intelligence. As we all aware of Facebook, has set a team to find out the benefits of deep learning. How Deep Learning applied to Business?

- When the business creates or consumes large volumes of data varying on time
- When we look for steps which suggests next steps
- When we have ambitions in life and wish to stay ahead from the competitors
- When we are unable to afford stagnancy and redundancy
- When we believe in Power of Technology

3. Deep Learning for Big Data Management: In various stages of abstraction, there are several processing levels which is the central to deep learning architecture which is structured hierarchically and interconnected in massive manner. The utilization of deep learning is exposed by the success in computer vision. Big progress has been made in computer vision using DCNNs which portrays the basic structure of visual cortex by connecting visual field with filters and arranging them in various levels interconnected in a successful manner. The first layer of DCNN is mapped loosely mapped to first cortical processing level and recently it was proved that consecutive layers of well trained DCNN portrays a correspondence in functionality to consecutive levels of the human visual processing hierarchy. Due to loose correspondence in their architecture, both biological and artificial visual systems come up with layers of

similar responding properties which means that such an architecture gives fundamentally advantageous approach to processing of information (X. Chen (2014)).

Now a days, managing large volumes of data which are very complex has become a big problem which should be viewed and handled seriously. These data are dynamic in nature and responding to real-time situations, the techniques used for processing such data are not sufficient to find solution to this problem. Several challenges include storage, search, sharing, transfer, visualization, querying, updating, predicting future trends, cluster analysis and privacy in information. Various and updated developments in the field of deep machine learning (DML) offers powerful tools for handling intelligent big data management.

4. Challenges in Big Data Analytics: There exist several challenges faced by Big Data Analytics. Some of problem areas includes determining the quality of data and validation of data, cleansing of data, reduction of data, representations of data, sampling of data, visualization of data, processing of data in parallel and distributed fashion, analysis in real time, improving data analysis by providing semantic input, discovering and integration of data, computation of parallel and distributed data, integration of data which are similar in aspects and developing new models for computation of large volumes of data.

Deep learning has the potential in giving solution for problems in data analysis and learning existing in large volumes of input data. To be specific, it helps in taking off representations of data that are complicated from huge volumes of data which are not supervised. Hence it has become an essential tool for big data analytics consisting of analysis of data from huge volumes of raw data which are not supervised and not categorized.

CONCLUSION

The study we conducted on significant areas related to Big data and Deep learning called as Applications of Deep learning algorithms and architectures for Big data analytics and the challenges faced by several problems of big data analytics on application of several algorithms of deep learning. A survey made in research of deep learning and applications in various domains is presented in this paper as a means to learn the usage of deep learning in big data analytics.

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Literature Review on Optical Layer Protection Scheme

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ABSTRACT

Recent years have seen the flourishing of research in the area of survivability with the progress of the research relating to reduction of restoration-time, reducing the path length for longest path, design better structure and recover the single and multiple failures during the failure of networks. To achieve this, the developers need to know the type of failures and find the protection path in advance, so that the network failure recovery is achieved without delay. Many researchers have put great efforts and contributed in research fields of survivability. WDM loopback recovery, generalized Loopback recovery, star block design, survivability approaches under static traffic, optimal configuration of P-cycles and protection cycles in WDM are some of the related works found in the literature.

KEY WORDS: PATH PROTECTION, LINK PROTECTION, PAGE SEGMENT PROTECTION, P-CYCLE.

INTRODUCTION

In telecom systems, optical fibers are the first choice as transport medium for the advantages of Cost, Capacity (in the range of terabits per second), Reliability and Scalability. The only medium providing cost-effective high-bandwidth service, optical fibers are the default option today in backbone networks. Yet, only a small fraction of the full installed optical fiber capacity is utilized, mainly due to large mismatches between fiber capacity, peak electronic processing (PEP) and source rates. Wave-length-division multiplexing (WDM) and similar multiplexing techniques are designed for more efficient fiber capacity utilization. Nowadays, the major problem in networks is "loss of service". Various protection techniques (Shen H et al (1999)) are available to avert loss

of service. The three main types of protection scheme for optical fibers are Path protection, Link protection, and Path segment protection (Dongyun Zhou & Suresh Subramaniam (2000)).

Optical Layer Protection (OLP): The OLP scheme is classified based on link, path and segment protection. Rerouting established around end nodes of failed links is called link protection. A backup path is predetermined between source and destination nodes in path protection. Path Segment protection is a compromise between path protection and link protection (Eshoul, A. E., & Mouftah, H. T. (2008))

Problems in networks have been widely investigated under different traffic environments ((Chlamtac I et al (1993)) (Zhenghao Zhang and Yuanyuan Yang (2005))). During static traffic conditions, fixed paths describe routes through a data network, routes that the system administrator usually enters into the router. Without a routing protocol overhead, this traffic is easily configured. Sometimes, the network changes need to be manually reconfigured (when automatic rerouting cannot solve

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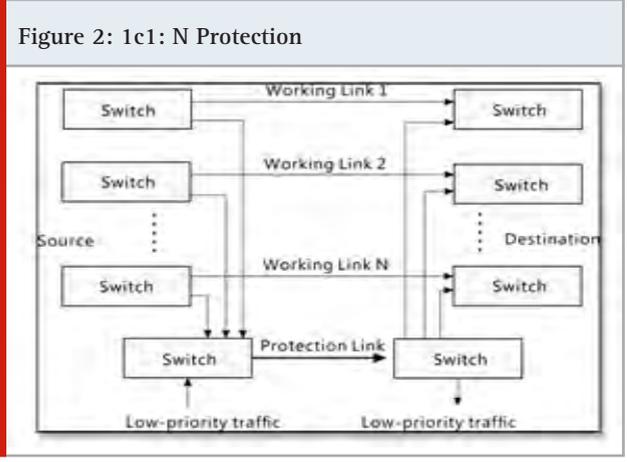
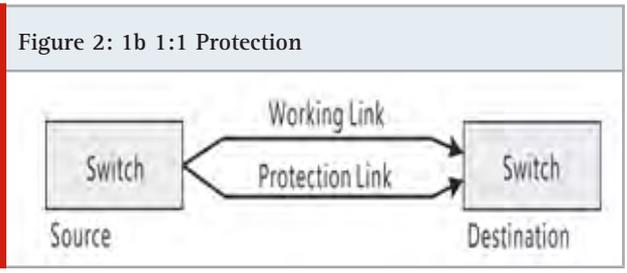
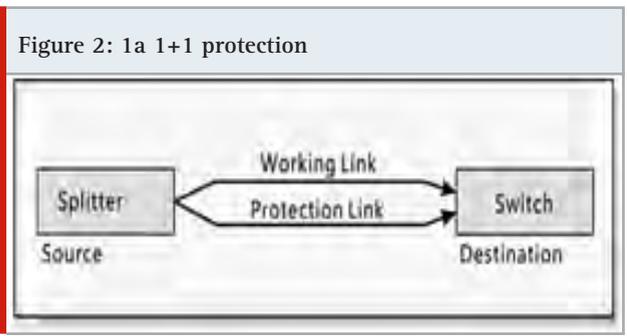


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network outages). Underdynamic traffic environment, connection requests depart and arrive at random times to the network.

2.1 Path Protection: The path protection method employs end-to-end detouring. The path protection schemes are 1+1, 1:1 and 1: N protections shown in Figure 2.1a, 2.1b, 2.1c (Guido Maier et.al (2002)).

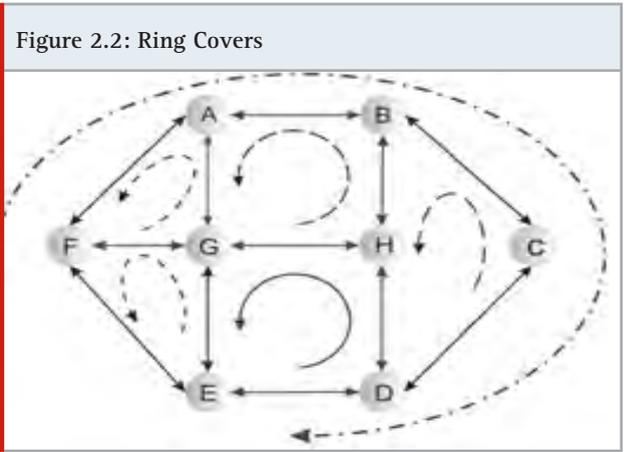
In 1+1 protection, the source transmits the data both by primary and backup paths. Whenever the fiber is cut, the route automatically switches over to another back fiber. This fast form of protection requires no protocol for signalling between source and destination. In 1:1 protection, the primary path is used for transmission. Whenever the link fails, source and destination nodes are switched over to respective backup paths. This requires signalling protocol. In 1: N protection, each N primary path has a single backup path.



2.2 Link Protection: When there is fiber cut, only failed links are replaced by backup paths with remaining light path links remaining unchanged. This type of recovery is local and fast. The entire backup paths are known in

advance and stored in the switch. These schemes are implemented into automatic protection switches. The local recovery protection is more suitable for complex topology. Figure 2.2 shows the link protection on mesh network (pre-planned protection). In link protection, the main approaches are loopback by ring and generalized loopback recovery (Rajiv Ramaswamy and Kumar N.Sivarajan (1998)).

2.3 Ring Covers: The first mesh-ring decomposition is at node cover. Each node in a network belongs to 1 or greater rings and any link belongs to 1 ring. However the node cover does not join all links, with a few unconnected links being present. Each node in a network belongs to one or more rings and any link belongs only to one ring. But the node cover does not connect all links, with some unconnected links being present. This is the main problem addressed by the node cover and solved by the ring cover technique. A family of directed cycles covering all the protection fibers needs to be identified, satisfying the condition of each protection fiber being used exactly once. Finding ring covers is simple in some planar topology, as the planar topology has f-1 inner faces and 1 outer face as shown in Figure 2.2. This method is used to identify the protection cycle in ring cover technique. This technique cannot be used for all types of topology; also, reconfiguration of the network is very difficult (Rachna Asthana R. & Singh, Y. N (2004)).

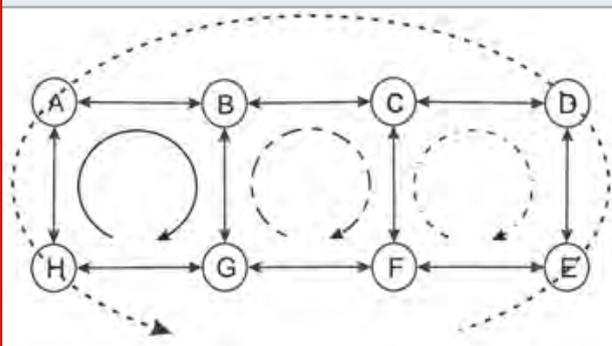


2.4 Double Cycle Cover: The alternative method of ring cover is Double Cycle Cover (Guido Maier et.al (2002)). Each link in a network appears exactly twice. The optimal double cycle cover can easily be found and solved in polynomial time for planar topology. The protection cycle is found for non-planar topology by using efficient heuristic algorithm (Zhang, Z and Acampora A (1994)). The protection cycles implemented are either fiber based or WDM based recovery (to reduce the redundancy of the link). The double cycle cover shown in Figure 2.3 has 8 nodes and 10 links. 4 rings are formed in Figure 2.3 using double cycle cover methods.

Figure 2.3 Double Cycle Cover: Ring1, Ring 2 and Ring3 are formed in clockwise direction and Ring 4 in anticlockwise direction. These are protection rings.

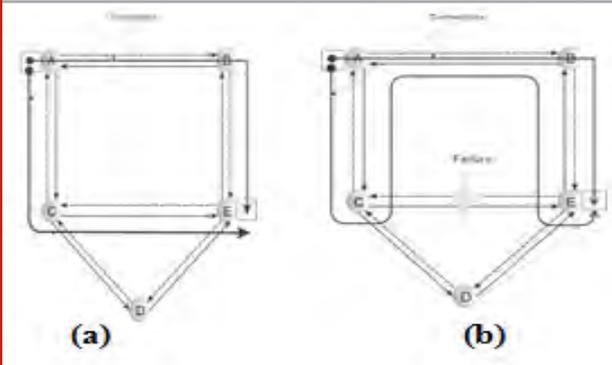
Whenever a fiber cut occurs, the path is changed to protection ring. So, formations of all the rings in the network have different delay and restoration times.

Figure 2.3: Double Cycle Cover



2.5 Generalized Loopback Recovery: The ring cover method is limited in scalability and is comparatively more expensive. Another approach more suitable for mesh topology known as Generalized Loopback Recovery is used. It has pairs of fiber links. The modelling of the graph is called conjugate digraphs. The working fiber is defined by clockwise direction and protection fiber by anticlockwise direction in a given network. These digraphs are calculated only once and named 'primary digraph' and 'backup digraph'. The protection cycles are found by using a heuristic algorithm from the backup digraph.

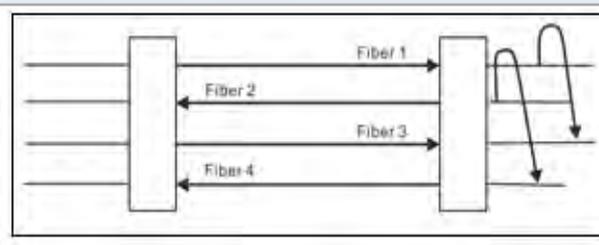
Figure 2.4: Generalized Loopback Recovery a) Before Failure b) After Failure



In Figure 2.4 ((Guido Maier et.al (2002)) & (Kalamani, K et.al (2006)), solid and broken lines represent the primary and backup digraphs respectively. Assume that link failures occur in nodes C and E. The traffic is diverted into backup digraph. The new path is found as shown in Figure 2.4. This method is very suitable for distributed control, uses network resources efficiently and is also scalable. The main disadvantage of GLBR is considering the overall network at the time of recovery for finding the backup path, which may result in long recovery paths. With fiber based protection, a backup fiber carries the entire traffic carried by the primary fiber 1. (Médard M et.al (2002)). The traffic is allowed in both directions in a network; it does not matter if the system is WDM based.

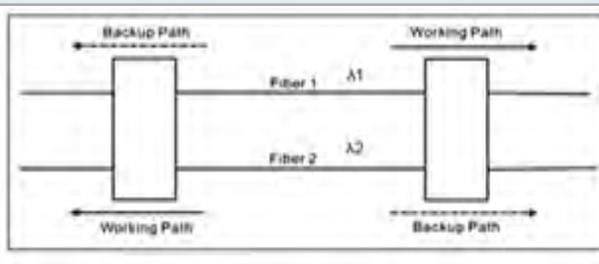
In generalized (fiber based) loopback recovery, a backup fiber carries the entire traffic carried by the primary fiber. Bi-directional traffic flow requires four fibers for fiber based restoration, as shown in Figure 2.5. Fibers 1 and fiber 2 are for carrying primary traffic; fiber 3 provides backup for fiber 1 and fiber 4 for fiber 2.

Figure 2.5: Fiber Based Recovery



When extended to WDM based loop back recovery, the protection paths of loop back recovery scheme – reserved at wavelength level – require only two fibers. WDM based recovery is shown in Figure 2.6. Fiber 1 carries primary traffic on λ_1 and fiber 2 on λ_2 . Backup is supplied through λ_1 on fiber 2 (for λ_1 on fiber 1) and by λ_2 on fiber 1 (for λ_2 on fiber 2). WDM based loopback recovery system's working on two fibers is its main advantage over fiber based system, which requires at least four fibers.

Figure 2.6: WDM Based Loop-back Recovery

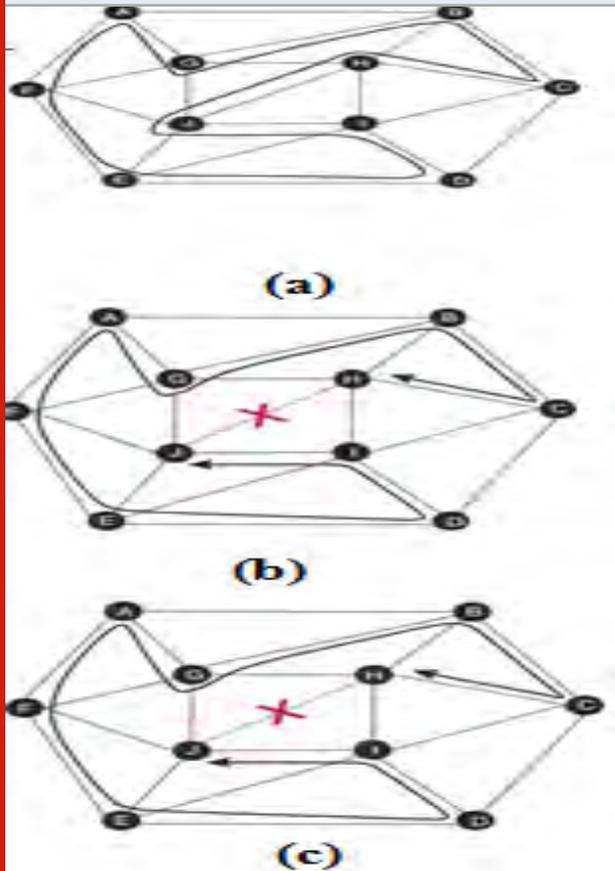


2.6 P-cycles: The P-cycle concept, introduced by Grover & Stamatelakis (1998) is characterized by preconfigured cycles in mesh networks. Ring protection mechanisms offer much faster recovery compared to mesh restoration mechanism. P-cycles, pre-connected closed structures of the network's spare capacity, provide protection to operating paths, which are in the form of P-cycle lightpaths in all optical networks. The P-cycle has two types of links: on-cycle span and straddling (chords) spans (Schupke, D et.al (2002)) as shown in Figure 2.7.

P-cycles (Pre-configured cycles), a few of the high-quality strategies for shared span protection, defend all on-cycle spans, at the same time as also straddling (chord) spans by way of combining the efficiency gain of mesh networks with the speed advantage of ring networks. Their mesh-like efficiency is because of the shared protection supplied with the aid of the P-cycle to all on-cycle spans and to straddling spans. The networks spare capacity is pre-related to form the

P-cycles. Consequently, cycles fulfil the requirements of efficiency and restoration speed. While providing complete solutions against single failures in networks, some issues still need to be addressed for enhancing their effectiveness.

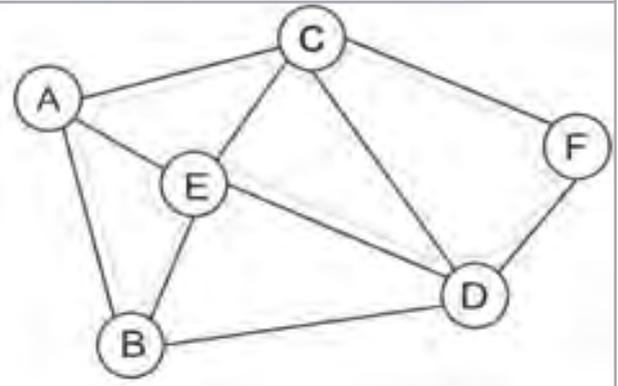
Figure 2.7: a) P-cycle b) On Cycle Failure c) Straddling Link Failure



Though recovery is very fast in ring-based networks, they are less efficient and less flexible than mesh-based networks. P-cycles have evolved from efforts to achieve ring-like speed combined with mesh-like efficiency and flexibility. A closed ring-like structure is formed by pre-connecting the spare capacity of the network, which now provides shared protection to all the on-cycle links while also straddling (chord links) the closed structures, called P-cycles. With the network's spare capacity pre-connected, just two switching actions (as in rings) at the end nodes of the failed link divert the traffic on the back-up path during any failure (Rachna Asthana et al (2010)).

2.6.1 Types of P-cycles: Types of P-cycles are named after their underlying architecture and the type of network protection offered. P-cycles generated based on architecture are Hamiltonian, Simple, Non-simple; based on type of protection are Span, Node encircling, path and flow P-cycles (Jaeger, F (1985)). In Hamiltonian P-cycle, the protection path passes through all nodes in a network only once as shown in Figure 2.8.

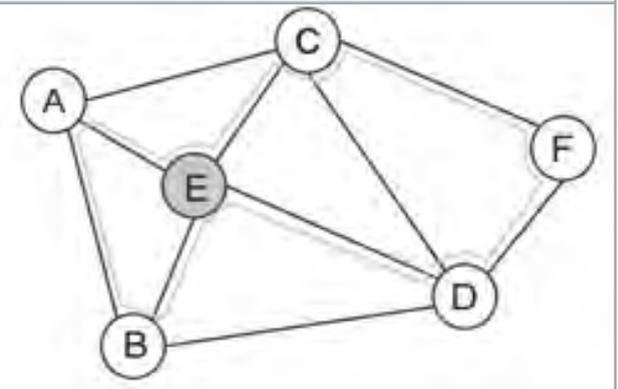
Figure 2.8: Hamiltonian P-cycles



In Simple P-cycle, protection paths need not pass through all nodes in the network and the nodes in a path are visited only once (Figure 2.7a). In Non-simple P-cycle, the protection path need not pass through all the nodes in the network and the nodes in a path are visited more than once (Figure 2.9).

Span P-cycle: It provides protection to span (Figure 2.7c)

Figure 2.9: Non Simple P-cycle



Node encircling P-cycle provides protection during node failure, passing through an adjacent node of a failed node rather than the failed node itself.

Path protecting P-cycle provides protection complete path between sender and receiver lying on P-cycle.

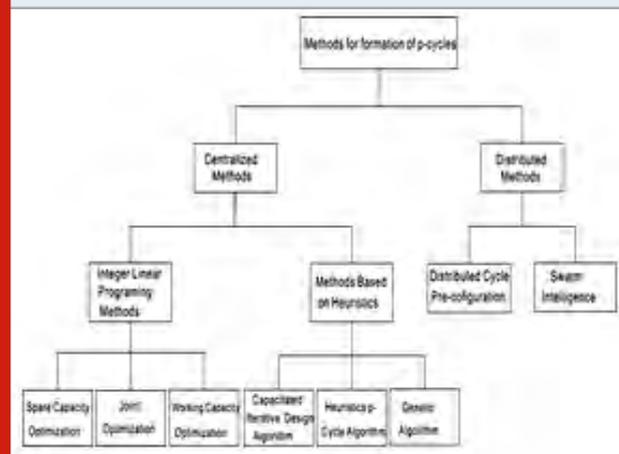
Flow P-cycle presents safety to finish path segment lying at the P-cycle.

2.6.2 Formation of P-cycles: P-cycles are either Centralized or decentralized as shown in Figure 2.10. The main requirements of P-cycles are demand and time.

Centralized Methods: In these methods, suitable large units of candidate-cycles is designed, one for each network graph. These are used to protect all spans' working capacities. The P-cycles, generated by using two

models – Integer Linear Programming and heuristics– are discussed below.

Figure 2.10: Design and Formation of P-cycle



Integer Linear Programming: These models are used for small or medium sized networks. Some techniques for creating P-cycle to protect the network under this model are described here. A spare capacity optimization is 100% supported for a single failure. All the working channels are protected and optimize the capacity of the P-cycle. The joint capacity optimization is ILP model and is optimized for the total network capacity, which includes spare and working capacities. The third ILP model is protected working capacity envelope optimization. This method follows some consideration of forming the P-cycles. It first determines the P-cycles and then optimizes them (Mohammad S et.al (2009)).

Heuristic Method: Based on efficiency ratios (ERs) of every possible unity P-cycles, it finds all the demands in a given network by using any efficient routing algorithms and lists all the unity cycles (called candidate cycles), then optimizes them using efficiency ratio. The highest ER ratio cycle is selected for the protection. However, this algorithm generates more backup capacity and hence increases redundancy ratio. A unity P-cycle can protect one working link in the opposite direction for every on-cycle span, two for every straddling span. Various methods are used for reducing the straddling protection link. Some algorithms consider one protection straddling link is a primary path and another for backup path to avoid node redundancy of the protection network. While inefficient compared to other types of P-cycles, the reducing straddling link heuristic method is fast and simple to create, and suitable for large sized networks (Zhenrong Zhang (2004)).

Distributed Method: It has two methods: Distributed Cycle Pre-configuration and Swarm intelligence. The first deals with problems of optimal logical configuration which contain physical capacities. Based on DCPC, the P-cycles, formed in distributed manner, are self-organized in the network's spare capacity with DCPC protocol. Whenever network changes occur, the algorithm is run each

time, creating optimal spare capacity based on Swarm Intelligent, which has high redundancy and is fully distributed, self-organized and adaptable. Like ant-like agents, it is simple to operate. All the management information is disseminated by agents with behaviours similar to those of ants, each agent operating almost independently from each other (Dongyun Zhou & Suresh Subramaniam (2000)).

2.7 Path Segment Protection: In Path Segment Protection method, which combines Path and Link protection segment Schemes (Rachna Asthana et.al (2010)), the segment path is protected. As the network can be divided into several segments and every segment has its own backup path. When there a segment fails, the traffic gets switched to backup paths, which are link disjoint paths, thus providing capacity efficiency superior to the link protection scheme. The backup paths in a segment are smaller than normal paths, so protection and restoration is very fast.

CONCLUSION

This work has provided a literature survey or review on optical layer protection scheme, P-cycle. The above study presents and explains an effective fault recovery system for optical networks. Analysis of general classification criteria indicates that the main safety and restoration strategies can be set for WDM networks. The complete work is based on the protection mechanism, viz. path, link and path segment protection. Based on the above mechanisms, there have been many developments based on much research.

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Study on Utility of AI/ML in UAS Based Cyber Physical Systems

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ABSTRACT

In the era of technology where Artificial Intelligence, Machine Learning, Cloud Computing, data science, deep learning any many more interconnected concepts are launched across the market to deliver facilities in each and every field. With each facility or service the key feature required is 'Security'. And these all services are majorly delivered over internet. Thus along with all these services the concept of cyber security is attached. The study of cyber security includes all the type of security from individual application security to the full system security and it can be enlarged to the whole domain security. The concept of Cyber physical system is to provide security to the whole domain with advance features. This CPS (abbreviation of Cyber Physical System) is an integration of computation with physical processes and feedback loops. CPS can be developed with very powerful framework which can even not be limited to a single domain, it allows for cross domain integration through modular processes. Thus, this system provides an opportunity to develop models and approaches to create systems that can garner maximum value for the society.[3] CPS are getting ubiquitous. There is higher adoption of this approach to design a system in areas like digital manufacturing, smart grid, medical devices, industrial applications which can be led by presence of wireless sensors and networks. This paper presents the study of frameworks of cyber physical systems which can be used in digital governance.

KEY WORDS: CYBER PHYSICAL SYSTEM, CYBER SECURITY.

INTRODUCTION

In the domain of digital electronics, the technology has took forward steps to significant increase in the number of systems merge the cyber-system with the physical world, which is known as cyber-physical-system. Cyber security is an overarching concern across all domains. Web 4.0 technologies like robotics, AI/ML, 3D printing has found applications across various domains. Next generation

CPS will be able to execute extraordinary tasks that are barely imagined today. These new capabilities will require high-confidence computing systems that can interact appropriately with humans and the physical world in dynamic environments and under unforeseen conditions. Achieving these capabilities presents a complex and multi-disciplinary engineering challenge ((Jamshidi, Mo et.al (2011))).

However structured model or framework is required to provide theoretical understanding of the emerging landscape. Latest technologies such as Edge Computing, FOG Computing are seems to provide strength to CPS. But in this integration the fidelity may be compromised if the components are not integrated into the whole. Thus, the design of CPS required reasoning along with complex functions, reliability, performance and unique

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challenges. Different existing surveys describe the holistic view of CPS. In this span, researchers have reached to Outline of CPS, Features, Challenges, applications, specifications, design, further research directions, system level requirements, characteristics and implementation principles (Gunes, Volkan et.al (2014)).

Thus, in total CPS are systems that integrate physical elements with cyber layer which can provide features such as sensing, monitoring and processing the data from physical components. Embedded computers and network perform monitoring and controlling in the processes of the system along with feedback loops where physical process affects computation and visa-versa (Shi, Jianhua et.al (2011)). In order to achieve this, UAV can be used as a platform which can fundamentally change the way CPSs are designed. It is applicable for military, civil, commercial applications and even in digital governance. Here, the requirement is raised to evolve a framework to develop CPS in digital governance (Sirasak Tepjit et.al (2019)).

Figure 1: CPS in various domains

Smart Manufacturing	• works on medium scale industry and optimizing productivity in the manufacture of goods or delivery of services
Emergency Response	• works on medium and large scale industry, system is used in handling the threats against public safety, and protecting nature and valuable infrastructures
Air Transportation	• works on large scale industry and it use to perform operation and traffic management of aircraft systems
Critical Infrastructure	• works on large scale industry and system handle the distribution of daily life supplies such as water, electricity, gas, oil etc...
Health Care and Medicine	• works on medium scale industry and system used to monitoring health conditions of the patients and taking necessary actions
Intelligent Transportation	• works on medium and large scale industry, it improving safety, coordination and services in traffic management with real-time information sharing
Robotic for Service	• works on small and medium scale industry, it use in performing services for the welfare of humans

I. CPS in Various Domains: There are number of research effort that address the domain such as smart manufacturing, Emergency Response, Air Transportation, critical infrastructure, health care and medicine, intelligent Transportation, and robotic for service. With respect to domain functionality, following figure provides an overview on the CPS applications. These all the domains can have applications based on advance technologies such as AI/ML, Cloud Computing, Blockchain, AR/VR and many more. The CPS integrated with these domains itself can be developed with the component of AI and ML which can provide extensive security to each and every element of the application (Mosterman, P.J et.la (2016)).

(A) Smart Manufacturing (SM): Smart manufacturing refers to the use of embedded software and hardware technologies to optimize productivity in the manufacture of goods or delivery of services. Smart factory is another frequently mentioned concept to refer to the next generation smart manufacturing. Smart manufacturing

is one of the leading CPS application domains because of drivers like mass production, domestic and international marketing, economic growth, etc.

(B) Emergency Response (ER): Emergency response refers to handling the threats against public safety, health, and welfare and protecting the nature, properties, and valuable infrastructures. CPS can provide fast emergency response via large number of sensor nodes in the regions in case of the natural or man-made disasters. However, this rapid response requires the nodes to collectively assess the situation and rapidly inform the central authority even in the frequently-changing environments. So robustness, effective resource utilization, adoptiveness, and timeliness come into play in this emergency response.

(C) Air Transportation (AT): Air transportation refers to any civil or military aviation systems and their traffic management. Smart air vehicles are expected to be predominant in the near future, especially for military service. The Unmanned Aerial Vehicle (UAV), commonly known as the drone, is just one of the well-known examples of smart air vehicles. Since physical-awareness is an important issue for the next generation air vehicles, CPSs are expected to make a profound impact on the future aviation and Air Traffic Management (ATM). Distributed control throughout the airspace is expected to become a substantial part of the next generation ATM systems. However, that would give rise to more scalability challenges since interactions between vehicles and infrastructure are becoming more complicated. Current capacity constraints at the major airports and airspace interactions between the airports and air vehicles in a multi-airport system limit the overall capacity of the system.

(D) Critical Infrastructure (CI): Critical infrastructure refers to valuable properties and public infrastructures that are necessary for the survival or welfare of the nations. The Smart Grid is one of the appealing applications in the critical infrastructure domain. The Smart Grid incorporates central/industrial power plants, energy storage and transmission facilities, renewable energy resources (such as wind farms and solar cells), and energy distribution and management facilities in smart homes/buildings. The Smart Grid describes the transformation from a centralized, producer-controlled network of electricity grid to a less centralized, more distributed, more cooperative, more responsive, and more consumer-interactive one by bringing future information and communication technologies and power system engineering together for grid modernization.

(E) Health Care and Medicine (HC&M): Health care and medicine refers to the issues addressing multiple aspects of the patient's physiology. A special attention is drawn to medical applications in CPS research since they provide significant research opportunities for the CPS community. These opportunities include, but are not limited to, technologies related to home care, assisted living, smart operating room, smart medical devices

(e.g. pace maker, medical ventilator, infusion pump etc.), and smart prescription. Current technological trends and challenges in the design of the Cyber-Physical Medical System (CPMS) are summarized in [70] along with promising research directions. These trends cover reliable software-based development to deliver new functionalities, increased connectivity of medical devices equipped with network interfaces, and demand for continuous patient monitoring (e.g. home care, assisted living, telemedicine, and sport-activity monitoring, etc.). Modeling and model-driven engineering will play an important role in the future CPMS development.

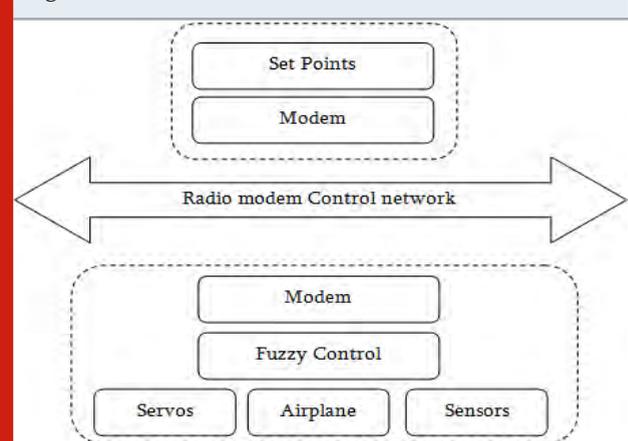
(F) Intelligent Transportation (IT): Intelligent transportation refers to the advanced technologies of sensing, communication, computation, and control mechanisms in transportation systems to improve safety, coordination, and services in traffic management with real-time information sharing. Intelligent transportation facilitates both ground and sea transportation through information sharing over satellites and provides communication environment among vehicles, the infrastructure, and passengers' portable devices. The Intelligent Transportation Systems (ITSS) integrate pedestrians, vehicles, sensors, road-side infrastructures, traffic management centers, satellites, and other transportation system components by adopting different variation of wireless communication technologies and standards.

Robotic for Service (RFS): Robotic for service refers to deploying intelligent robots to perform services for the welfare of humans, and the equipment in a fully autonomous, semi-autonomous, or remotely controlled manner, excluding manufacturing operations. Robotic for service is identified as one of the six disruptive civil technologies with potential impacts on the U.S. interests out to 2025. Robots can be deployed for several purposes, including but not limited to defense (e.g. Explosive disposal, surveillance in prohibited areas, etc.), environment monitoring and control, assisted living, logistics, and so on. Since the next generation robots are likely to have close interactions with humans in the physical environment of their operation, learning and interpretation of human activities by the robots comes into play as an important factor. From CPS perspective, integration of humans and smart robots is very important to enable all actors of CPSs to achieve better cooperation, collaboration, and organization to overcome complex duties (Chen, Hong. (2017)).

II. Network Control: Today, different processes or plants are controlled by a single computer. This is possible through the use of the concept of network control. However, the benefit of having a network is considerable, such as faster configuration of controllers. The solution also presents additional problems, due to constraints of the network. For example, packets of data can arrive at variable times, not in order, or not at all. As a consequence, new control algorithms to overcome these problems have been continuously developed during the past few years.

Network control systems definition: There are many definitions of Network Control Systems. "Network Control Systems (NCS) are spatially distributed systems in which communication between sensors, actuators and controllers occurs through a shared band limited digital communication network". This is complemented by Baillieul and Antsaklis, who state that "The universal feature of networked control systems is that the component elements are spatially distributed, and may operate in an asynchronous manner, but have their operation coordinated to achieve some overall objective".

Figure 2: hierarchical structure of NCS



Network control structure: The two general configurations in network control systems are direct structure and hierarchical structure. In the NCS direct structure, the advantage of such a configuration is the economy in cabling and remote commissioning of sensors and actuators. In the NCS hierarchical structure, the control network is used to coordinate two or more Level 1 controllers by a Level 2 unit.

NCS hierarchical structure for one UAV: The proposed structure is depicted in Figure 3. The structure shows at the bottom, the plant represented by the airplane including its sensors and actuators. Level 1 corresponds to the controller, which in our case is the autopilot. The autopilot is based on fuzzy control rules and adaptive control. On top of everything else, Level 2 generates the set points on the PC.

CONCLUSION

In conclusion, there are various domains where security is the primary concern and a dedicated system is required to emphasize the domain application. UAV based CPS applications can be integrated in domains such as Agriculture, forest and wildlife, urban development, healthcare, traffic management, homeland security, disaster management and mining. Indian UAV designs can integrate with advanced sensors and cameras. This system will embed network control structure, follows hierarchical structure. We need to define the system level characteristic in integrating UAS as a cyber-

physical system. In each component we can increase the computational operations at the edge level and provide autonomous functioning capabilities to reduce errors and increase system fidelity. This can be enhanced by use of AI/ML at each component level. To some extent UAS based systems have this aspect implemented in the form of automated flight control systems, obstacle avoidance, auto pilot, swarm operation capabilities etc. The application AI/ML enhances fidelity at the component level and at the system level and even at the system of systems level.

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Automatic Cassava Plantation using Bluetooth

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ABSTRACT

Agriculture plays a vital role in mankind's life. Among various crops, cassava – a tropical root crop, its production is major in South Indian states of India. Mostly farmers face the problem of insufficient labors. The cultivation rate also has been reduced due to this problem. Here the technological development plays its role majestically. The project is implemented to automate the process of cassava plantation, by reducing the manpower. The cassava stem is automatically fetched from a container and get planted into the soil. Thus, it will help the farmers for easy plantation of cassava with reduced labors and amount. In this project the implementation of the cassava plantation process by developing a product which automatic separation of an individual from a group and the stem enters into roller setup with a high force with the help of rack and pinion and it helps to plant the stem into the soil. The movement of the planter is controlled using an android application using Bluetooth and the current position of the planter is displayed and monitored using LED display. Thus, with reduced manpower and improved technology, the cassava plantation is automatically implemented.

KEY WORDS: AGRICULTURE, AUTOMATION, CASSAVA PLANTATION, BLUETOOTH.

INTRODUCTION

Cassava is similar to other tuber crops like sweet potato and yam. The cassava plant is a woody plant with erect stems and spirally arranged simple lobed leaves with petioles up to 30 cm in length. The edible roots of the plant are usually cylindrical and tapered and are white, brown, or reddish in colour (S.Annamalai and R.Vijayaraj (2019)). Cassava plant gives the 3rd highest yield of carbohydrates per cultivated area among crop plants, after for sugarcane and sugar beets. In tropics, cassava is the third most important source of calories, after rice

and maize. Cassava is originated in North-East Brazil and was introduced to India (Kerala) by the Portuguese in the 17th century. India occupies fifth place in cassava cultivation, the first four being Brazil, Zaire, Nigeria, and Indonesia. Thailand and India are the major cassava growing countries in Asia (P.Tamilarasu et.al (2017)).

In India Cassava is cultivated in an area of 0.21million hectares in India, with a total production of 7.74 million tons. It is cultivated mainly in Tamil Nadu, Andhra Pradesh, Karnataka, and Kerala. Tamil Nadu and Kerala account for about 80% of the total acreage of the crop in India (hadrack Kwadwo Amponsah et.al (2017)). Considering a 1-hectare commercial cassava plantation, it would be difficult for a single farmer to plant the whole land with cassava cultivars. If the proprietor wishes to finish the planting in a certain period, the production cost would be high since several laborers must be paid to do the job and because they are only estimating the distances between each cultivar, it may result to a low

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yield of cassava planted in an incorrect relative position (D.Manohar Jesudas et.al (2016)).

Objectives: The scope of the designed planter is to automate the process of the plantation of cassava with smart control. The main scope of the project is to reduce manpower and increase efficiency.

1. Reduce machine complexity
2. Reduces labor cost
3. Time consumption.

Existing Method: Many methods have been developed for automatic plantation of cassava stems, to make the farmers as well as the farming techniques easier (K.V. Hariharan et.al (2015)). In most of the existing methods, the techniques of converting the mechanical power of the moving machine into energy are used, so the cassava stakes are taken into the planter and using the converted energy the stakes should be cut into the stem of a particular length, according to the planter design the stems are planted into the cultivated soil as shown in Figure 1. In this existing machine, the power consumption is high and the size of the implemented planter should be of also complex (Shadrack Kwadwo Amponash et.al (2014)).

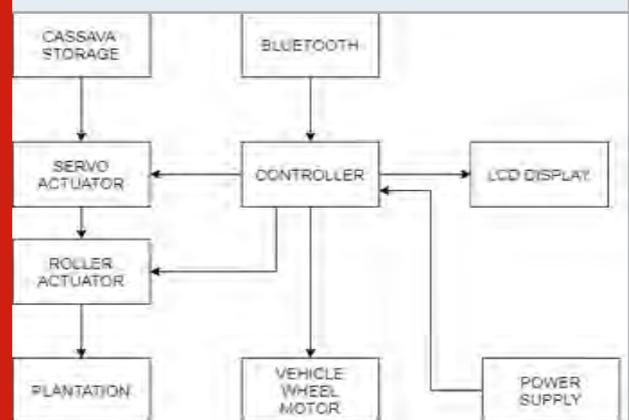
Figure 1: Existing Cassava Planter



METHODOLOGY

The cassava stems of required heights are loaded into the cassava storage container. Then the process of fetching the stem one by one at an appropriate delay of time is made with the help of rack and pinion arrangement. The controller mainly controls the function of motors, once the item is fetched it actuates the roller motor and deactivates the servo actuator mechanism. With the help of roller function, the stem gets planted into the cultivated soil. Now, at this time the controller activates the wheel motor movement and deactivates the roller functioning. According to the predefined distance between the stem, the process goes on until the farmer stops the process. Here, the Bluetooth, an interface for the farmer who can able to start, stop and control the movement of the planter with this smart control, and the visualization of controlled movement of the planter can also be made with the help of LCD display (N.Abdullahi et.al (2014)).

Figure 2: Block Diagram of Cassava Plantation



RESULTS

The cassava stem from the cassava stored container is picked individually by rack and pinion arrangement. After this etching process, the stem enters into the roller, and then it gets planted it to the soil. All the controlled actions of the servo actuator, roller motor, and wheel motor are carried out by the controller. Thus, finally, Bluetooth makes communication between the farmer and the planter. The movement of the planter has been monitored with the help of LCD.

Table 1. The output of the Proposed Work

Description	Output
Type of Planting	Single Bud
Plant to Plant distance	60 cms
Plantation per hour	90

Figure 3: Automated Cassava Planting Machine



CONCLUSION AND FUTURE SCOPE

Thus the designed single row automatic cassava planter is very convenient to the farmers, so that the manpower, cost of work, time, and fuel consumption is reduced. This equipment is very simple so that even an unprofessional man can also operate easily. In the future, this planter will be extended to plant two rows simultaneously and also implemented in solar-based IoT plantation.

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Abnormality Detection of Optic Disc Using Entropy Based Algorithm and Cnn

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ABSTRACT

Glaucoma is a group of eye diseases that can cause loss of vision and blindness by damaging a nerve in the back of your eye called the optic nerve. Glaucoma is the second leading cause of blindness. When the optic disc in the eye is damaged then it leads to disease called glaucoma. To detect this eye disease optic disc is segmented from the eye and checked for its abnormality. In this project the optic disc is segmented by using entropy based algorithm and the abnormality is checked by the usage of Convolutional neural network (CNN). The CNN is trained with 561 images and tested with 50 images. This approach which found to be effective with the expected speed and accuracy. The accuracy of the project is 94% by CNN.

KEY WORDS: DIABETIC RETINOPATHY(DR), RETINAL FUNDUS IMAGES, MICRO ANEURYSMS, EDGE DETECTION, MULTI SVM CLASSIFIER.

INTRODUCTION

The optic disc (OD) is one of the main physiological structures of the retinal eye, from which optic nerve and blood vessels spreads to surrounding area. The disease glaucoma is one of the leading causes of blindness for aged peoples. It can occur at any age group of people but is more common in older adults. In most cases, glaucoma is caused by higher-than-normal pressure inside the eye which is called as ocular hypertension. But sometimes glaucoma can occur even when pressure inside the eye named intraocular pressure is normal.

In 2010, 2.1 million (95% Uncertainty Interval (UI):1.9,2.6) people were blind, and 4.2 (95% UI:3.7,5.8) million were visually impaired because to glaucoma. These figures were lower in regions with younger populations (10%). From 1990 to 2010, the amount of blind or visually impaired thanks to glaucoma increased by 0.8 million (95%UI:0.7, 1.1) or 62% and by 2.3 million (95%UI:2.1,3.5) or 83%, respectively. Percentage of worldwide blindness caused by glaucoma increased between 1990 and 2010 from 4.4% (4.0,5.1) to 6.6%. Age-standardized prevalence of glaucoma related blindness and MSVI didn't differ markedly between world regions nor between women. The worldwide number of glaucoma blind increased by 0.8 million within the period from 1990 to 2010, although the age-standardized global prevalence of glaucoma related blindness in adults aged 50+ years decreased from 0.2% to 0.1%.

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The worldwide demographic transition with increasing population size, substantial increase within the average age in most regions and falling death rates quite outweighed the decrease within the prevalence of glaucoma related blindness in order that absolutely the numbers increased by 0.8 million or 62% from 1990 to 2010. the worldwide prevalence of glaucoma related MSVI increased from 0.2% to 0.3% from 1990 to 2010, resulting in marked increase within the absolute number of individuals visually impaired by glaucoma by 2.3 million or 83% within the same period. These figures show that, despite the relatively low percentage of glaucoma related blindness and MSVI on all causes of blindness and MSVI, an intensification of measures to deal with the growing number of individuals blind or visually impaired by glaucoma appears mandatory.

Finally, in 2010, 2.1 million people were blind and 4.2 million people were visually impaired because of glaucoma. the amount of individuals blind and visually impaired thanks to glaucoma increased by 0.8 million people or 62% and by 2.3 million people or 83%, respectively, within the period from 1990 to 2010. One out of 15 blind people was blind because of glaucoma, and one out of 45 visually impaired people was visually impaired thanks to glaucoma. The aim of the project is to provide an automated and suitable approach using image processing so that optic disc is located and its abnormality can be detected at early levels and further damage in the eye can be minimized. Even with treatment, about 15 percent of individuals with glaucoma become blind in a minimum of one eye within 20 years.

Literature Survey: (Bingui and Ren-Junshuai (2018)) discussed about optic disc localisation algorithm based on improved corner detection. In this paper, the location of the optic disk is done by two approaches namely Harris detection algorithm and fast corner extraction. First the pre-processing is done and clahe algorithm is used to enhance the contrast of retinal image then the fast corner extraction algorithm is used to detect the rough extraction of corner points mainly L-type but the image does not contain only L-type. It also contains X and Y type. Harris detection algorithm calculates the corner response function. The CRF value is calculated using the threshold value. After the corner points are determined the window is set up with the image in a centre and number of corner points in each image is counted. The window which has largest number of corner points is the position of optic disc.

In general, the detection accuracy of this algorithm is similar to that of most existing algorithms, but the detection efficiency is better. It proves the feasibility of corner detection algorithm in optic disc localization. (Fulong ren and Jinzhu yang (2017)) discussed about Automatic optic disc localization and segmentation

in retinal image by line operator and level sets. In this paper, optic disc localization is done by three successive processing steps- Optic disc size estimation, candidate region identification, accurate optic disc localization. In the candidate region identification it is based on optic disc features of brightness and vessel convergence.

In optic disc size estimation, the cup size, optic disc radius, optic disc size are calculated. In candidate region identification optic disc brightness feature is estimated because cup is the brightest path of fundus image. The red channel image is suitable for optic disc detection. A line operator evaluates the image brightness variation along multiple line segment of specific orientation that pass through blood vessel. The present work contributes to the more effective evaluation of the OD and realizing automatic screening system for early eye diseases to a large extent. In the future, a level set model integrated with ellipse shape will be considered to get more reliability and improvement for OD segmentation. (Muhammad Naseer Bajwa and Muhammad Imran Malik (2019)) discussed about two stage frame work for optic disc localization and glaucoma classification in fundus image using deep learning. In this paper optic disc localization is done using CNN. The model consists of three major modules: Region Proposal Network (RPN), CNN classifier, and Bounding Box Regression. Given an image for object detection RPN generates a number of random rectangular object proposals with associated objectness scores.

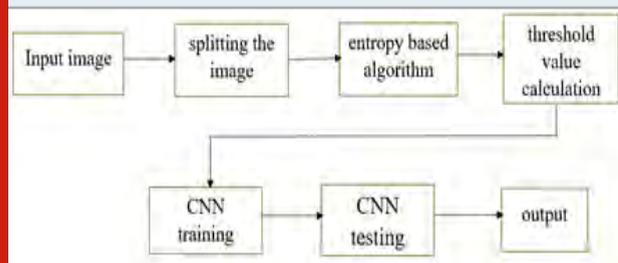
These proposals are fed to CNN that classifies whether a given object is present in the proposal. Then bounding box regression is performed to fit the rectangle closely to the object and provide precise location of the object in the image. The performance of this fully automated systems sets new state-of-the-art results in six out of seven publicly available datasets with IOU greater than 50%. (Ms. Bhaminee R Shetty (2017)) discussed about detection of diabetic retinopathy. In this project, microaneurysm segmentation is automatically done by using mathematical morphology. Exudates segmentation results are automatically performed by using max tree and attribute filtering to reduce noise and obtain exudates candidates.

The method improved previous researcher's methods. Feature extraction using exudates feature values, microaneurysm, entropy green channel, green channel homogeneity, the statistical value of saturation images (mean, standard deviation, kurtosis, skewness) can be used a reference for classification. Performance of support vector machine (SVM) was in excellent category with a sensitivity value of 96.9%, Specificity 100%, positive predictive value 100% and negative predictive value (NPV) (Hanan S. Alghamdi (2016)).

METHODS

In this project the input images of size 2240x1488 pixels. The optic disc is segmented by using entropy based algorithm and the abnormality is checked by the CNN.

Figure 1: Block diagram of proposed method



The algorithm for optic disc abnormality detection

Input: Retinal image

Output: Retinal image with marking the optic disc location

Step 1: Divide retinal image

Step 2: For each part compute the entropy value

Step 3: Pick the part with maximum value

Step 4: Calculate the threshold value to locate the optic disc

Step 5: Train the CNN with normal and abnormal optic disc

Step 6: Feed the retinal image from step 4 for evaluation

A. Entropy based algorithm: Entropy may be a statistical measure of randomness which will characterize the feel of the input image. Optical disc area has rich information, its entropy value is more significant in this area. So, optic disc area has highest entropy value (Imran Basit and Usman Akram (2016)). In this project the input retinal image is given as the input image. The input image is divided into two equal half- left and right, then the entropy value is calculated for each sides based upon its texture features. The portion of eye which has the optic disc has the highest entropy value and the other side has the lower entropy value. Hence based upon the entropy value the optic disc side is identified, then based upon the threshold value of the brightest path the optic disc is located.

In Image processing, entropy measure generates a value which represents new feature which will be exploited in image analysis like texture analysis. Low values of entropy visit smoothing texture, while texture with more details has higher entropy values. Thus, it is wont to generate a brand new feature to live the smoothing of the feel of images. As related, the blind spot area in fundus image contains more details like nerves and vessels passing through which means its texture isn't smooth, so it's expected that its entropy value would be

above other regions within the fundus image.

B. Optic disc localization: The centre surrounding pixels is applied to the brightest region in morphological processed image We applied 2-dimensional correlation coefficient (Equation. 1), to OD bright region. Thus, the pixels with the best intensity are selected as potential OD pixel candidates. The OD is finally located through the centroid of this set of pixels (Muhammad Nauman Zahoora (2018)).

A and B, are row and column values of morphological image m and n are matrices of the bright region which is same size of A and B.

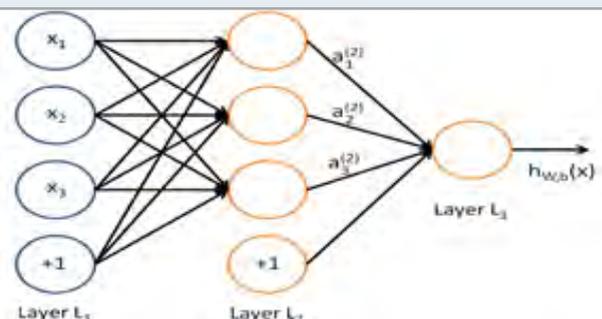
$A = \text{mean2}(A)$, and $B = \text{mean2}(B)$.

C. Convolution neural network

$$r = \frac{\sum m \sum n (A_m A_n - \bar{A})(B_m B_n - \bar{B})}{\sqrt{(\sum m \sum n (A_m A_n - \bar{A})^2)} \sqrt{(\sum m \sum n (B_m B_n - \bar{B})^2)}}$$

Convolutional neural network is the specialized kind of neural network that are very successful particularly at computer vision task such as recognizing objects, scenes, faces etc., LENET was the very first convolutional network which induced the field of deep learning. There they are mainly used for character recognition such as digits etc., since then epoching dwell method of convnets because of lack of competing power at the time.

Figure 2: Simple neuron structure

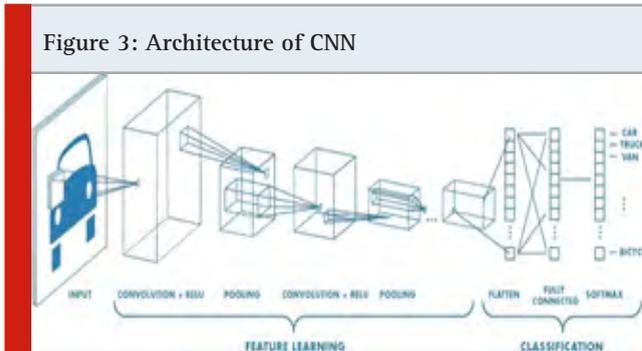


The fig. 2. shows the simple neuron structure. Convolutional neural network consists of five most important layers,

- Input layer
- Convolution layer
- Pooling layer
- Fully connected layer and
- Output layer

Fig. 3. shows the architecture of CNN. Technically, deep learning CNN models to train and test, each input image will pass it through a series of convolution layers with

filters, Pooling, fully connected layers (FC) and apply Softmax function to classify an object with probabilistic values between 0 and 1.



dimension of data by combining the outputs of neuron clusters at one layer into a single neuron in the next layer. Pooling may be max or min. Max pooling refers that it uses maximum value from each of a cluster of neurons at the prior layer. Minimum pooling refers that it uses the minimum value from each of a cluster of neurons at the prior layer.

(iv) Fully connected layer: Fully connected layer which connects all the inputs from one layer to every activation unit of the next layer. In the machine learning model, the last few layers are fully connected layers which compile the data extracted by previous layers to form the final output.

Table 1. structure of confusion matrix

Disorder True positive (TP)	No disorder False positive (FP)
Positive test result Negative test result	True negative (TN) False negative (FN)

(i) Input layer: It consists of several neurons where the input is based on the size of an image. This is the very first step which gives the initial data to the network for further processing. The nodes of the input layer is passive is that they do not modify the data. They receive the single value on their input and duplicate the value to their multiple outputs.

(ii) Convolution layer: Convnet name derived from the convolution operation. The primary purpose of convolution in the case of convent is to extract significance features an images. The convolution operation preserves spatial relation between pixels by learning image features. sIt is a mathematical process that takes two inputs like image matrix and a filter or kernel.

A convolutional layer within a neural network should have the subsequent attributes:

- Convolutional kernal defined by a width and height of an image.
- The depth of the convolution filter must be adequate to the amount channels of the input feature map.
- This layer which convolve the input and given it to the next stage for further processing. It learn the features as well as classify the data.

(iii) Pooling layer: This layer is mainly used to reduce the

C. CNN training

Training a neural network consists of two phases:

1. A forward phase, where the input is passed completely through the network.
2. A backward phase, where gradients are backpropagated (backprop) and weights are updated

There also are two major implementation-specific ideas we'll use:

- During the forward phase, each layer will cache any data are need for the backward phase. This implies that any backward phase must be preceded by a corresponding forward phase.
- During the backward phase, each layer will receive a gradient and return a gradient. It will receive the gradient of loss with reference to its outputs ($\partial L / \partial out$) and return the gradient of loss with reference to its inputs ($\partial L / \partial in$).

These two ideas will help keep our training implementation clean and arranged (Kavitha N S (2019)).

D. Feature extraction

In general, Positive = identified and negative = rejected. Therefore:

- True positive = correctly identified
- False positive = incorrectly identified
- True negative = correctly rejected
- False negative = incorrectly rejected

Confusion matrix: Consider a gaggle with P positive instances and N negative instances of some condition. The four outcomes can be formulated in a 2x2 contingency table or confusion matrix as shown.

Sensitivity: Sensitivity refers to the test's ability to properly detect ill patients who do have the condition. It is also called as true positive rate, the recall, or probability of detection. Mathematically, this can be expressed as:

$$\text{sensitivity} = \frac{\text{number of true positives}}{(\text{number of true positives} + \text{number of false negatives})}$$

Sensitivity= Probability of positive test given that patient have the disease

Specificity: Specificity relates to the test’s ability to properly reject healthy patients without a condition. Specificity of a test is that the proportion of healthy patients known not to have the disease, who will test negative for it. It is also called the true negative rate. Mathematically, this can also be written as:

$$\text{specificity} = \frac{\text{number of true negatives}}{(\text{number of true negatives} + \text{number of false positives})}$$

Accuracy

The accuracy may be a measure of the degree of closeness of a measured or calculated value to its actual value.

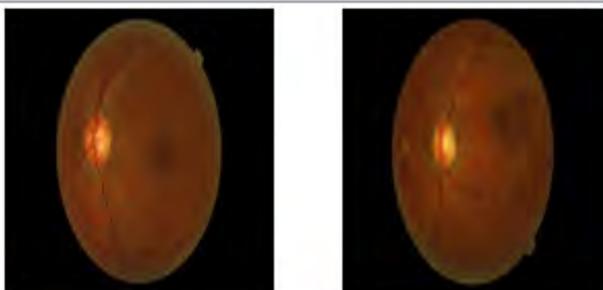
$$\text{Accuracy} = \frac{\text{number of correct predictions}}{\text{Total number of predictions}}$$

Validation and Experimental Results:

A. Data set information: Drishti-GS contains 101 images and messidor contains 460 images. In total 561 images which is used for training. The optic disc of the image is cropped in the dimension of 100x100 and it is trained in CNN for the detection of the abnormality. DRHAGIS fundus image dataset contains 40 images and high resolution fundus image dataset contains 45 images. In total 85 images out of that 50 images are taken and tested (Lakshmi Balasubramanium (2015)).

B. Evaluations: When the training of the CNN is completed an input image from testing dataset is given for the detection of optic disc and check its abnormality. The size of input image is 100x100. The input image (a) and (b) is taken from data set. Fig.5. shows the images of the human eye (Manoj Kakarla (2016)).

Figure 5: Images of human eye



(a) Normal eye

(b) Affected eye

1) Splitting the image: The input image is divided into two parts so that the optic disc is easy to identify.

Figure 6: Splitted image of human eye



(a) splitted image of normal eye



(b) splitted image of affected eye

2) Entropy value calculation: The entropy value is calculated for each side of the image. The side which has the highest entropy value is identified and it is said that optic disc is located in that side.

- Entropy value of left part is 5.2399
- Entropy value of right part is 4.9262

Hence the left part has the highest value so the optic disc is located on left side

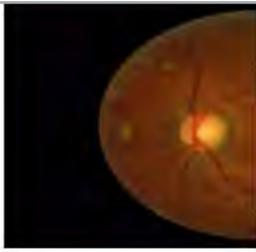
Figure 7: Entropy value calculated images



(a) Entropy value calculation for normal eye

- Entropy value of left part is 5.3346
- Entropy value of right part is 5.0026

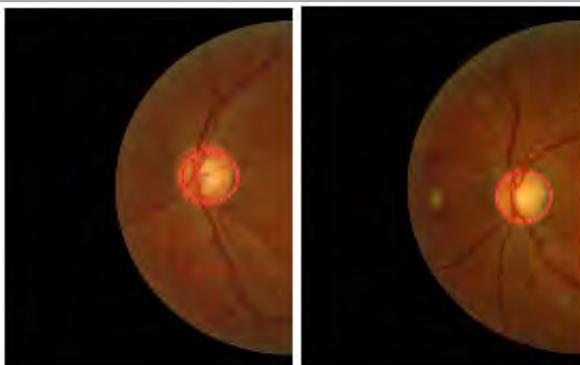
Hence the left part has the highest value so the optic disc is located on left side.



(b) Entropy value calculation for affected eye

3) **Localization of optic disc:** After identifying the optic disc side in the image the optic disc is located by using the threshold value of the brightest part in the image.

Figure 8: Localization of optic disc of human eye



(a) (b)

(a) localization of optic disc of normal eye

(b) localization of optic disc of affected eye

Figure 9: Training process in CNN

Epochs	TRAINING Loss	VALID-LOSS (cross-entropy)	VALID-ACCURACY Score	VALID-ACCURACY Accuracy	Mean Validation F1-Score
1	2.17	0.172	0.5049	0.000000	0.000000
2	3.02	0.102	0.5719	0.000000	0.000000
3	3.00	0.173	0.5550	0.000000	0.000000
4	3.00	0.203	0.4990	0.000000	0.000000
5	3.00	0.228	0.5100	0.000000	0.000000
6	3.00	4.005	0.3327	0.000000	0.000000
7	3.00	0.794	0.5159	0.000000	0.000000
8	3.00	5.47	0.4394	0.000000	0.000000
9	3.00	0.261	0.4070	0.000000	0.000000
10	4.00	7.39	0.4857	0.000000	0.000000
11	3.00	0.284	0.5740	0.000000	0.000000
12	4.00	3.003	0.5060	0.000000	0.000000
13	3.00	12.05	0.4483	0.000000	0.000000
14	3.00	1.019	0.5830	0.000000	0.000000
15	3.00	14.33	0.3293	0.000000	0.000000
16	3.00	1.007	0.2259	0.000000	0.000000
17	4.00	0.201	0.5100	0.000000	0.000000
18	3.000	1.004	0.5114	0.000000	0.000000
19	3.000	1.006	0.4960	0.000000	0.000000
20	3.000	1.002	0.5000	0.000000	0.000000
21	3.000	2.002	0.5457	0.000000	0.000000
22	3.000	2.001	0.5000	0.000000	0.000000
23	3.000	2.000	0.5000	0.000000	0.000000
24	3.000	2.000	0.5000	0.000000	0.000000
25	3.000	2.000	0.5000	0.000000	0.000000
26	3.000	2.000	0.5000	0.000000	0.000000
27	3.000	2.000	0.5000	0.000000	0.000000
28	3.000	2.000	0.5000	0.000000	0.000000
29	3.000	2.000	0.5000	0.000000	0.000000
30	3.000	2.000	0.5000	0.000000	0.000000
31	3.000	2.000	0.5000	0.000000	0.000000
32	3.000	2.000	0.5000	0.000000	0.000000
33	3.000	2.000	0.5000	0.000000	0.000000
34	3.000	2.000	0.5000	0.000000	0.000000
35	3.000	2.000	0.5000	0.000000	0.000000
36	3.000	2.000	0.5000	0.000000	0.000000
37	3.000	2.000	0.5000	0.000000	0.000000
38	3.000	2.000	0.5000	0.000000	0.000000
39	3.000	2.000	0.5000	0.000000	0.000000
40	3.000	2.000	0.5000	0.000000	0.000000
41	3.000	2.000	0.5000	0.000000	0.000000
42	3.000	2.000	0.5000	0.000000	0.000000
43	3.000	2.000	0.5000	0.000000	0.000000
44	3.000	2.000	0.5000	0.000000	0.000000
45	3.000	2.000	0.5000	0.000000	0.000000
46	3.000	2.000	0.5000	0.000000	0.000000
47	3.000	2.000	0.5000	0.000000	0.000000
48	3.000	2.000	0.5000	0.000000	0.000000
49	3.000	2.000	0.5000	0.000000	0.000000
50	3.000	2.000	0.5000	0.000000	0.000000

(a) Training during normal eye

Epochs	TRAINING Loss	VALID-LOSS (cross-entropy)	VALID-ACCURACY Score	VALID-ACCURACY Accuracy	Mean Validation F1-Score
1	2.17	0.172	0.5049	0.000000	0.000000
2	3.02	0.102	0.5719	0.000000	0.000000
3	3.00	0.173	0.5550	0.000000	0.000000
4	3.00	0.203	0.4990	0.000000	0.000000
5	3.00	0.228	0.5100	0.000000	0.000000
6	3.00	4.005	0.3327	0.000000	0.000000
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8	3.00	5.47	0.4394	0.000000	0.000000
9	3.00	0.261	0.4070	0.000000	0.000000
10	4.00	7.39	0.4857	0.000000	0.000000
11	3.00	0.284	0.5740	0.000000	0.000000
12	4.00	3.003	0.5060	0.000000	0.000000
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28	3.000	2.000	0.5000	0.000000	0.000000
29	3.000	2.000	0.5000	0.000000	0.000000
30	3.000	2.000	0.5000	0.000000	0.000000
31	3.000	2.000	0.5000	0.000000	0.000000
32	3.000	2.000	0.5000	0.000000	0.000000
33	3.000	2.000	0.5000	0.000000	0.000000
34	3.000	2.000	0.5000	0.000000	0.000000
35	3.000	2.000	0.5000	0.000000	0.000000
36	3.000	2.000	0.5000	0.000000	0.000000
37	3.000	2.000	0.5000	0.000000	0.000000
38	3.000	2.000	0.5000	0.000000	0.000000
39	3.000	2.000	0.5000	0.000000	0.000000
40	3.000	2.000	0.5000	0.000000	0.000000
41	3.000	2.000	0.5000	0.000000	0.000000
42	3.000	2.000	0.5000	0.000000	0.000000
43	3.000	2.000	0.5000	0.000000	0.000000
44	3.000	2.000	0.5000	0.000000	0.000000
45	3.000	2.000	0.5000	0.000000	0.000000
46	3.000	2.000	0.5000	0.000000	0.000000
47	3.000	2.000	0.5000	0.000000	0.000000
48	3.000	2.000	0.5000	0.000000	0.000000
49	3.000	2.000	0.5000	0.000000	0.000000
50	3.000	2.000	0.5000	0.000000	0.000000

(b) Training during affected eye

4) **Training in cnn:** The normal and affected optic disc images are trained in CNN. Based on these features an image is tested in CNN for its abnormality.

5) **Testing in cnn:** The located optic disc is checked for its abnormality in CNN by the help of trained image in CNN. The optic disc is considered as normal as it does not contain any damages in optic nerve or any small grown blood vessels in it. The optic disc is considered as abnormal as it does not contain some damages in optic nerve or any small grown blood vessels in it. Then the message box is displayed as normal or affected.

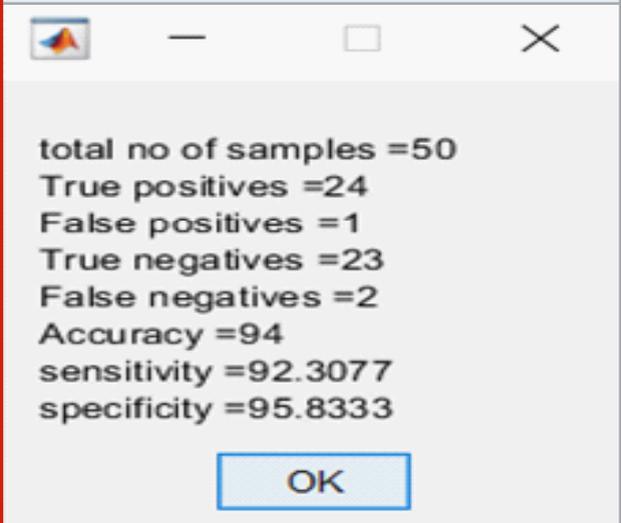
Figure 10: Result of normal eye



Figure 11: Result of affected eye



Figure 12: Parameters of the experiment



6) Experimental results: The entropy based algorithm and CNN is used for the abnormality detection of optic disc. Entropy based algorithm finds the optic disc segment and based upon its threshold value optic disc is identified. Then the CNN classifies the image as normal eye or affected eye based on optic disc abnormalities present in retina. By using this result the diseased eye can be easily detected and cured at early stage. The parameters of the overall performance is displayed in the message box.

The CNN is trained with 561 images taken from Drishti-GS dataset and messidor dataset. Then 50 images are randomly picked from the DRHAGIS fundus image dataset and high resolution fundus image dataset. 47 images out of 50 images gives the exact result. Thus, the accuracy of the project is 94%.

CONCLUSION

Automated Optic Disc abnormality Detection in Fundus Images is a challenging task and essential tool to assist the eye specialists because there is a large number of people with optic disc abnormality. This paper proposed automatic optic disc detection and check for its abnormality based on the entropy based algorithm and CNN. This helps doctors to cure patients at the earlier stage and prevents further eye damages. the accuracy of the project is 94%.

Future Enhancement: In the future work, the accuracy can also be increased by improving the performance of the data or even the algorithm for detecting optic disc can be varied. In addition, this system can be used to detect other retinal diseases.

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Certain Investigation on Palm Vein based Authenticating System

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ABSTRACT

In recent days, efforts taken on securing data or information is been major field of research. Biometrics doesn't limit in securing data, it also supports in authenticating individuals in financial, banking sectors. Palm vein pattern-based authentication system is one among such securing method. Reliability on biometric security is very much accepted than any other method of guarding data. In this paper, a three-stage process is proposed, which includes, palm vein image enhancement, segmentation and classification. For image enhancement Contrast Limited Adaptive Histogram Equalization was used with Gabor filter. The next level involves mathematical morphological segmentation followed by Support Vector Machine with Radial Basis Function classifier for categorization which supports in authentication. This SVM-RBF classifier achieves 0.0139% of Equal Error Rate which demonstrates as outperforming percentage of result comparatively.

KEY WORDS: VEIN RECOGNITION, SUPPORT VECTOR MACHINE - RADIAL BASIS FUNCTION, GABOR FILTER, GRAY LEVEL CO-OCCURRENCE MATRIX, CONTRAST LIMITED ADAPTIVE HISTOGRAM EQUALIZATION, MATHEMATICAL MORPHOLOGY.

INTRODUCTION

The growing demand for securing and authenticating with finger vein or palm vein supports in various aspects of developing field. Various methods had been proposed for securing the palm vein image patterns obtained as there are issues of spoofing, which leads vulnerable effects. These drawbacks don't limit in depending on the palm vein pattern of authentication. This majorly depends on the principle of Infrared absorption. The IR light passed through Palm penetrates through the vein

and are captured as images by the sensors placed on the opposite side of the palm. These palm vein pattern obtained are unique in nature and thus supports for authenticating and identifying individuals. These images obtained are considered for the process of enhancement as these patterns cannot be counterfeited and duplication of patterns can be avoided. The texture features involving contrast correlation, energy and homogeneity are considered for authenticating the palm vein of human with Support Vector Machine classifier (G. Lalli, et.al (2014)).

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application of three algorithms with Euclidian distance comparison, the final result was achieved (M. Pan and W. Kang (2011)).

Yingbo Zhou et al proposed two approaches for achieving improved results. This approach works well even though there is common potential deformation like rotational, scaling and translation. The improvement in the performance was recognized, verified and analyzed on larger databases. The robustness and superiority with hessian phase for palm vein feature extraction and analyzing the eigen values was achieved (Y. Zhou and A. Kumar (2011)). Selma Elnasir et al proposed palm vein recognition system based on Linear Discrimination Analysis and two-dimensional Discrete Wavelet Transformations. Performance analysis was done with Equal Error Rate on PolyU dataset.

The database images were extracted with the wavelength of 850nm shows a better result when compared with Gabor filtered images (S. Elnasir and S. M. Shamsuddin (2014)). Yi-Bo Zhang et al focused-on image registration with a low-cost CCD camera and near infrared source. The system includes capturing of Infrared palm images, Region of Interest extraction, multiscale filtering for palm vein extraction and matching. Recognition rate was found to be good but not suitable for real time datasets (Y.-B. Zhang et.al (2007)). Junwen Sun et al proposed the curvelet transformation for frequency domain conversion and Gabor filter for extracting vein patterns. For palm vein verification, score level fusion scheme was proposed and it was applied on Hong Kong PolyU Database which results in Equal Error Rate of 0.1023% (J. Sun and W. Abdulla (2013)).

3. Palm Vein Based Authenticating System: The block diagram for palm vein authenticating system is shown in Figure 1. The image is acquired using Near Infra-Red (NIR) source with the range of 720 nanometer and a scanner kept on both the sides of palm. The image obtained is further filtered and processed using Gabor filter and Contrast Limited adaptive Histogram Equalization (CLAHE) algorithm. The required part of the image is taken by considering the Region of Interest algorithm.

A. Algorithm for ROI Extraction

Step 1: Binarise the image with 0.4 threshold.

Step 2: Get the row and column size of image.

Step 3: Initiate for loop with range i=1 to row.

Step 4: Initiate a nested loop with range j=1 to column.

Step 5: Initiate a conditional if statement that $\text{bwimage}(i,j) \neq 0$. Once the value is not equal to zero, the j value terminates the loop and i value increases by one.

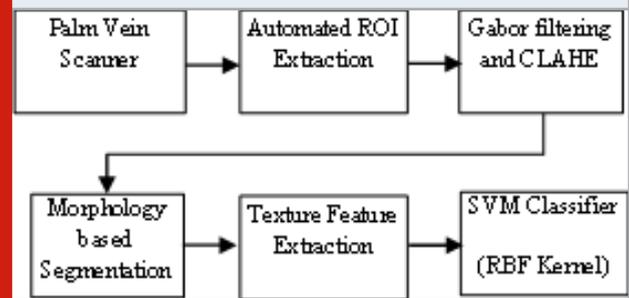
Step 6: Whenever i value increases, the previous value of i and j are stored in an array.

Step 7: The loop continues till i value equals to the value of row.

Step 8: The stored values are taken for cropping the Region of Interest.

Step 9: The Region of Interest image is finally stored in drive and further preceded for

Figure 1: Block diagram of the palm vein based authenticating System.



Gray Level Co-occurrence Matrix (GLCM) is used to extract certain features such as contrast, correlation, energy and homogeneity. The extracted features are classified as required using Support Vector Machine with modified kernel of Radial Basis Function.

B. Gabor Filtering: Gabor filter is one among wavelet that can be designed with parameters like frequency, direction, spatial position and phase. Required features on the pattern of palm vein obtained are extracted by Gabor filter of different orientation and frequency. Gabor filter is a type of linear filters generally applied for texture analysis in the image processing domain which analyzes specific frequency content along specific direction in a required region among the region of analysis. These Gabor filters suits mainly for discrimination and texture representation two-dimensional function of Gabor filter is given as follows.

$$g = \exp\left(-\frac{x'^2 + \gamma^2 x'^2}{2\sigma^2}\right) \exp\left(i\left(2\pi\frac{x'}{\lambda} + \phi\right)\right)$$

$$g_{rc} = \exp\left(-\frac{x + \gamma y}{2\sigma^2}\right) \cos\left(i\left(2\pi\frac{x}{\lambda} + \phi\right)\right)$$

Where

$$x' = x \cos \theta + y \sin \theta,$$

$$y' = -x \sin \theta + y \cos \theta$$

Figure 2: Input Palm Vein Image

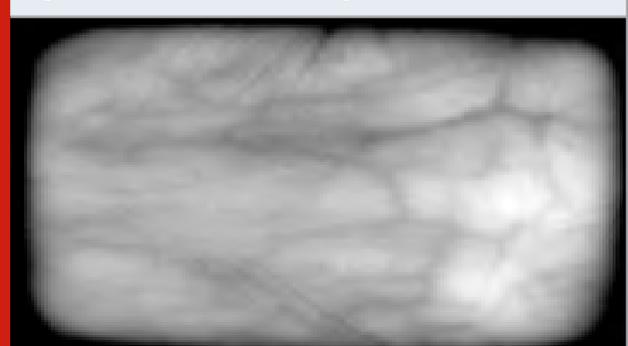
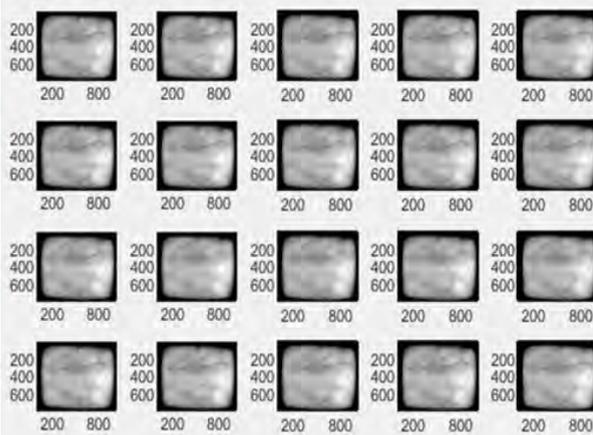


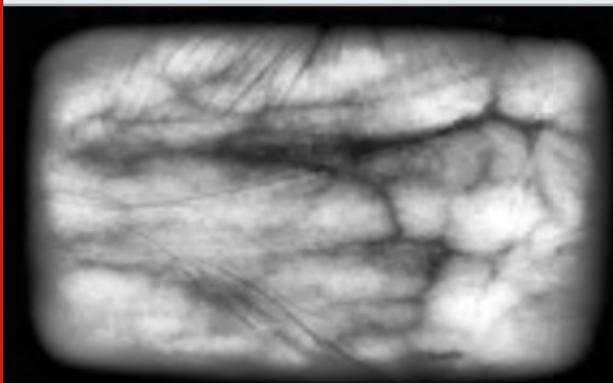
Figure 3: Gabor results for different values of theta



The acquired palm vein image is shown in Figure 2 and the Gabor filtered results for various theta values are obtained and shown in Figure 3. Nearly twenty iterations were considered for the next level of Contrast Limited Adaptive Histogram Equalization.

C. Adaptive Histogram Equalization: The local contrast and edge definitions of images were improved and enhanced by Adaptive Histogram Equalization. Twenty iterations taken with Gabor filter is considered and the best iterated image with clear information is processed with Contrast Limited Adaptive Histogram Equalization (R. del Proyecto (2011)) and (K. Siranjeevi (2014)) and (Dharmadhikari, A. P., & Ganorkar, S. R. (2014)) and (H. Liu et.al (2018)).

Figure 4: Image after contrast limited adaptive histogram equalization



The noise amplified along with the enhanced detail of the images can be avoided by considering Contrast Limited Adaptive Histogram Equalization. The adaptive histogram equalization image is shown in Figure 4.

Canny edge detection algorithm is used for extracting the edges of required vein pattern. The Figure 5 shows Edge extracted image of Contrast Limited Adaptive Histogram Equalized output. The required pattern of vein is alone considered for the purpose of authentication while the remaining regions or patterns obtained is considered as

noise for the process of securing information ((Y. Lu, et.al (2019)) and (H. Qin and M. A. El-Yacoubi (2017)) and (L. Yang et.al (2018)) and (G. Lalli et.la (2014)) and (L. Yang et.al (2019))). These noise which is considered as the unwanted patterns for authentication can be removed by the next step of process which is morphological segmentation.

Figure 5: Edge extracted image of contrast limited adaptive histogram equalized output



Figure 6: Edge enhancement by using morphological dilation



D. Morphological Segmentation: Morphological erosion and dilation in twelve direction are proceeded to acquire the enhanced image with smoothed output. The output of all twelve directions are summed up to obtain the required result [7]. Further to get more smoothed image gaussian filter of five-pixel width is used. As stated above the unwanted pattern of information in the image is removed by the process of morphological segmentation is shown in Figure 6. Further filtrations are done by fixing a threshold (G. Lalli et.al (2014)) value as below which the values obtained were removed and the complementary image is obtained as shown in Figure 7.

E. Gray Level Co-occurrence Matrix: Gray level co-occurrence matrix is only suitable for gray scale images. The image is in a gray scale format and therefore no further conversion is required (P. Hidayatullah, and M. Zuhdi (2015)). This process includes the formation of

gray value-based co-occurrence matrix which involves combining pair of pixel values and performs remapping to form a new matrix [8-10]. For examining the textures, a statistical method considering the pixel with spatial relationship is the gray level co-occurrence matrix(A. Müller et.al (2012)) . Among various texture features, contrast, correlation, energy and homogeneity were considered for feature extraction on palm vein pattern and sample feature values for 24 images are shown in Table 1.

Figure 7: Extracted palm vein pattern by using mathematical morphology-based segmentation

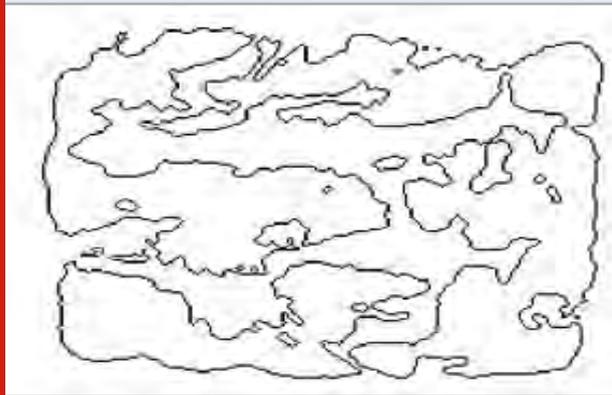


Table 1. Feature values of 24 sample images from properties of Gray Level Co-occurrence Matrix

Features/ Image	Contrast	Correlation	Energy	Homogeneity
Vein001	3.47948	0.282442	0.850482	5.409363
Vein002	3.49308	0.288765	0.855317	5.372027
Vein003	3.47646	0.267889	0.839149	5.428419
Vein004	3.473	0.271898	0.849983	5.437576
Vein005	3.49202	0.287511	0.843777	5.329944
Vein006	3.50952	0.301662	0.856767	5.323143
Vein007	3.46934	0.277218	0.814045	5.334894
Vein008	3.44966	0.268001	0.803422	5.364287
Vein009	3.44982	0.287127	0.807465	5.437981
Vein010	3.47414	0.293332	0.834418	5.376698
Vein011	3.45918	0.278267	0.82028	5.38672
Vein012	3.4666	0.293843	0.829299	5.388418
Vein013	3.54198	0.359493	0.903462	5.292449
Vein014	3.56152	0.361467	0.919659	5.259142
Vein015	3.57904	0.324008	0.954208	5.27446
Vein016	3.57204	0.322816	0.95374	5.297149
Vein017	3.57216	0.287353	0.961455	5.363584
Vein018	3.48492	0.270684	0.857337	5.38694
Vein019	3.52358	0.260894	0.900614	5.376583
Vein020	3.5227	0.301534	0.908802	5.390625
Vein021	3.51686	0.312782	0.878182	5.344828
Vein022	3.50416	0.311523	0.87829	5.43223
Vein023	3.47386	0.227223	0.858543	5.458907
Vein024	3.46946	0.308376	0.836995	5.388024

Table 2. Equal Error Rate of various approaches

Approaches	EER rate
Selma Elnasir	0.568%
Junwen Sun	0.1023%
Support Vector Machine	0.0453%
SVM-RBF	0.0139%

Figure 8: Classification of palm vein image using gray level co-occurrence matrix features with support vector machine classifier

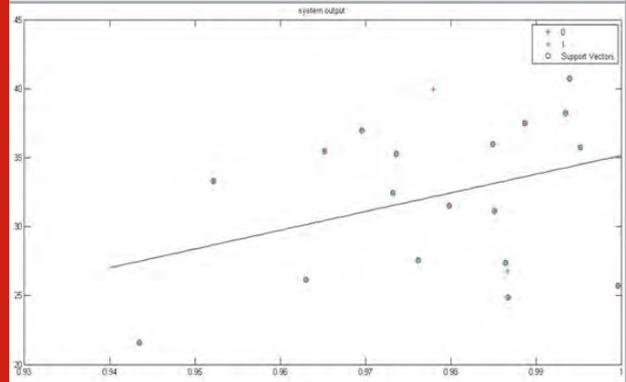
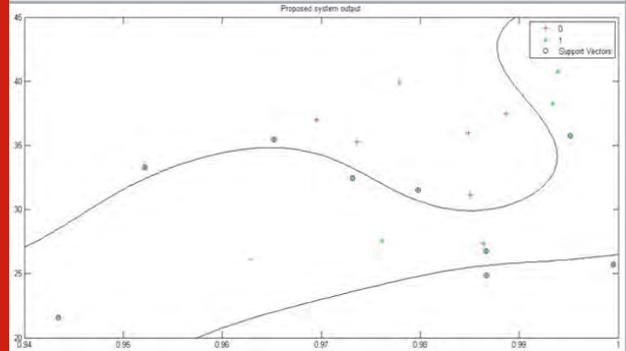


Figure 9: Classification of palm vein image with support vector machine classifier with radial basis function modified kernel



F. Support Vector Machine with Radial Basis Function

Kernel Classification: The kernel point depending on the distance from the origin with Radial Basis Function is considered for Support Vector Machine models ((N. B. Prakash et.al (2014)) and (Algeria, N et.al (2018))). The classification of palm vein image using Gray Level Co-Occurrence Matrix features with Support Vector Machine classifier and Support Vector Machine Classifier with Radial Basis Function modified kernel are shown in the following Figure 8 and Figure 9.

The above Table 2 shows the comparison of Equal Error Rate (EER) of proposed system with existing systems.

CONCLUSION

In palm vein recognition the modified kernel of Radial Basis Function with Support Vector Machine outperforms in authentication. A new algorithm is proposed for region of interest extraction. The iterative results of Gabor filter provide the optimized result for further morphological segmentation process. The classification results of Support Vector Machine with and without RBF kernel shows best performance. The Equal Error Rate comparison with the related works shows outperforming results which is 0.0139%. Mocking of palm vein patterns remains as a drawback and thread for depending on the biometric pattern for authenticating and securing information. Researchers can be proceeded for avoiding such spoofing of the biometric patterns obtained for trustable dependency.

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Intravenous Fluid Alert Management Connected to Smartphone Using Iot

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ABSTRACT

In hospitals, Intravenous fluids blockage and the control of them is a major issue. The nurse and other staff in hospitals have a greater number of patients at a time to manage. It is very difficult for them to keep track of every patients' intravenous fluids in control. Some patients need a regular change of their intravenous fluids one after another. They need to be taken good care of fast recovery. This idea is to provide cost-effective, reliable, Intravenous fluid flow monitoring system which can be easily implemented in any hospital and it is easy for doctors as well as medical attendants to screen the saline stream from a distance. The proposed system uses ultrasonic sensors to monitor the saline level. There is a sensor to monitor heart rate and oxygen level in blood. IoT is used to connect the mobile devices and the sensors to notify the nurse and the staff in the hospital. This can help the patients' faster recovery and preventive measures can be taken in some critical situations.

KEY WORDS: ULTRASONIC SENSOR, MICROCONTROLLER, ESP8266, WIRELESS MODULE, SALINE BOTTLE, SENSOR, IOT.

INTRODUCTION

Because of the headway in innovation, the advancement in the clinical field is fast. In recent days, many programmed health monitoring gadgets are created to guarantee patients' safety and to reduce the pressure of the doctors. The development of such gadgets presents an uncommon change in the clinical field for checking the parameters like heartbeat rate and blood oxygen levels ((Jian-Xing Wu et.al (2018))). The IoT has The Internet of Medical Things (IOMT) is the collection of clinical gadgets and applications that associate with healthcare IT frameworks through online PC networks. Clinical gadgets furnished with Wi-Fi permit the

machine-to-machine correspondence that is the premise of IOMT. IOMT devices link to cloud platforms such as Amazon Web Services, on which captured data can be stored and analysed. IOMT is also known as healthcare IoT (Ping-Tzan Huang et.al (2017)). IOMT incorporates remote patient checking of individuals with ceaseless or long-haul conditions; following patient drug orders and the area of patients admitted to emergency clinics; and patients' wearable mHealth gadgets, which can send information to caregivers (Sathiya Devi.G.S and A.K.Joshi (2016)). Infusion pumps that associate with analytics dashboards and emergency clinic beds fixed with sensors that measure patients' vital signs are clinical gadgets that can be changed over to or deployed as IOMT technology (Ho-Chiao Chuang et.al (2015)).

ARTICLE INFORMATION

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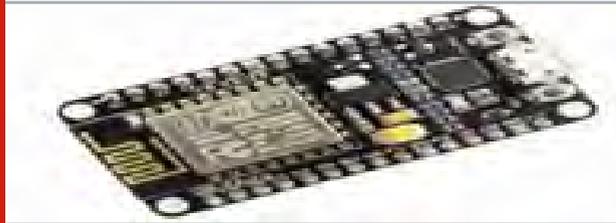
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form the Internet of Things. In our Smart Grocery Management System, the data from the ultrasonic sensor will reach the cloud platform through the internet. Then this data can be retrieved from the cloud and visualized. This setup is the so-called Internet of Things (Baker et.al (2017)).

1.2.Ultrasonic sensor: Ultrasonic sensors can both sense and transmit hence they are also called transceivers. Ultrasonic sensors work on a principle as same as that of transducers, transducers convert ultrasound waves to electrical signals or contrariwise. They can unravel even the most developed tasks including object detection or level estimation. When ultrasonic sensing elements generate high-frequency sound waves then an echo is generated that is received back by the sensor. The distance to an object is measured by measuring the time interval between sending the signal and receiving the echo. Once the ultrasonic wave is launched, the timing is begun and the ultrasonic transmitter emits an ultrasonic wave in one direction. As soon as this wave which is spread in the air will encounter obstacles on the way would come back instantly. Once the ultrasonic receiver would receive the reflected wave it will stop timing.

1.3.NodeMCU

Figure 1: NodeMCU



NodeMCU is an open-source LUA: based firmware produced for ESP8266 WiFi chip. By investigating functionality with ESP8266 chip, NodeMCU firmware accompanies the ESP8266 Development board/unit, for example, the NodeMCU Development board. NodeMCU Dev Kit/board comprises of ESP8266 wifi empowered chip. The ESP8266 is an easy Wi-Fi chip created by Espressif Systems with TCP/IP convention. For more information about ESP8266, you can refer to the ESP8266 Wi-Fi Module. There is Version2 (V2) accessible for NodeMCU Dev Kit, for example, NodeMCU Development Board v1.0 (Version2), which for the most part comes in dark shaded PCB.

2.Existing system: The paper proposes the system which can consequently screen the saline flow rate by utilizing a microcontroller. It can remotely send the data to medical attendant's or authority's PC and show the results as saline dot rate, the number of dabs beginning from the saline container, saline arrangement plan given to the patient in ml and remaining time to release the saline container with the help of consecutive port test programming. The framework is solid, financially effective and advantageous for medical attendants. It

tends to be reused for the following saline container. It is gainful for attendants just as specialists at provincial medical clinics. Nurses can screen the saline level from distance. It is, generally, great around night time as clinical specialists do not have to go to the patient's bed to check the level of saline in the compartment.

2.1.System Analysis and Design: The transmitter part contains ATMEGA328, CC2500 wireless module transmitter, Bluetooth module, buzzer, IR sensor, green and red diode and battery. The receiver part contains the CC2500 wireless module receiver, PC or laptop and cell phone.

2.2.IR Sensor: IR sensor is utilized to detect the bead originating from the saline container (Sathiya Devi.G.S and A.K.Joshi (2016)). Here, the IR sensor Transceiver is utilized (Priyadarshini.R et.al (2018)). At the point when the sensor transmitter recognizes the bead then it transmits the signal to the collector with the goal that the receiver can get the bead and sends it to the comparator.

2.3.Comparator: The LM358 double comparator is utilized. The comparator is utilized to adjust the feeble signals originating from the IR transceiver (Parag Chatterjee et.al (2017)). It is utilized to contrast the signal and its threshold value and afterwards pass the appropriate signal to the microcontroller ATMEGA 328.

2.4.ATMEGA 328 28 pin Controller: Oscillator circuit and reset circuit are given as a contribution to the microcontroller. Right now, sequential correspondence. It is the modules are utilized henceforth ATMEGA 328 microcontroller is best reasonable here [11]. It is having a glimmer memory of 32Kbytes, EEPROM information memory of 1 Kbytes and SRAM information memory of 2 Kbytes. It has 23 I/O pins and two 8 piece, one 16 piece clocks. It has a 10 piece six channels A/D converter. There are six PWM channels. The preparing rate of the outer oscillator is up to 20 MHZ.

2.5.Power Supply Unit: The stockpile unit comprises a battery, fundamental channel and controller IC 7805 which is utilized to give a supply voltage of 5v (Parag Chatterjee et.al (2017)). There is an arrangement of utilizing a transformer just as the connector of 12volt and 1-ampere current. In the event, that transformer is utilized, at that point bridge rectifier and 1000 microfarad capacitor is given.

2.6.CC2500 Wireless Module: CC2500 wireless module acts as a transceiver (Parag Chatterjee et.al (2017)). A transmitter is utilized to transmit the information through a microcontroller to the receiver. The receiver is associated with a PC or laptop. TTL to USB converter is utilized to acquire data on a PC or laptop so specialists can perceive the saline level with the assistance of a sequential port test window which is shown on a PC or laptop. The Bluetooth module is utilized to send the information wirelessly on an attendant's cell phone and the outcomes are shown with the assistance of

Bluetooth terminal application. Because of the utilization of wireless modules, it is simple for attendants just as specialists to check the saline level without going at a patient's bed.

2.7. Buzzer and LEDs: In the programming, the basic level is set at 70ml. By and large, the saline container contains 500ml arrangement. At the point when the saline arrangement is above 70ml at that point green drove will squint and when the saline arrangement falls underneath 70ml or the basic level then red drove begins flickering and signal will begin ringing with the goal that it will be simple for medical caretakers or patient's family members to comprehend the specific situation of staying saline arrangement in the bottle (Ashika A et.al (2019)).

3. System Result: The computer programs depend on the Arduino stage which is done. The outcomes are gotten on cell phones with the assistance of Bluetooth terminal programming and are acquired on a PC or laptop utilizing serial port test software. The outcomes contain the number of beads originating from the saline bottle, the arrangement given to the patient in ml, the drop rate and the remaining solution in the bottle (S.Muthupandiyar et.al (2018)).

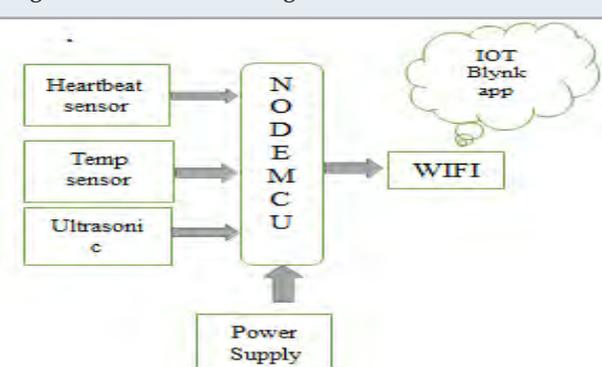
4. Proposed System: Patients suffer from a wide variety of disabilities can run in seriousness from confinements of stamina to loss of motion. The IoT provides proactive help to patients with its advanced human-machine interaction by internetworking physical devices and embedded sensors which enable these objects for gathering and trading information. IoT technology provides proactive help to patients by internetworking physical devices and embedded sensors. Paralyzed patients are provided with unobtrusive support by the caregivers with the help of an application where a combination of services such as Patient Monitoring system of unconscious people. All the components hear bat sensor, temperature sensor, MEMS sensor and node MCU are connected over an internet IOT BLYNK Platform. The digital converter is the way to convert the sensors signal into a digital value which is controlled by Microcontroller. Communication between hardware and software can be done using RS232 communication. Patient on reaching the Higher Limit (HL) sends alerts to all the mobile numbers entered over the network. The android application is provided to the patient and text messages are sent to the doctor, caregiver and family member.

4.1. Sensing Module: This framework utilizes Temperature and heartbeat sensor for following wellbeing of the patient. Both the sensors are associated with the ArduinoUNO. To follow the patient wellbeing miniaturized scale controller is thus interfaced with an LCD show and WI-FI association with sending the information to the web-server (wireless detecting hub). If there should be an occurrence of any unexpected changes in understanding pulse or internal heat level alarm is sent about the patient utilizing IoT. This structure moreover shows patients temperature and heartbeat followed live

data with timestamps over the internetwork. Thus patient health monitoring system dependent on IoT utilizes the web to viably screen tolerant wellbeing and helps the client checking their friends and family quarters work and spares lives.

4.2 Block Diagram: The sensors are associated with a microcontroller to follow the status which is thus interfaced with an LCD just as WiFi association to transmit alarms. If framework identifies any sudden changes in Patient heartbeat or internal heat level, the framework consequently alarms the client about the patient status over IoT and shows details about heartbeat and temperature of patient live over the web.

Figure 2: Architecture Diagram



4.3. Heartbeat Sensor: The Pulse Sensor is a plug-and-play pulse sensor for Arduino. It tends to be utilized by students, craftsmen, competitors, makers, and game and mobile engineers who need to handily consolidate live pulse information into their undertakings. The embodiment is a coordinated optical enhancing circuit and noise dispensing circuit sensor. Clasp the Pulse Sensor to your ear cartilage or fingertip and attachment it into your Arduino, one can prepare to read pulse.

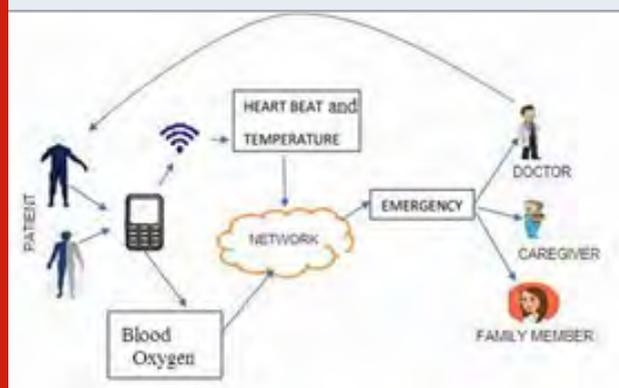
4.4. LM35 Temperature Sensor: The LM35 plan is precision joined circuit temperature devices with a yield voltage comparing to the Centigrade temperature. The LM35 contraption has an ideal situation over direct temperature sensors adjusted in Kelvin, as the customer isn't required to subtract a gigantic consistent voltage from the output to get worthwhile Centigrade scaling. The LM35 device doesn't require any outside arrangement or slicing to give commonplace exactness of $\pm 1/4^\circ\text{C}$ at room temperature and $\pm 3/4^\circ\text{C}$ over a full -55°C to 150°C temperature range.

4.5. ESP8266: The ESP8266 is very easy to understand and easy gadget to give web availability to your projects. The module can work both as an Access point (can make a hotspot) and as a station (can associate with Wi-Fi), subsequently it can without much of a stretch bring information and transfer it to the web making the Internet of Things as simple as could be expected under the circumstances. It can likewise bring information from the web utilizing API's subsequently your project could get to any data that is accessible on the web, in this

manner making it more intelligent. Another energizing component of the module is that it very well may be customized utilizing the Arduino IDE which makes it significantly easier to understand.

5. Internet of Things: Our system tries to focus on improving the facilities for supporting the patient using IOT technology that not only realizes the needs but may help in health care services. Nowadays, smartphones are coming with much and more advanced facilities so that it can be used as both LTE and WIFI. Such smartphones can act as concentrators in this system.

Figure 3: Architecture of Cloud Transmission

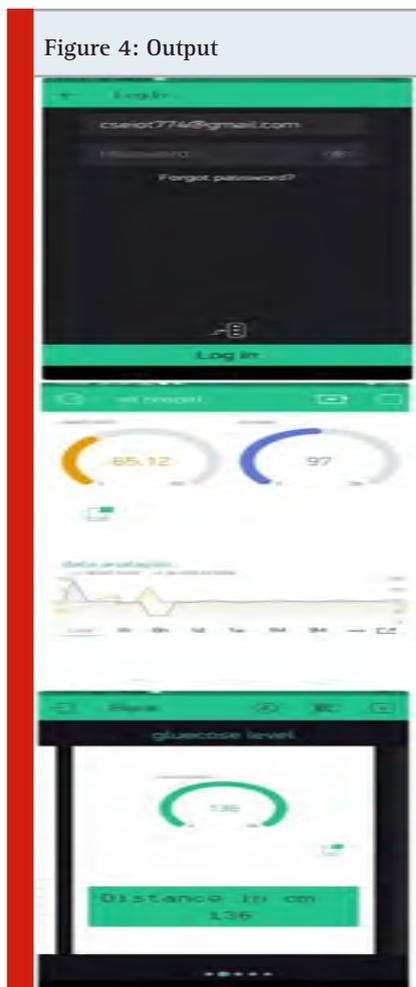


Data collected by the concentrator will be stored into cloud storage. Stored data can be easily accessible from anywhere by doctors. Cloudlet which is a small processing unit. It is used for both sharing the data and also processing locally. When data is stored in the IoT cloud, it enables timely access to produce better diagnostic details. It is the best possible solution for health applications. The BLYNK platform is allowed to wirelessly communicate through WIFI enables interface which reduces the data transfer latency. At last, the data in the cloudlet will be saved in the cloud for faster storage access. The data improvisation between cloudlet and cloud can which can be differentiated by a new technique known as context-aware concentration where context is the current and expected status of the patient. It is necessary to keep the patient's digital records secure and also correspondingly storing it in the cloud. To provide additional security for unauthorized access and appropriate authentication preserving measures taken when offline transfer to the cloud takes place. Therefore, secure cloud storage frameworks were introduced to deal with sensitive medical information, but it is still a challenge.

6. BLYNK IOT Platform: BLYNK IoT app platform was developed for the net of Things applications. This server doable to manage associate will show device info victimization node MCU hardware remotely from any location This server operated regionally and it's chargeable for communication between golem devices and real-time embedded devices .it will management the thousand of embedded devices and objects. A BLYNK library is to activate communication with the server

and processes all the incoming and out coming back commands from your BLYNK app and NodeMCU. This native server will store information and visualize it effectively. It gives precise results and high performance. BLYNK is a Platform with IOS and Android apps to control Arduino, Raspberry Pi and the likes over the Internet. It has an easy to use interface and also provides you with innovative drag and drop feature which enables easier and faster development.

Figure 4: Output



BLYNK enables you to choose supporting hardware of your choice. We can even use Arduino or any other BLYNK supported devices can be linked to the Internet over Wi-Fi or Ethernet and even on this new ESP8266 chip. BLYNK can be used to control hardware remotely and it can display results over the interface, and it also stores data in the cloud, Characteristics of Blynk is that it supports devices Connection to the cloud also will be done by Ethernet, Wi-Fi, Bluetooth etc. It provides a Set of easy-to-use Widgets. Integration with new functionality using virtual pins. BLYNK is open-source but an extremely useful tool where user can add new devices and connect those devices with a unique ID from which user hardware can be easily identified and can be easily accessed.

1. Easy to use interface.
2. Doesnt needs any regular maintenance of cloud

- data.
3. Patient health is dynamically monitored and optimized to provides the fastest response time.
 4. Precise notification when saline is monitored to be empty.
 5. A fully portable system which can be used for many other similar functions.
 6. Provides a low-cost cutting edge solution.

CONCLUSION

The proposed system is about the implementation of the intravenous drips alert management using the ultrasonic sensor and monitoring the patient's heart rate and oxygen level in the blood. Here we use the ultrasonic sensor to detect the level of the fluid in the saline bottle and simultaneously the heartbeat rate and the oxygen level is also being monitored using the sensors. The BLYNK app will notify when the heartbeat rate increases or decreases and the same for the oxygen. This real-time monitoring of the fluid level and the other parameters of a patient is achieved by connecting the sensor, microcontroller circuit to the mobile phone through WIFI module and the user ID, a password will be given to the staffs. Using these, a person can monitor it from anywhere in the building without any issues. It is more useful than the previous systems because there is only Bluetooth module in the system which can be only within a certain distance. The proposed system has wireless module so there will be no network issues in the treatment.

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Water Quality Monitoring System Using Internet of Things

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ABSTRACT

Water pollution is the major cause of water transmittable diseases. An operative and structured system for water monitoring system is important for the concern of polluted water around the world. With increased expansion of wireless sensor technologies in Internet of Things (IOT) platform, a real time water monitoring system can be designed for remote operation monitoring by means of real-time data acquisition, transmission and processing. In this system, sensors are interfaced to a micro controller which procedure and examine the data. The examined data is then conveyed to a monitoring center through WI-FI module. Through an online portal, the end user is able to view the data and will receive alerts if the water is contaminated. The proposed system will collect four different parameters of water like turbidity, water pH, entire dissolved solids and water temperature on the surface of water in real time with high speed from numerous sensor nodes.

KEY WORDS: INTERNET OF THINGS, SENSORS, MICROCONTROLLER, THINGSPEAK, WATER PARAMETERS.

INTRODUCTION

The proposed model presents a design for water quality testing by checking Ph, Turbidity, and Total dissolved solids in different water samples using available sensors. This system will also measure the Temperature of the water which can be suitable for applications which requires temperature measurements. Through the dashboard the user will be able to monitor the parameters. The user will also receive email alerts in case of any abrupt Changes in the parameters.

A. Existing work and challenges: In the literature Cho Zin Mint et al., (2018), the proposed system used Field programmable gate design board as the core module of the system and Zigbee based wireless communiqué module to send the data. The composed water parameters were then sent to monitoring device which is PC, and the data was displayed using Nios II code in Altera Quartus II software. The proposed system could not display the data on to a mobile or PC which could not support FPGA softwares. Also the system could not give alerts and warnings to the end user. In S. I. samsudin et al., (2018), the proposed system offered monitoring of only two water parameter, PH and Turbidity. In literature T. P. Lambrou et al., (2014), the designed system could not store previous parameter values and remote users are not able to have access to the system.

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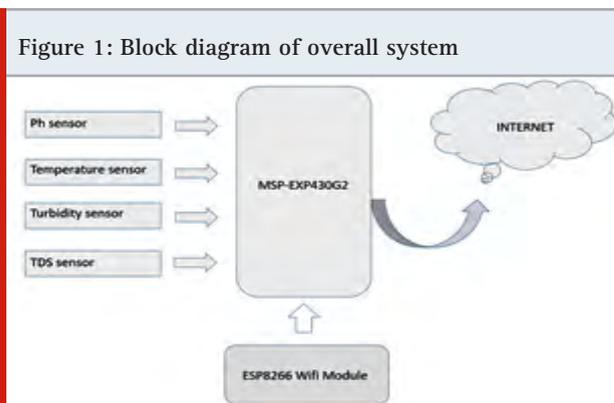
B. Salient features of projected scheme

The system will:

- Monitor the Quality Of Drinkable Water:
- To prevent waterborne diseases, the health and water department must continuously monitor the water condition.
- Check undesirable changes in water parameter values in the water body:
- Water may contain a number of impurities and infections, or chemicals released by industries which are very harmful for humans as well as aquatic life. Hence we essential a sensor based electronic scheme that can be used to check the infections occur in water.
- Ensures appropriate pH, turbidity, TDS and temperature level:
- The pH profile variations due to the growth and metabolic actions of microbes during water spoilage process. The pH level can deliver accurate sign of the freshness of the water sample.
- Takes continuous measurements of water conditions using IOT.

METHODOLOGY

The MSP430 Micro-controller is the chief constituent of the overall system and it is programmable by embedded C programming language. All four sensors are deployed in the water body which will analyze the quality of the water resources, and they are interfaced with the MSP430 controller via its GPIO pins. The PH and TDS sensor gives analog output, whereas the turbidity and temperature sensors can provide analog as well digital output. Microcontroller receives the parameter data from the sensors and processes it. Energia IDE is used to build and run the program. The code is then uploaded onto the microcontroller. The values can be displayed onto the serial monitor for verification. The collected data is displayed in real time. Wi-fi connectivity is given to MSP430 using ESP8266 wifi module. By logging onto the online portal, authorized users can access the data. On the webpage the collected parameter values are shown in real time. The user can log in to the portal by entering the correct user identity and password and can view the data. When the pollution level in the water body rises, warnings are sent to the end user through email.



III. HARDWARE COMPONENTS: i. MSP430G2553 Launchpad development board (MSP EXP430G2ET)

The MSP430G2553 Launchpad is an inexpensive and easy-to-use evaluation module. It has an on-board debug probe. The MSP-EXP430G2 is fully programmable by Code Composer Studio and Energia. It operates on 1.8V – 3.6V. It has 16 Bit RISC construction and up to 16 MHz system clock. It has 24 GPIO pins.

ii. ESP8266 WiFi Module: The ESP8266 is an economical WIFI unit with full TCP/IP stack and MC capability. ESP8266 can perform either as a standalone device or it can be a slave to a microcontroller. The module is pre-programmed with AT commands set firmware. This module has storage capability which enables it to be integrated with sensors and it has powerful on-board processing.

iii. PH Sensor: Operating voltage is between 3 to 5 volts. Operating Temperature is 0-45 degree Celsius. PH is a degree of the of an solution acidity or basicity. Mathematically, pH is the negative logarithm of the activity of hydrogen ion. Chemical constituent's nutrients and heavy metals can be determined by PH of water. Metals are extra toxic at lower pH since they are more soluble. Extremely low or high pH cannot be significant for the use of water. High pH value causes a bitter taste, causes encrust in water pipes or water using applications. Low pH can corrode or liquefy metals and other materials. The pH sensor has a reference electrode and measuring electrode. Reference electrode is given a positive potential and measuring electrode is given negative electrode. The reference electrode has fixed potential.

iv. Turbidity Sensor: Turbidity is termed as the measure of liquids relative clarity. Turbidity is measured in NTU (nephelometric turbidity units). Measuring turbidity is essential since it can provide home for pathogens and the growth of pathogens in distribution system and if not removed leading to waterborne disease outbreak. This sensor can provide digital and analog output. The threshold can be adjusted when the device is in digital signal mode. The mode can be selected depending upon your microcontroller.

v. Total Dissolved Solids Sensor (TDS): Entire liquefied solids sensor designates how much milligrams of soluble solids are liquefied in one litre of water. Higher amounts of soluble solids dissolved in water indicates that the TDS value is high. Hence, TDS can be used as a references to reflect the cleanliness of water. The TDS sensor supports 3.3 V to 5.5 V voltage input, and 0V to 2.3V analog voltage. The excitation source used is an Ac signal, which efficiently prevents the probe from getting polarized and prolongs its life and also Increase's the firmness of the output signal. The TDS sensor probe is waterproof and it can be submerged in water for longer time period capacities.

vi. Temperature sensor: The PH sensor has an on-board thermistor to evaluate the temperature value. The

thermistor is a resistor whose resistance is contingent on temperature. It works on the principle that as the temperature rises, the thermistors resistance decreases. Since thermistor encounters such a wide change in resistance per degrees Celsius, the slightest change in temperature is precise with quick response time. The operating range is between -50 to 250 degree Celsius.

IV. TESTING WATER SAMPLES

i. Results obtained from Turbidity Sensor: The Analog output signal is taken from this sensor. The output value decreases when the sensor is dipped in water sample with high turbidity. Turbidity sensor is tested on a few water samples and the results are listed in a table below.

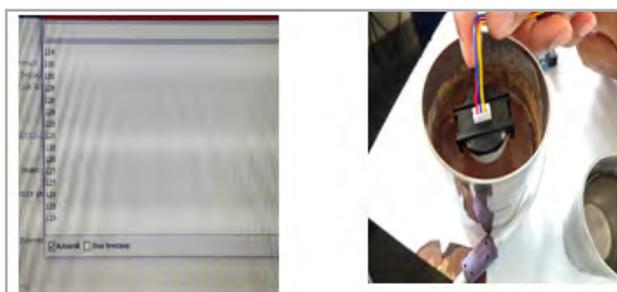


Table 1

Test solution	Sample volume (ml)	Sensor output	Corresponding voltage value
Tap water	500ml	Varies between:	141 – 1450. 49 V - 0.50V
Muddy water	500ml	Varies between:	126-132 0.44 V - 0.46V
Water +Kerosene	500ml	varies between:	135-140 0.47V - 0.49V

Conclusion drawn from the above table is that for clear or clean water the turbidity value is high that is above 140, and as the water gets dirty and muddy the turbidity value decreases.

ii. Results obtained from PH Sensor: The output of ph sensor is analog. Different types of ph solution samples have been taken for the measurements: Acids, Alkaline (base) and Neutral samples. The pH sensor is dipped into the pH solution when a reading is been taken.

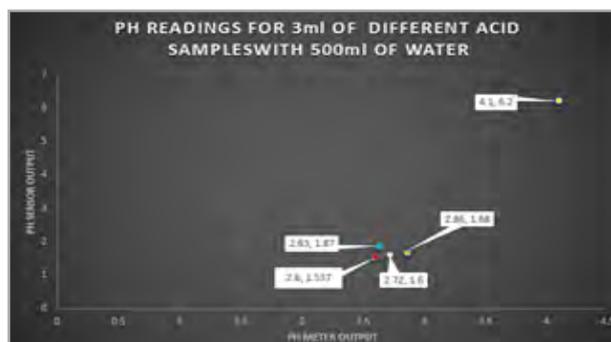
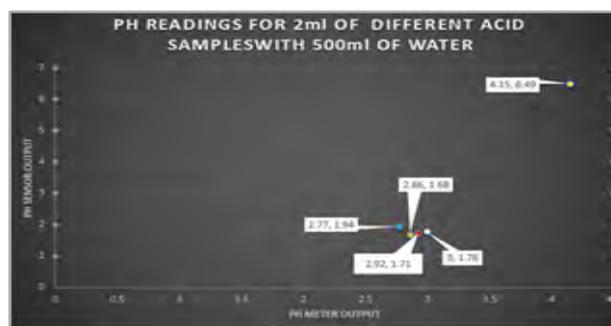
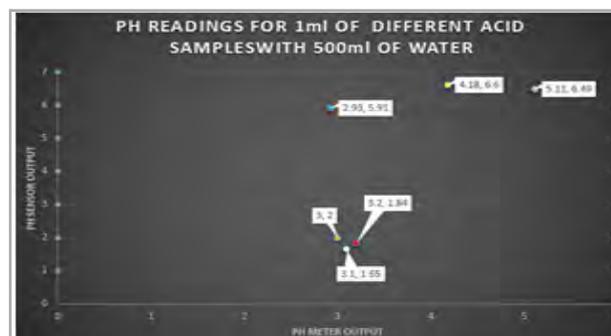
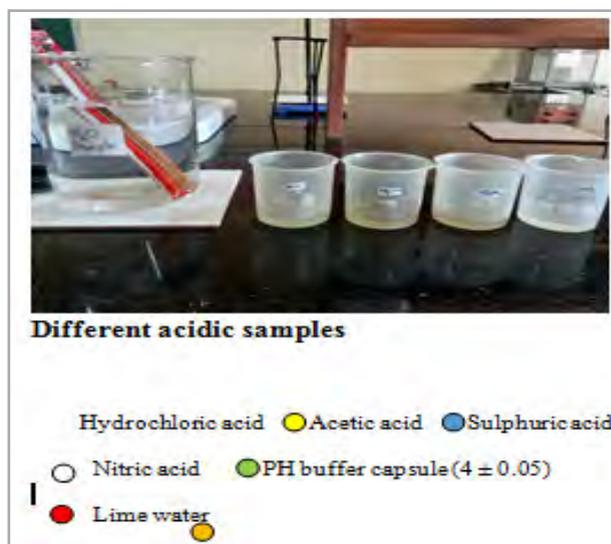
iii. The pH sensor has to be primarily washed with distilled water for obtaining a reliable reading.

iv. Results obtained from TDS sensor

TDS Measurements

5. SOFTWARE IMPLEMENTATION: The hardware is programmed using Energia IDE. The energia IDE is a cross platform and is supported by Mac, Windows and

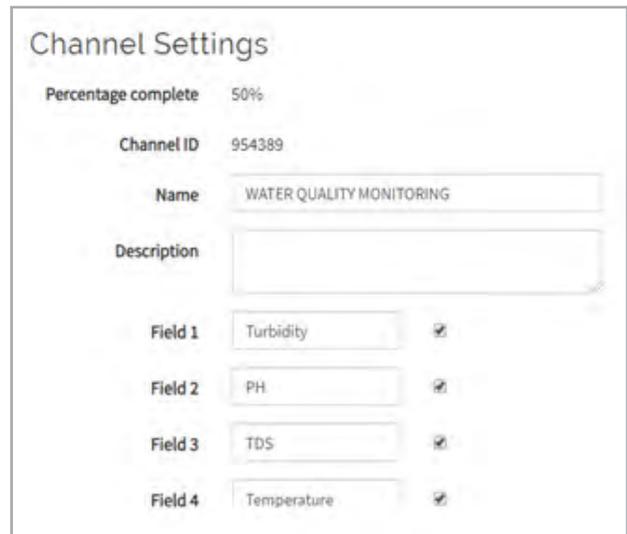
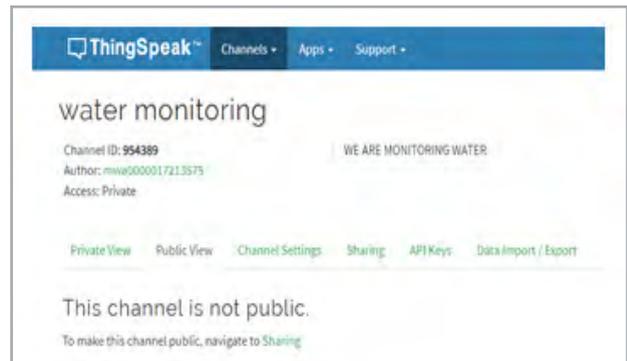
Linux operating system [8]. The pH, turbidity, TDS and Temperature sensor are connected to the MSP430. The MSP430 will then process the data. The read data will be displayed on webpage created by “ATOM” text editor. The code is written using HTML, CSS and JAVA scripts. The collected data is sent onto a ThingSpeak channel.



Test sample	Amount of water (ml)	PH meter reading	PH sensor output
Purified water	500ml	7.2	8

Test sample	Amount of base added (ml)	Amount of water added (ml)	PH meter reading	PH sensor output
Ammonia	1ml	500ml	9.73	10.59
	2ml	500ml	9.95	10.74
	3ml	500ml	10.06	11.22
	5ml	500ml	12.83	13.6
Test Solution of PH 8.2	-	500ml	8.2	8
Soap water	-	500ml	10.14	11.1
PH buffer capsules 9.2±0.05	-	500ml	9.47	13.88

Type of water sample	Amount of water added	Output of TDS SENSOR	Result obtained from TDS meter
base(sodium hydroxide 0.1N)	500ml	700 - 712 ppm	609 ppm
acid(Hcl)	500ml	538ppm-542ppm	447 ppm
calcium carbonate CaCo3	500ml	311ppm-316ppm	67 ppm
kcl salt	500ml	625ppm-635ppm	545 ppm
magnesium sulphate	500ml	401ppm-410ppm	250 ppm
magnesium sulphate(more co 500ml)		601ppm-610ppm	537 ppm
copper sulphate CuSo4	500ml	555ppm-560ppm	510 ppm

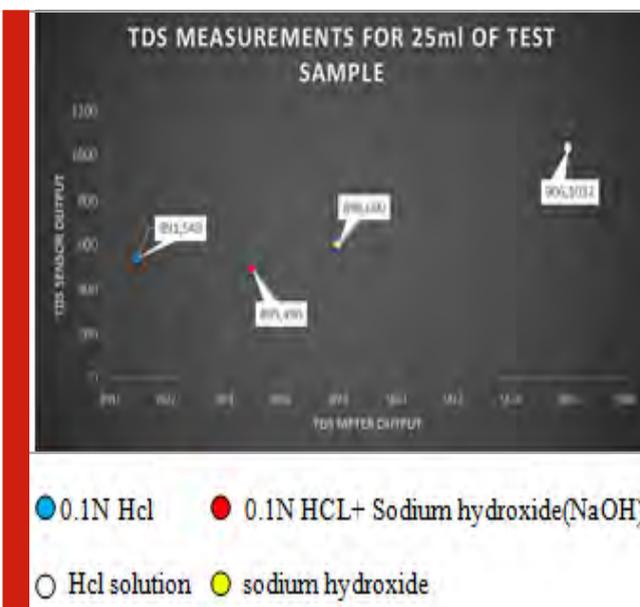


i. Setting up channel in ThinkSpeak API

Setting up Thingspeak channel

CONCLUSION AND FUTURE WORK

The results of five water quality parameters confirm that the system has achieved reliability and feasibility of using it for real monitoring purposes. We were able to set up Thingspeak channel as an online Dashboard for viewing the sensor data. Future work would entail interfacing MSP430 micro-controller with ESP8266 wifi module for the transfer of sensor data and hence creating an Internet



of Things system by connecting Msp430 to cloud and monitoring the operation of the device remotely. The water monitoring scheme reduces the time and costs in sensing water quality.

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Dynamic Mechanical Analysis of Acid Treated Surface Modified Natural Fillers Reinforced Epoxy Based Polymer Composite

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ABSTRACT

Now public awareness and stringent regulatory forces for the use of polymers, manufacturing and the automotive industry have begun to use renewable energy sources. Since mixtures reinforced with natural fillers show a significant role in the development of lightweight structural materials, this study attentions on the use of (coconut shell powder, rice husk, and hybrid bio filler) as reinforcement in epoxy matrix. The influence of natural fillers loading (treated 10, 20, and 30 vol %) and (untreated 10, 20, and 30 vol %) on the viscoelastic properties natural filler was studied primarily. The test outcomes showed that the treated hybrid composites with a fraction of 20 volumes have the best mechanical and viscoelastic properties. In addition, the effect of filler surface correction was analyzed using namic acid. Of these, treatment with malic acid improves the viscoelastic properties of the combined associated to all other circumstances. The synergistic effect resulted in the totaling of a natural filler and apparent handling to recover the things of the composite. This effect advances adhesion and stress transfer during reinforcement. The morphology of the filler surface was assessed by micro-graphs obtained by a scanning electron microscope.

KEY WORDS: BIO FILLER, VISCOELASTIC ANALYSIS, CHEMICAL TREATMENT, EPOXY.

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INTRODUCTION

Due to the developing request for environmentally friendly resources, polymer composites reinforced with natural fillers are being examined by researchers around the world as a suitable alternative. Composites based on natural fillers have several advantages, such as weight loss rate, low costs, environmental friendliness, low carbon emissions (Tajvidi, M., & Ebrahimi, G. (2003)) (Saheb, D. N., & Jog, J. P. (1999)) (Li, X et.al (2007)) and (Xie, Y et.al 2010) and (Tajvidi, M., & Ebrahimi, G. (2003)) and (Zabihzadeh, S. M. (2009)) and (Sobczak, L et.al (2013)). Numerous investigators have studied natural fillers as an appropriate reinforcement for polymer matrix composites. Saw powder has been used as a natural filler in GRP composites and it has been found that the addition of sawdust dust compared to natural fillers improves the tensile strength of the composite likened to tensions, storage modules and pure polymers.

The most commonly used fillers are carbon nanotubes, nanotone, silicon framework, talc, aluminum flakes and steel fibers ((Faruk, O et.al (2014)) and (Saheb, D. N., & Jog, J. P. (1999)) and (Demir, H et.al (2006))). Fillers are used to develop the stiffness, wet properties and heat resistance of composites and are used to lessen the cost of composites. The effect of filler on the belongings of polymer composites has been deliberate by many investigators. 1. (Sreekumar, P. A. et.al (2009)) Examined calcium carbonate in the polypropylene matrix and evaluated the effect of filler material on the mechanical possessions. It has been stated that filling the filler has ensued in an 85% upsurge in tensile modulus, with the addition of the filler not significantly changing the strength and difficulty of the compressor. (Chen, R. Y et.al (2015)).

Montmorillonitenano is included in the composition of coconut shell and polyester as a nanofiller, prepared using density molding technology. In adding, the result of the chemical handling of the fiber on the mechanical possessions of the compound was investigated. These results indicated that investments in nanofillers resulted in an increase in dynamic components and a slight change in the glass temperature for the treated fiber compounds.. (Rajini, N et.al (2013)) studied the peanut powder as bio-filling. Peanut shell particles containing compounds with different particle dimension and volume fractions were produced. Studies show that a volumetric ratio of 60:40 and a particle size of 0.5 microns increase the potentiating effect of the compound.(Raju, G. U., & Kumarappa, S. (2011)).

Studied the effect of potassium-titanium alloy filled epoxy composites on tensile and bending properties and found that adding filler reduces tensile and bending strength. A maximum reduction in tensile strength of up to 20% was reported in 15% of the weight of the whisker load. However, the inclusion of filler material increased the tensile and bending elastic modules. The effect of dust from snail shells on polypropylene compounds has been studied by (Raju, G. U., & Kumarappa, S. (2011))

results showed an increase in traction, bending, and impact belongings due to an increase in filler content and dimension. (Faruk, O et.al (2014)) the mechanical manners of polypropylene composites with wood flour mixture was studied and it was found that adding fillers to the polypropylene matrix enhances the machine-driven things of the composite substantial.

MATERIAL AND METHODS

Natural fillers have been used as strengthening in an epoxy matrix. The effect of the volumetric fraction of the filler and of the chemical handling on the viscoelastic possessions of the composite was deliberate. Natural fillers are used for the manufacture of compounds of various volumetric fractions (10%, 20%, 30% transformed and unprocessed). The surface effect was then analyzed using a chemical solution, such as hydrochloric acid seeds, respectively. After the chemical treatment, the aggregate samples were prepared manually after compression. The specimens were prepared in accordance with ASTM ideals for testing. The tensile test was achieved in traction mode according to ASTM D638 with a dynamic mechanical analysis [DMA] of 2 mm / min.

RESULTS AND DISCUSSION

Show that when adding a filler concentration, the mechanical properties are up to 20 vol. % Natural filler (sawdust, peanut shell, and hybrid natural filler). The extreme tensile strength and elastic modulus gained for the overhead composition are respectively fillers. Likewise, in a three-point bend test, the extreme detected bending strength and elastic modulus are 20 vol. % Of Natural Hybrid Filler, respectively. But the proportion upsurge is not very significant compared to 20 vol. % composite natural filler. During the impact test, the material experiences a large volume of deformation for a short duration, and therefore, no important changes were observed in price. A powerful interface allows the composite to survive the practical load, even if several fillers are wrecked, the load can be transported from the filler component. In addition, figure 2 shows a uniform dispersion of the filler.

Figure 1: 20 vol % hybrid natural filler

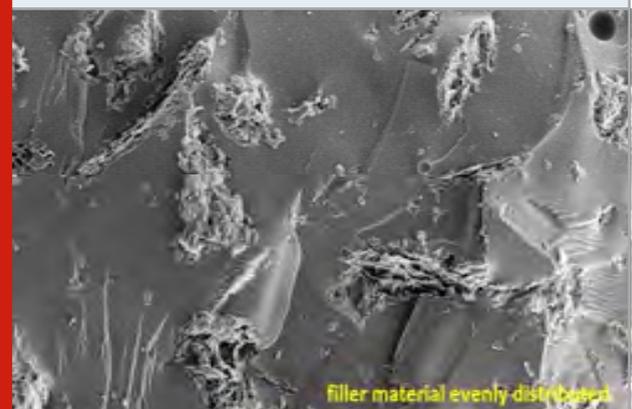
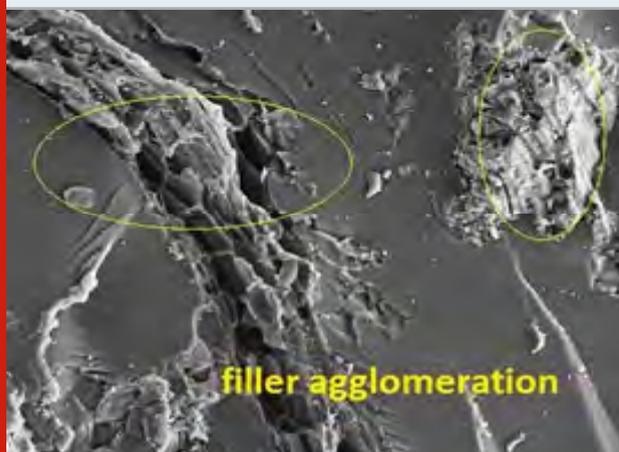


Figure 2: 30 vol % filler agglomeration



With a further upsurge in the volume fraction of the filler, the tensile strength begins to decrease due to agglomeration of the filler to a larger volume fraction. In addition, the grouping of the filler leads to poor dampening of the filler matrix, therefore, to a poor connection between the filler. This hints to a lessening in mechanical possessions. In addition, the upsurge in the number of fillers leads to the fact that the filler is twisted and bent, subsequent in a transfer of stress among the matrix and the filler.

Effect of surface alteration on mechanical possessions of composite: Filling dimensions, such as volume filling, play an imperative part in influencing the strength of the composite material. Although volumetric quantity plays an imperative role in defining the strength of the composite, SEM images show that the connection of the filler with the matrix also has a significant result on the possessions of the reinforced composite substantial with the filler. To recover the relationship between the filler and the matrix achieved to improve the surface of the normal filler. This change develops the surface adhesion among the filler and the matrix and therefore increases the complete strength of the composite. In this study, menstrual acid was treated on a natural filler. A chemical concentration of 4% was used

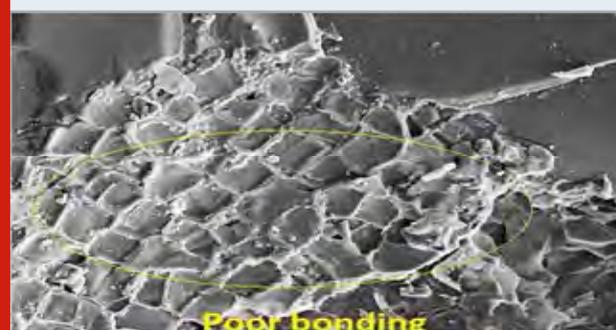
Treatment However, excessive treatment damages the filler itself and therefore requires optimal concentration of chemical treatment [4%] for better adhesion. It has been found that chemical treatments improve the mechanical possessions of compound materials compared to reinforced mixtures with untreated fillers. Cellulose in natural fillers is available in the form of long and thin polymer chains. The strong inter- and intermolecular bond which increases the strength of the filler. During chemical treatment, the fillers swells and the monoclinic construction of the cellulose changes into another polymorphic form. This causes the interface among the fiber and the surface to stick poorly. An important drug driven by chemical treatments is the breakdown of hydrogen bonds in network structures, which increases surface depressions, as well as the removal of certain

quantities of lignin, wax and oil present on the superficial of the filler.

Figure 3: chemically treated filler hybrid composite



Figure 4: 30 vol % hybrid filler composite



Dynamic Mechanical Study: The result of temperature and frequency on storage modules with chemically treated epoxy resin and bio-filler, composite with 20% treated and untreated epoxy filler, is shown in Fig. X-Y. The test temperature is between 300 and 2400 C and the frequency is between 0.5 and 10 Hz. Statistics show that the energy engrossed by the compost is good at all hotness up to 1400 C. The energy absorbed is from the resin which from the composite is almost the same as the test temperature increases. This indicates that the filler effectively transfers the load to 1400C. So they tend to leave their connections with the Matrix and, because of their intentions, fail in their work.

Figure 5: Storage Module (SM) of epoxy resin with treated and untreated coconut shell powder composite at 10 Hz Frequency

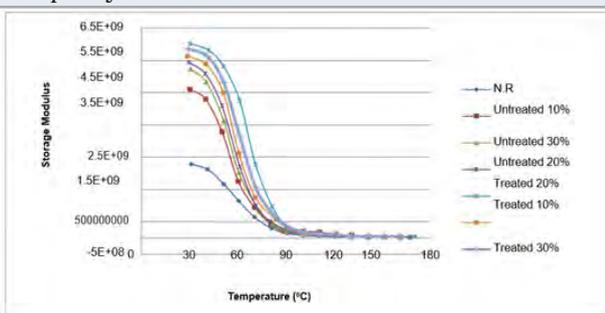


Figure 6: SM of epoxy resin with untreated and treated coconut shell powder composite at 5 Hz

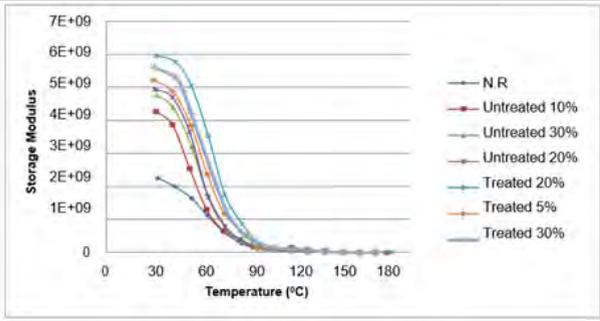


Figure 10: SM of epoxy resin with treated and untreated ground nut shell powder composite at 5 Hz Frequency

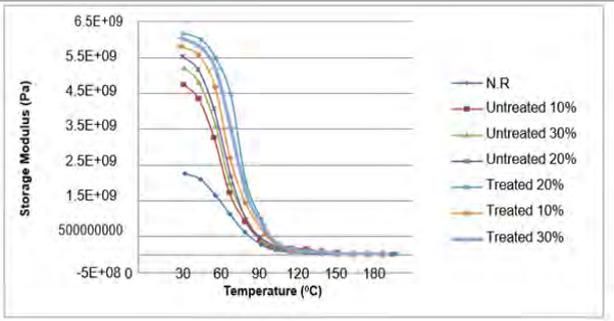


Figure 7: SM of epoxy resin with treated and untreated coconut shell powder composite at 2 Hz

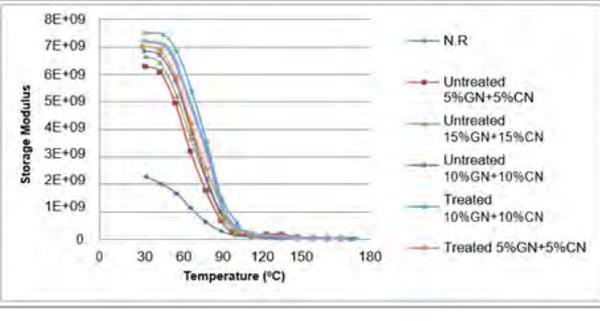


Figure 11: SM of epoxy resin with treated and untreated ground nut shell powder composite at 2 Hz

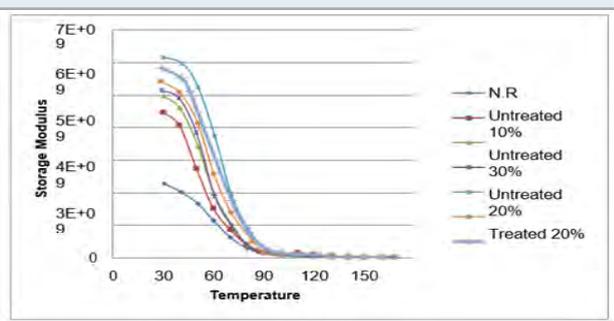


Figure 8: SM of epoxy resin with treated and untreated coconut shell powder composite at 0.5 Hz

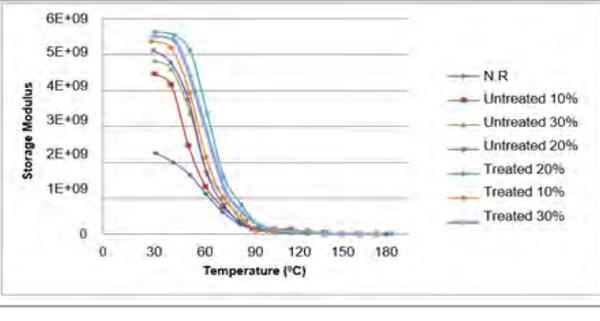


Figure 12: SM of epoxy resin with treated and untreated ground nut shell powder Composite at 0.5 Hz

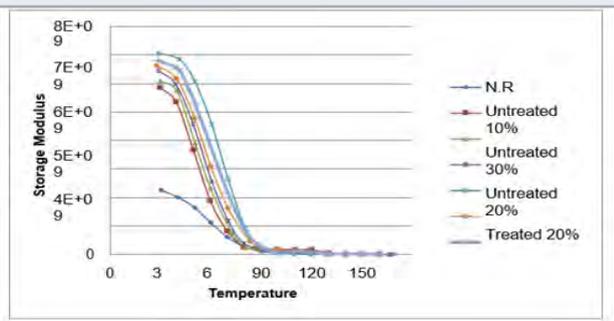


Figure 9: SM of epoxy resin with treated and untreated ground nut shell powder composite at 10 Hz

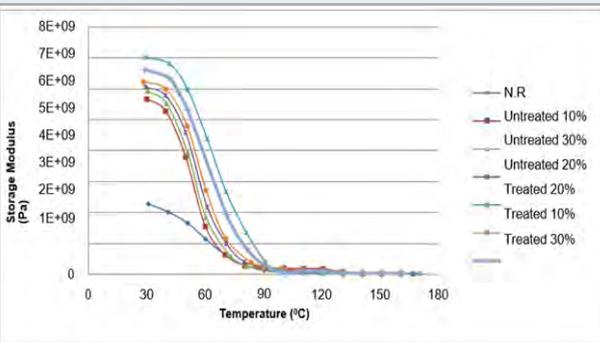


Figure 13: SM of epoxy resin with treated and untreated rice husk shell powder Composite at 10 Hz

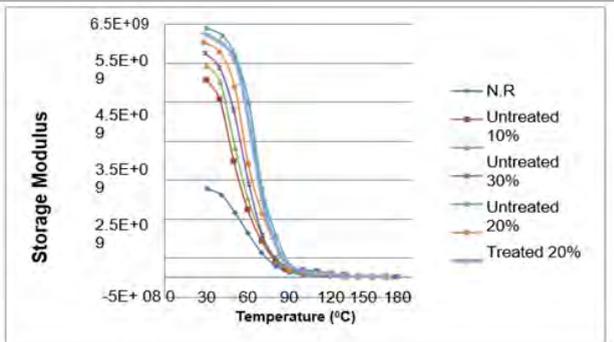


Figure 14: SM of epoxy resin with treated and untreated rice husk shell powder Composite at 5 Hz Frequency

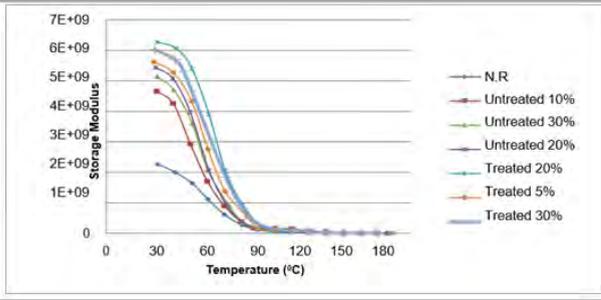


Figure 18: SM of epoxy resin with treated and untreated saw dust shell powder Composite at 5 Hz Frequency

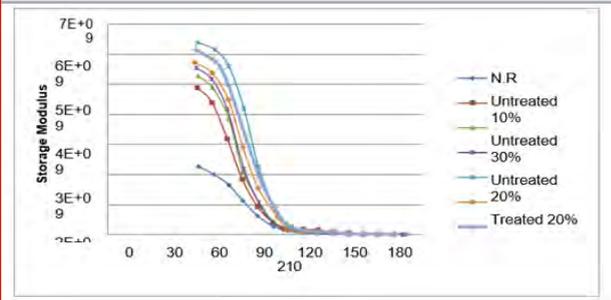


Figure 15: SM of epoxy resin with treated and untreated rice husk shell powder Composite at 2 Hz

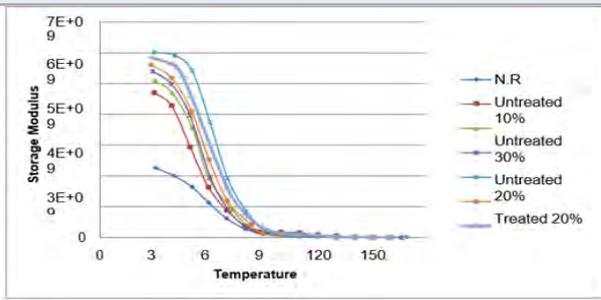


Figure 19: SM of epoxy resin with treated and untreated saw dust shell powder Composite at 2 Hz Frequency

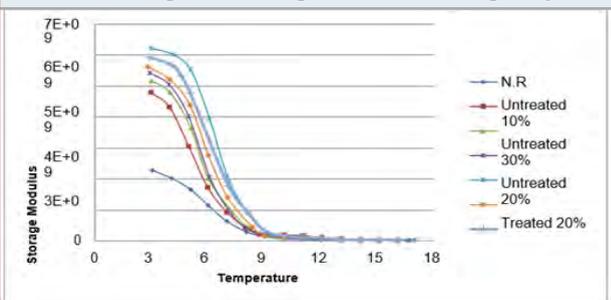


Figure 16: SM of epoxy resin with treated and untreated rice husk shell powder Composite at 0.5 Hz

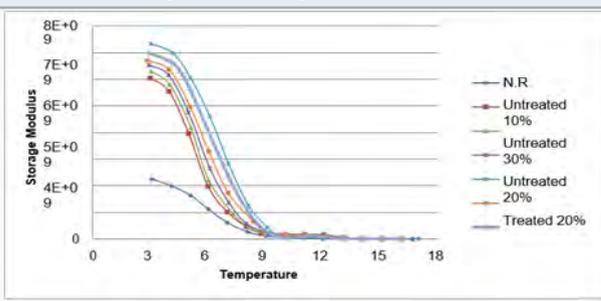


Figure 20: SM of epoxy resin with treated and untreated saw dust shell powder Composite at 0.5 Hz

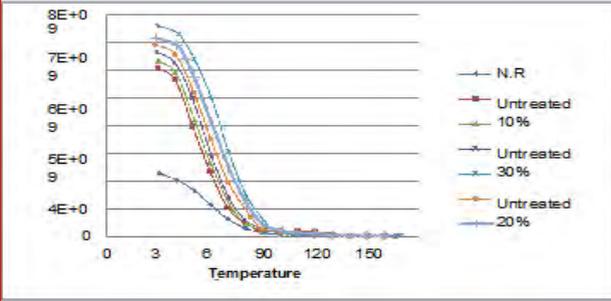


Figure 17: SM of epoxy resin with treated and untreated saw dust shell powder Composite at 10 Hz

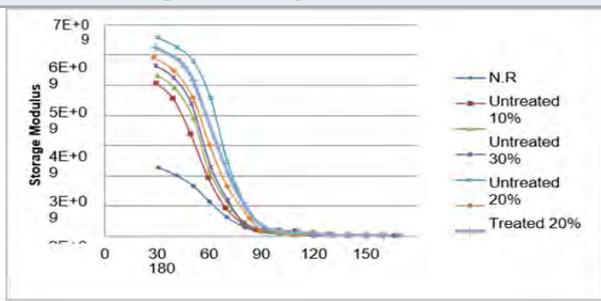


Figure 21: SM of epoxy resin with treated and untreated hybrid shell powder Composite at 10 Hz

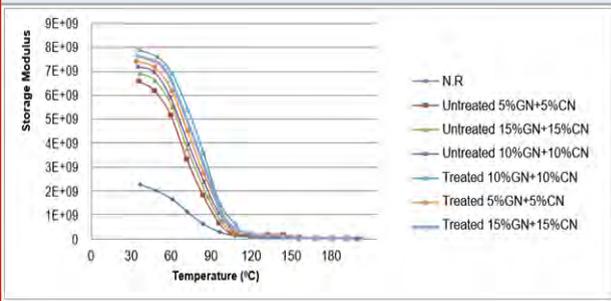


Figure 22: SM of epoxy resin with treated and untreated hybrid shell powder Composite at 5 Hz Frequency

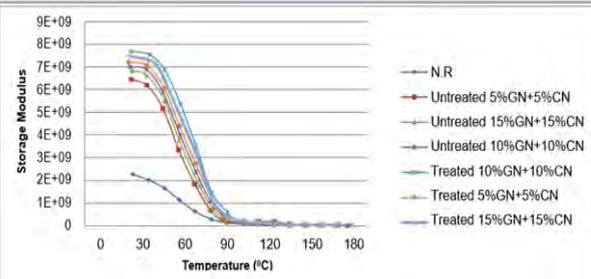


Figure 23: SM of epoxy resin with treated and untreated hybrid shell powder Composite at 2 Hz

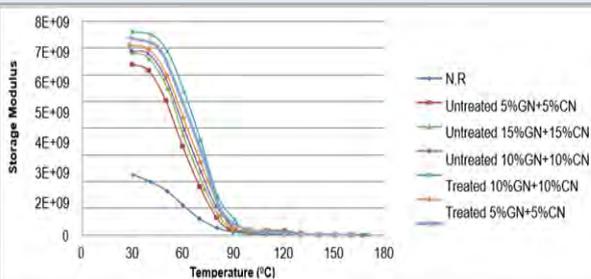
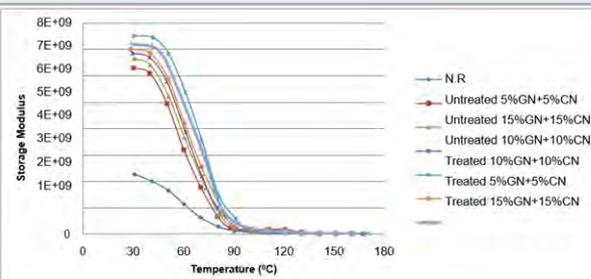


Figure 24: SM of epoxy resin with treated and untreated hybrid shell powder Composite at 0.5 Hz



The researchers suggested that incorporating fillers into the epoxy matrix increases the SM or hardness value of the collection. Another observation of FIG. X-Y is that the addition of fillers with processed fibers provides a lower value for a longer life of the modules. When you expose more time [low frequency], the value decreases. This is due to the fact that molecules with lower frequencies are more rearranged than molecules with higher frequencies. This molecular reordering of the material reduces the content to local stress. At low hotness, the particles are so stable that they cannot resonate with oscillating loads and therefore continue rigid. A thermosetting polymer has a cross bond every 20 atoms, this bond is maintained at all temperatures and therefore they are strong.

Loss Factor: It is generally labelled as the relationship between the loss section and the content storage module. Figure X-Y shows a diagram of the loss coefficient of the natural biofillers contained in the composite substantial. This suggests that the aggregate has a better energy dissipation system than the matrix. The substantial is said to be glassy or elastic energy at low temperature because the phase change of the material at temperature increases in the state of rubber or elastic entropy. Transition from the glazed position to the flexible rubber position. This is called a glass infection. The glass transition temperature is often considered as the minimum decreasing modulus temperature. In this work, the browning peak compared to the epoxy resin decreases, a significant change in the transition temperature [TG] of the glass is observed, indicating that the charge has an equivalent effect, which leads to a change in the TG value. Initially, stable because an increase in temperature causes the movement of small groups and the molecular chains initiated in the structure of the polymer. The higher the browning peak, the higher the degree of molecular dynamics. 600 ° C and 1100 ° C at 1 Hz and 10 Hz, indicating that the height of the curve δ -tan reductions and the width relative to the epoxy. The width of the niche peak represents the interaction between the homogeneous phases to the amorphous phase of Materials.

A reduction in height and an upsurge in width indicate a decrease in the mobility of molecules and an upsurge in the phase of heterogeneity. A reduced harvest height indicates better interface adhesion among the matrix and the reinforcement. Adding fillers and bad bite treatments increases the TG at the glass transition temperature relative to the resin. It shows the values of the epoxy and composite memory modules at 300 ° C, 600 ° C and 1100 ° C and shows that the variation of the e values between 30 and 600 ° C is not very important, while the temperature at 1100 ° C has a huge temperature effect on the energy absorption possessions of composite materials. Still TG, the physical assets are fully regulated by the matrix and therefore do not change significantly. When the material changes phase of the properties is caused by the breaking of the polymer chain.

Figure 25: Effect of Tan δ at 10 Hz on epoxy resin with melic treated coconut bio fillers epoxy composite

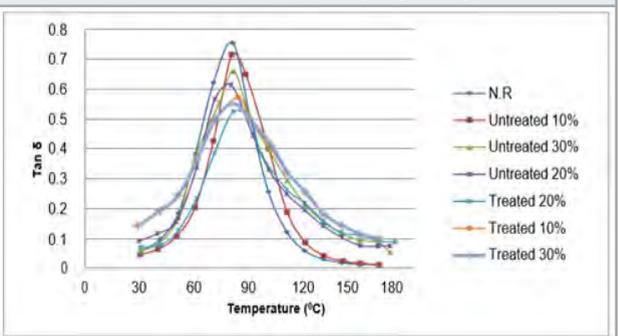


Figure 26: Effect of Tan δ at 5 Hz on epoxy resin with melic treated coconut bio fillers epoxy composite

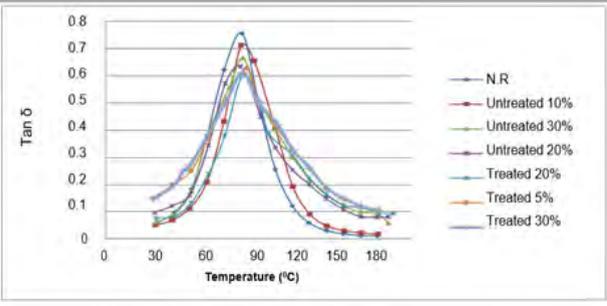


Figure 30: Effect of Tan δ at 5 Hz on epoxy resin with melic treated ground nut shell bio fillers epoxy composite

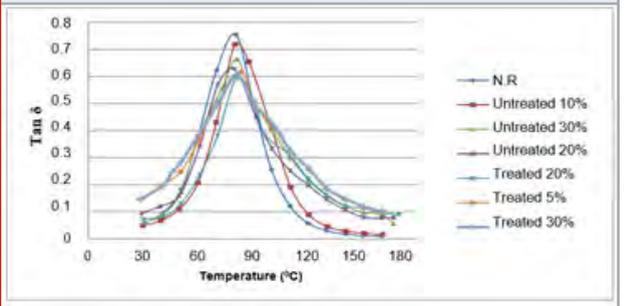


Figure 27: Effect of Tan δ at 2 Hz on epoxy resin with melic treated coconut bio fillers epoxy composite

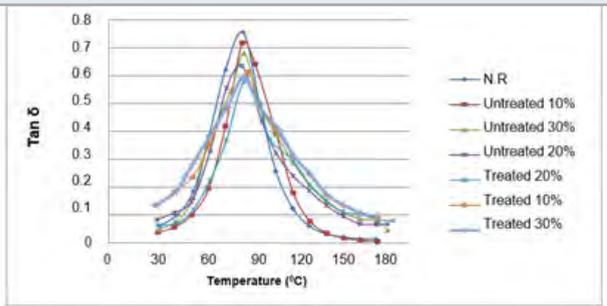


Figure 31: Effect of Tan δ at 2 Hz on epoxy resin with melic treated ground nut shell bio fillers epoxy composite

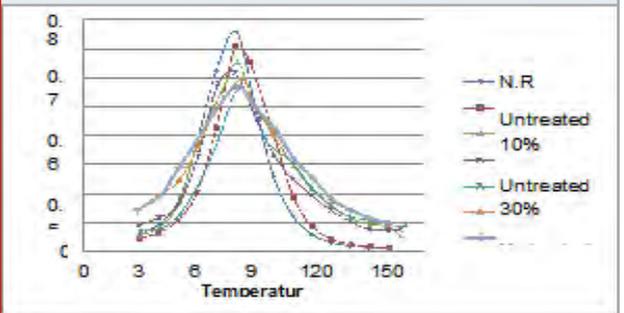


Figure 28: Effect of Tan δ at 0.5 Hz on epoxy resin with melic treated coconut bio fillers epoxy composite

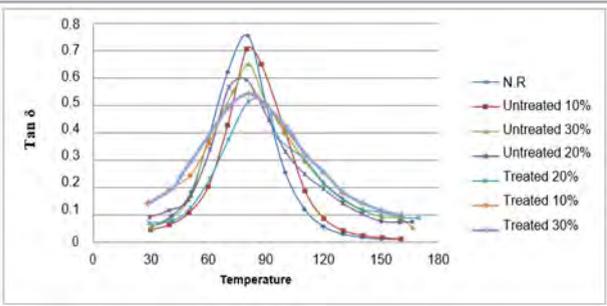


Figure 32: Effect of Tan δ at 2 Hz on epoxy resin with melic treated ground nut shell bio fillers epoxy composite

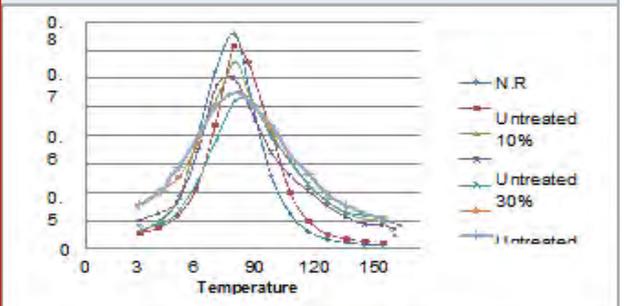


Figure 29: Effect of Tan δ at 10 Hz on epoxy resin with melic treated ground nut shell bio fillers epoxy composite

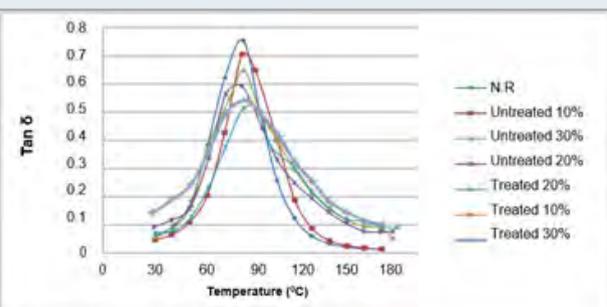


Figure 33: Effect of Tan δ at 0.5 Hz on epoxy resin with melic treated ground nut shell bio fillers epoxy composite

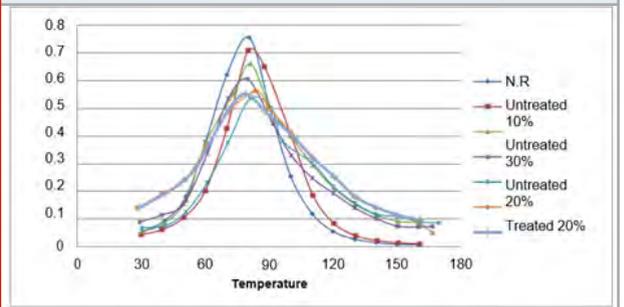


Figure 34: Effect of Tan δ at 10 Hz on epoxy resin with melic treated rice husk shell bio fillers epoxy composite

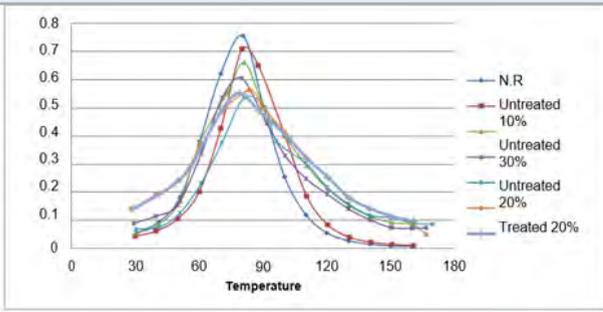


Figure 38: Effect of Tan δ at 10 Hz on epoxy resin with melic treated saw dust shell bio fillers epoxy composite

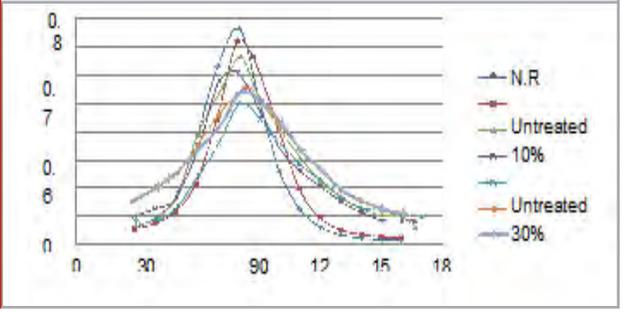


Figure 35: Effect of Tan δ at 5 Hz on epoxy resin with melic treated rice husk shell bio

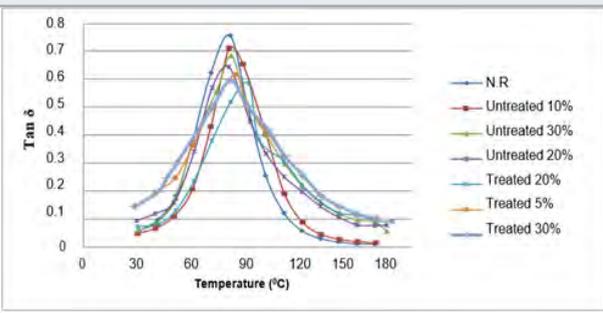


Figure 39: Effect of Tan δ at 5 Hz on epoxy resin with melic treated saw dust shell bio fillers epoxy composite

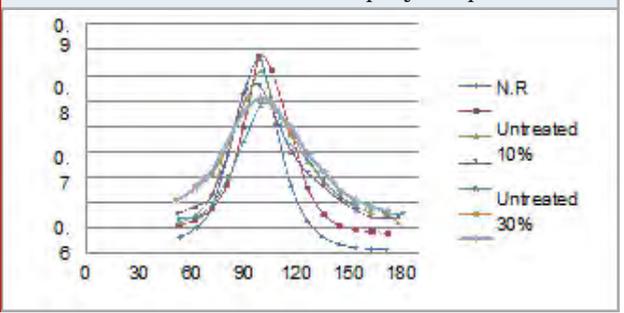


Figure 36: Effect of Tan δ at 2 Hz on epoxy resin with melic treated rice husk shell bio fillers epoxy composite

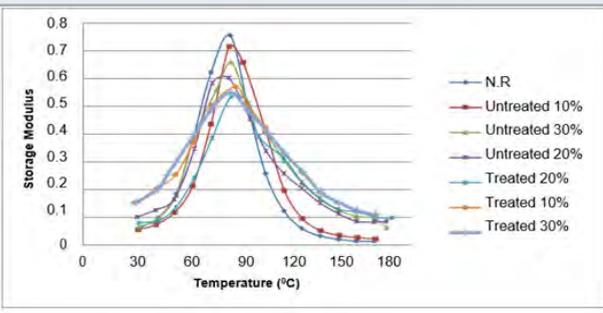


Figure 40: Effect of Tan δ at 2 Hz on epoxy resin with melic treated saw dust shell bio fillers epoxy composite

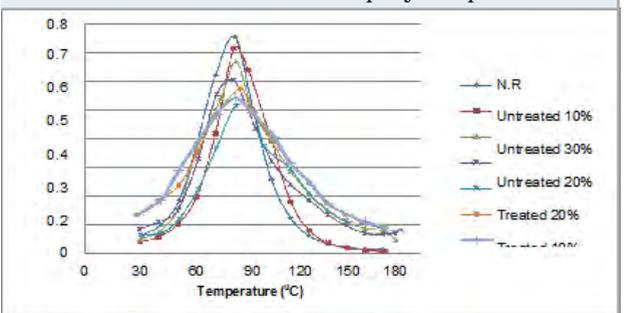


Figure 37: Effect of Tan δ at 0.5 Hz on epoxy resin with melic treated rice husk shell bio fillers epoxy composite

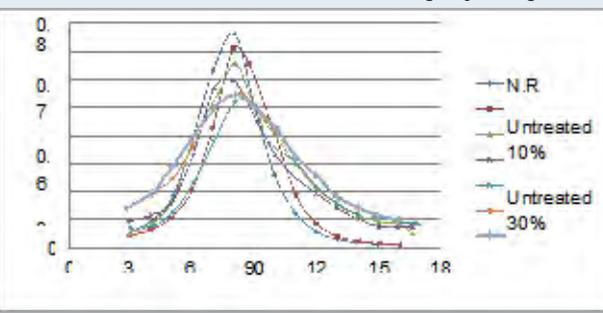


Figure 41: Effect of Tan δ at 0.5 Hz on epoxy resin with melic treated saw dust shell bio fillers epoxy composite

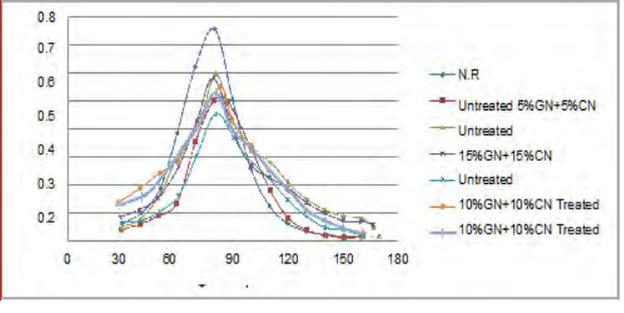


Figure 42: Effect of $\tan \delta$ at 10 Hz on epoxy resin with melic treated hybrid bio fillers epoxy composite

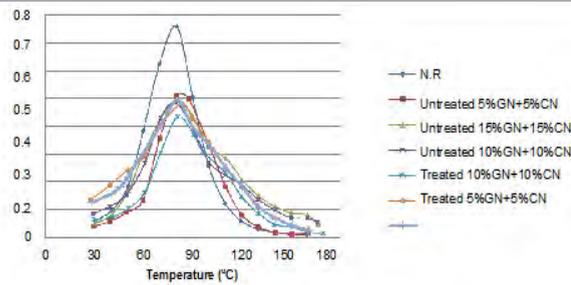


Figure 43: Effect of $\tan \delta$ at 5 Hz on epoxy resin with melic treated hybrid bio fillers epoxy composite

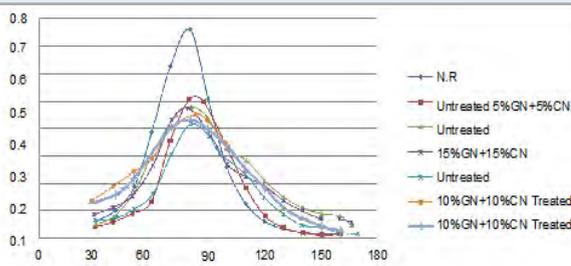


Figure 44: Effect of $\tan \delta$ at 2 Hz on epoxy resin with melic treated hybrid bio fillers epoxy composite

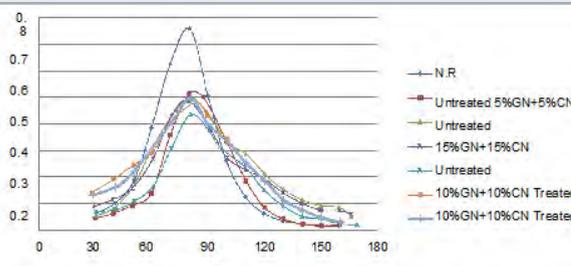
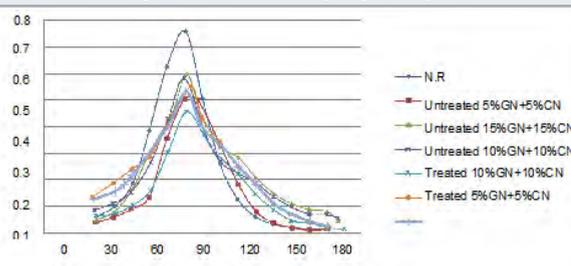


Figure 45: Effect of $\tan \delta$ at 0.5 Hz on epoxy resin with melic treated hybrid bio fillers epoxy composite

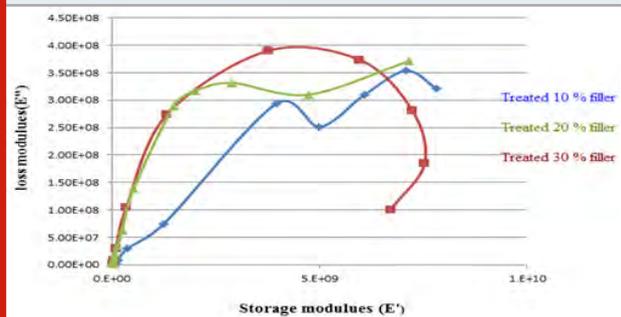


Cole - Cole Plot

The Cole-Cole line defines the dynamic correspondence at a glass transition hotness. It is designed by applying a loss module (E'') with a certain frequency relative to the memory module (E'). The Cole-Cole diagram deals with structural changes that occur in a cross related

polymer due to the totaling of filler and fibers in the resin. The type of substantial, heterogeneity or uniformity depends on the type of layout. This is as indicated in the equation.

Figure 46



$$1E'' = f(E')$$

The figure shows a call-to-call diagram with 20 volumes of filler in a composite. The display type shows the unity of the system. Curve for 20 vols. The% in the figure shows the semicircle of the position, indicating the unity of the fusion it produces. In addition, the addition of the filler deviates from the semi-circular shape, indicating that the integration is heterogeneous. The call-to-call diagram shows the loss modulus (E'') to the contribution of the elastic modulus. In this graph, the relative influence of E'' is greater than that of E' . It displays that the substantial can absorb more energy than it emits. The call-to-call diagram shows that when filler is inserted, the fertilization among the filler and the matrix upsurges and the call-to-call diagram becomes pleasurable.

CONCLUSION

When analyzing the influence of filler parameters and the increased mechanical and dynamic-mechanical properties of natural fillers, the following conclusions were drawn: Optimal parameters that offer excellent dynamic mechanical properties, filler volume percentage 20 vol%. Increasing the filler also makes the filler spiral. This reduces interface adhesion. Similarly, increasing the volume percentage leads to the incorporation of the filler.

- EM The SEM picture confirms the above findings.
- The effect of the surface alteration was analyzed on the optimal volume fraction of the filling. The results show that harmful treatment increases the cumulative benefit over other treatments such as 10% and 20%. The processing of the male surface destroys hemicellulose and lignin, shows more cellulose on the surface of the filler and makes the filler less brittle than other untreated treatments.
- The addition of fillers to processed treated fillers extends the short time measured by the memory module and leads to higher values. At the same time, exposure to high [low frequency] leads to

an impairment. This is because molecules with lower frequencies have higher rearrangements than molecules with higher frequencies.

- The coefficient loss rate results show that adding reinforcements reduces the combined loss rate. This designates that the compound has a better energy dissipation machinery than the matrix.
- Optimal parameters for excellent mechanical properties, filling volume 20 vol. An increase in the filling also makes the filling spiral. This reduces the adhesion of the interface. Similarly, increasing the volume percentage leads to the inclusion of a filler. Therefore, these two signs cause a reduction in the static mechanical assets after reaching the optimal value. The outcomes display that the treatment recovers the combined functionality. With the exception of the malic acid modification, the mechanical properties of the compound improved associated to untreated.

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Secured Authentication Using Image Shield Protection

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ABSTRACT

In web technology website security is the most important aspect. Privacy and security of data is of great importance for all web applications. Secured authentication is the key point to prevent unauthorized users from accessing the data. Existing Login Authentication is implemented as text format using identical username and password. But this device faces immense challenges from hackers, network intruders where people easily get the user's password through several methods of hacking. The framework for safe login authentication using image hotspot protection. The picture hot spot design is primarily used to prevent the unauthorized user from testing the device using different techniques of text intrusion. User initially approved must identify the exact hot spot from the picture. The user is asked to click the exact point and confuse the hackers for each clicked hot spot; the user uploaded image is created with predefined password support so hackers have found it difficult to access the password. The second step is to compare the coordinates selected with the encrypted value of the database coordinates once the hot spot is clicked in a picture, hence the user has to choose the hotspot with intersecting points which is permitted for only 3 attempts and the account is blocked. In graphical password protection, the specific hot spot can be tapped using a Pixel-Following Method based Contour-Tracing Algorithm. The uploaded files will be saved using Steganography in a protected way.

KEY WORDS: WEBSITE SECURITY, SECURED AUTHENTICATION, CONTOUR-TRACING ALGORITHM, STEGANOGRAPHY.

INTRODUCTION

A social network service consists of each user's identity (often a profile), social links, and a range of additional services, such as career services. Online social network sites are web-based services that enable individuals to create a public profile, create a list of users to share connections with, and view and cross system connections. Many social network applications, such as e-mail and

instant, are web-based and provide users with means to communicate over the Web (Avudaiappan, T et.al (2018)). Social network sites are diverse and incorporate new technologies for information and communication, such as mobile networking, photo / video / sharing, and blogging.

There are many ways hackers can take advantage of a malicious device:

- (a) The app will spread spam to large numbers of users and their families,
- (b) The app can collect personal information from users such as email addresses, hometowns and gender and
- (c) The app will "reproduce" through popularization of other malicious apps.

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Image Hotspot Security: The image hot spot architecture is used to prevent unauthorized users from assessing the system and also to prevent the password from being hacked. User initially authorized must identify the exact hot spot from the image. Almost five hot spot is used in earlier algorithm. As this process has a high likelihood of finding the password, the proposed system is designed with one hot spot password. The user is asked to click the exact point and confuse the hackers for each clicked hot spot; a duplicate image is created to make it difficult for hackers to access the password. Second step is to select the character with intersecting points once a matrix with alphabet list is clicked. Each time a new matrix is generated to make the process more difficult for hackers. Because two passwords were created by the user in this process, one is text password and the other is graphical password. Using the segmentation algorithm spot from the image is compared and the alpha numeric matrix algorithm is used to select specific hot spot in the graphical password.

Image Steganography: Cryptographic data can also be used in steganography to enhance the security of this data. In this approach we first encrypt a message using the substitution cipher method and then inject the encrypted message into the JPEG picture using DCT in the frequency domain.

Related methods: Token-based security solutions face theft fear and password-based services have memorizing issue. To avoid these kinds of problems in the aforesaid two methods, biometric information of a person is taken for authentication. Biometric is now a familiar approach through which personnel could be recognized depending on their biological or behavioral characters. (Mudassar Ali Khan et.al 2018) Majorly, the template security issue of multimodal biometrics is emphasized with various techniques to protect the crucial asset of human identity, 2019.

Our scheme also prevents above-mentioned attacks using a random nonce and pre-shared key and provides secure mutual authentication and anonymity. Therefore, the proposed scheme can be suitable to resource limited environments. An adversary can attempt to perform various attacks such as man-in-the-middle (MITM), replay, impersonation and wearable device stolen attacks. (Swati K. Choudhary et.al (2019)) Therefore, secure mutual authentication and key establishment are essential to provide privacy of user, 2019.

The increasing popularity of instant messaging applications has introduced some security measures. One of these security measures is the authentication activity that users need to make. Authentication in instant messaging applications means verifying that someone is messaging with the right person. In studies conducted to date, users are not able to achieve full success in authentication activities. In the first phase, users were expected to compare the authentication keys. In the second phase, we investigated how users assessed it when the authentication key changed. (MyeongHyun Kim

et.al (2019)) We observed that, although the participants know that they need to authenticate the other user, they can ignore the authentication process, 2018.

We have also demonstrated an attack on a prototype video surveillance system, and showed how the proposed scheme can be useful in mitigating the security vulnerability at low hardware and performance overhead. (Gamze Akman (2018)) The response generated on-the-fly by the challenge applied to a PUF instance can be used to generate session key for secure message encryption; thus offloads the complexity of managing and storing the keys for IOT device, 2018. A secure storage mechanism for cloud computing is proposed in this paper to address the available present issues, combining different security mechanism. The proposed solution includes auditing and monitoring service engines to detect and prove violations of security properties. Also the Colored Petri Nets (CPNs) are used for evaluation. (Urbi Chatterjee et.al (2018)) This results in data breach detections with proof with improved security, 2017.

The program also has several extra features including text alerts, record keeping of all login and login attempts, and a user-friendly configuration menu. Initial tests show that the NFC-based multifactor authentication system has the advantage of improved security with a simplified login process. As personal data becomes more virtual and hacking techniques become more sophisticated, the need for secure authentication becomes increasingly important. (Carlos Andr'e Batista et.al (2017)) Two-factor authentication is not commonly utilized to log users into their computer accounts, 2017.

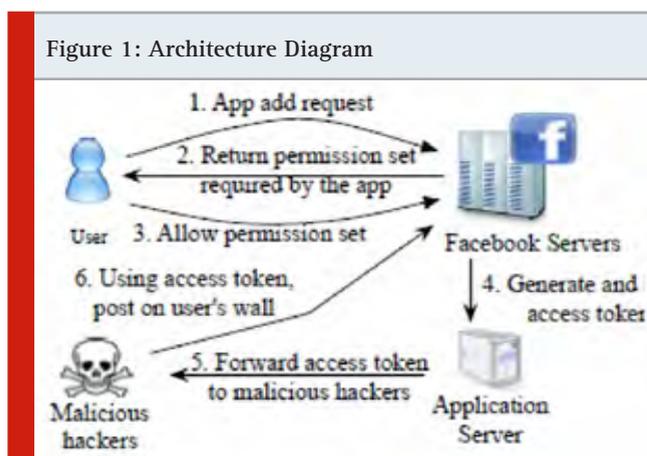
A secure biometric based authentication scheme is proposed which provides secure user identification, mutual authentication, session key issue and proxy issue in cases where a single cloud service provider (SP) provides more than one service. In Cloud computing, dedicated systems, storage Spaces and processors are maintained to provide solutions to the users. (Walter Austin Hufstetler (2017)) Here the user pays for use rather than contributing for use as in Grid Computing, 2017. We have been developing the QSA system using deformable mirrors. Thanks to an efficient optical setup and adaptive optics methods, a system experiment of the QSA was successfully demonstrated with an error probability of 3.7×10^3 . The proof-of principle experiments of the QSA was demonstrated even with a high average photon number, μ of 230 ± 40 . (Dr. G. Jasper Willsie Kathrine (2017)) This is because the number, n of spatial-dimension of optical quantum states was increased up to 1100 ± 200 using a spatial light modulator (SLM), 2017.

We use Scyther tool to analyze the security of authentication protocol in S-Mbank scheme. From the proposed scheme, we are able to provide more security protection for mobile banking service Keywords. On the other side, all of the solutions only authenticate the entities. So that, the needs of mutual authentication for both sides of the bank and the user, so the mobile banking

transaction become more secure. (Masahito Oya1 et.al (2017)) We use signcryption scheme to make efficiency in computation than sign-thenencrypt scheme, 2017.

It analyzes existing authentication schemes to identify the research gaps and then proposes a secure authentication scheme which uses Bluetooth Low Energy (BLE, BT 4.0+ version) devices for user identification and which can handle RT/CR MITM phishing attacks, attacks launched via malicious browser extensions and app spoofing via attackers. The proposed scheme is location/client system independent and is secure from Bluetooth address spoofing attacks. An attacker can compromise them by sending a phishing website link to user. The user under deception will enter his user name on the phishing website. Attacker after receiving the user name will enter it in real time on the authentic website. (Dea Saka Kurnia Putra et.al (2017)) The push notification corresponding to the user account will be sent the smart phone app, 2017.

Proposed System: User authentication can be made secure using biometric or token-based authentication techniques but special hardware is necessary for processing. The other easy to use authentication method remains the technique based on knowledge. Two approaches improve authentication by means of this technique. Photo hotspot schemes were introduced in the first, while cryptographic techniques are suggested in second approach schemes by coordinates. Second approach to improving the protection of conventional text passwords was adopted in this paper.



Benefits: The proposed scheme uses passwords based on alphanumeric characters, thus memorability results would be the same as text password scheme. The problem with alphanumeric passwords is that passwords easy to remember are easy to guess by dictionary attack. Nevertheless, because of password transformation layer, easy to remember passwords are not easy to guess in the proposed scheme. The proposed scheme uses passwords based on alphanumeric characters, thus memorability results would be the same as text password scheme. The problem with alphanumeric passwords is that passwords easy to remember are easy to guess by dictionary attack. Nevertheless, because of password transformation

layer, easy to remember passwords are not easy to guess in the proposed scheme. For other knowledge-based authentication schemes, the proposed password transformation layer can also be used to improve the security against dictionary and brute force attacks.

Platforms and Interfaces: MySQL is written in C and C++. The SQL parser use yacc and home-brewed llexer, sql_lex.cc.MySQL works on many different system platforms, including AIX, BSDi, FreeBSD, HP_UX, i5\OS, Linux, Mac OS X, NetBSD, Novell Net Ware, Open BSD, open Solaris, eComStation, OS\2 Warp, QNX, IRIX, Solaris, Symbian, SunOS, SCO Open server, SCO UnixWare, SunOS, True64 and Microsoft Windows. A port of MySQL to open VMS is also available. Links to MySQL database libraries are available in all major language programming languages-specific APIs. Additionally, an ODBC interface called MySQL enables additional programming languages to communicate with a MySQL database, such as ASP or ColdFusion, which support the ODBC interface. In ANSI C\ANSI C++ the MySQL server and the official libraries are mostly implemented. Also downloadable from the MySQL site are GUI administration tools: MySQL administrator and MySQL Query Browser. Both of the GUI tools are now included in one package tools \5.0.html MySQL GUI Tools.

The Main Features of MySQL

1. Written in C and C++.
2. Tested on a wide range of different compilers.
3. Works on different platforms.
4. Makes use of GNU Auto, Autoconf, and Libtool for portability.
5. Multi-layered MySQL Server Architecture, with separate modules.
6. SQL functions are implemented using a highly optimized library of classes, and should be as quick as possible. There is generally no memory allocation after initialization of the query.

Data Types

1. Many data types: signed\unsigned integers 1,2,3,4 and 8 bytes long, FLOAT, DOUBLE, CHAR, VARCHAR, TEXT, BLOB, DATE, TIME, DATETIME, TIMESTAMP, YEAR, SET, ENUM.
2. Fixed-length and variable-length records.

Statements and Functions: Full operator and function support in the SELECT list and WHERE clause of queries.

For Example:

1. MySQL>SELECT CONCAT (first name,',', last name).
2. FROM citizen.
3. WHERE income\dependents>10000 AND age>30.
4. Full support for SQLGROUP BY and ORDER BY clauses. Support for group functions (COUNT (), COUNT (DISTINCT....), AVG (), STD (), SUM (), MAX (), MIN() and GROUP CONCAT ()).
5. Support for LEFT OUTER JOIN and RIGHT OUTER JOIN with both standard SQL and ODBC syntax.
6. Names of the functions do not conflict with names

of the table or column. ABS for example is a valid name for the column. The only restrictions that are allowed no space between the function names for a function call.

7. Tables from different databases can be referenced in the same sentence.

Security

1. A privileges and password scheme that is very versatile and reliable and allows for host-based verification.
2. Passwords are protected; because every password traffic is encrypted when connect to a server.

Uses: MySQL is used in Web applications and functions as the database part of the LAMP software stack. The growth of web application use is closely related to the popularity of PHP, mostly in conjunction with MySQL. For data storage and user data recording, most high-traffic websites (including Flickr, Face Book, Facebook, Twitter, Nokia and YouTube) use MySQL (Gaurav Varshney et.al (2017)).

Future Releases

1. The MySQL 6 roadmap specifies support for:
2. All storage engines with reference integrity and international key support are planned for release in MySQL 6.1.
3. For MySQL 6.0 beyond the 65,536 Basic Multilingual Plane (BMP) characters, support for additional Unicode characters is informed.
4. A new storage unit, called falcon, is also in terms of. Will find a preview of Falcon on MySQL website.

Apache Server: The Apache HTTP Server, commonly called simply Apache, is a web server that plays a key role in the initial growth of the World Wide Web. The majority of web servers using Apache run the Linux Operating System.

Apache is developed and maintained under the auspices of the Apache Software Foundation, by an open community of developers. The framework is available on a wide range of operating systems, including UNIX, FreeBSD, Linux, Solaris, Novell NetWare, Mac OS X, Microsoft Windows, OS/2, TPF, and eCom Station. Apache is defined as free software and open source software, published under the Apache License.

Features: Apache supports a number of features, many of which are implemented as compiled modules that expand the core functionality. These can include programming language support on the server side of authentication schemes. Perl, Python, Tel and PHP support certain common language interfaces. The common modules for authentication include mod access, mod auth, mod digest, and mod auth digest, the mod digest successor. A list of other features includes the mod ssl support for SSL and TLS, a proxy module, a rewrite engine for URLs, implemented under mod include and mod ext. Virtual hosting allows one installation of Apache to support several different actual websites. For

Example, one machine with one Apache installation could simultaneously serve www.example.com test47.test_server.test.com, etc.

Uses: Apache mainly serves static content as well as dynamic web pages on the World Wide Web. Many web applications are built in anticipation of the world and features Apache offers. Apache is the web server portion of the common stack of LAMP web server applications, along with MySQL and the programming languages PHP / Perl / Python (and now also Ruby). Apache is redistributed as part of various proprietary software bundles, including the Oracle Database or the application server IBM Network Sphere. Mac OS X uses Apache as its built-in web server and as support for its application server WebObjects. It's also assisted in the Kylix and DeOlphi development tools by Borland in some way. Novell NetWare 6.5 contains Apache, where it is the default web server. Apache comes with many Linux distributions as well.

Modules

User Modules

Login: Users can get into their account by logging in. The login module lets users log in to a username and password. Place this module on any Module Tab to allow users to log in to the application. If the administrator has authorized users to create accounts a connection to the Create Account appears in the login tab.

New User Registration: New users are allowed to register their information in these modules. After that the user gets the permission to access their information by logging in.

Security Page: It is then guided to this page after positive login. It should be given a security code on to mobile number from this website. Once the code has been issued then enter the code on this link. Then select a hotspot image within five seconds if the selected hotspot failed to match the account has been logged out and it did not select the hotspot image within the time of logged out.

Profile Page: After a good login, it will be guided to this page with security code and image hotspot. Here can see all of the information and with expertise that can change or adjust the account details.

Post Image or Status: User can upload a picture or status to the public through this module. If any unauthorized or malicious post is posted, admin automatically blocked the user account. If a user uploaded some unwanted or malicious post before updating the post to the public the user receives an error notification from the admin for unwanted post. If you cancel this post before you have stopped uploading your account. If after receiving the warning you post your message, your account has been blocked.

Comments Page: User can view all posts posted by users in this module and the user has the permission to send comments for that posting.

Upload File to Encrypt: After logging in successfully it will be redirected to this page. To attach the secret message, it should upload the picture. And enter the secret message which should be stored in encrypted form as well.

View Album: All uploaded files will be viewed in album format. Secret message will be hidden into the image. That message will be displayed outside.

Download and Decrypt the File: Once user clicks the download button, the user will receive an OTP to display the secret message. User need to enter the OTP correctly after obtaining an OTP. If that OTP matches, it will display secret message separately in decrypted format. The program will redirect to the album page if OTP doesn't match.

Logout: This module has been used to allow users to log out their account. When the account has been logged out no one can access the account without username and password information.

Admin Modules

Login: By logging in, the admin can access his account. The Authentication Module helps him to sign in with a User Name and password. You can place this module on any Module Tab to allow admin to login to the application.

View User Details: Admin will show all of the users and his information in this tab. If any new users register their details here, after the user registers his account, Admin can show their details there. Admin has permission to remove users from this site and its information.

View User Blocked Accounts: Admin can access all blocked user accounts and the details of last operation of that user in this section. Admin has permission to disable this user account that has been disabled or to delete its user account.

Logout: This module has been used to allow Admin to log out his account. Once the account has been logged out no one can access the account without the username and password knowledge. A technique that has been suggested to address competing needs is simultaneous encryption whereby the encryption key is usually the section information hash after effect. Although simultaneous encryption is by all accounts a reasonable possibility to achieve privacy and deduplication meanwhile, it experiences shockingly different definitely understood vulnerabilities such as lexicon assaults: an aggressor who can locate or predict a document can infer the probable encryption key.

Experimental Result: In this project, we present the text mining algorithm, which segments use global and local context in meaningful phrases called segments. In guiding the segmentation process, we demonstrate through our algorithm that local linguistic features are

more reliable than term-dependence. This discovery opens up opportunities for tools that are built to apply formal text to tweets that are thought to be much noisier than formal text. Photo hotspot is a list of coordinates related to a particular photo, generated to hyperlink image areas to different destinations (as opposed to a standard image link, where the whole image region links to a single destination). For example, a world map could hyperlink each country to more details about that country.

Homepage
New User Registration
Register Image Hotspot
Step-1 Enter username and password
Step-2- Choose Hotspot
Send Post
Binding image and secret message
Admin Login

Future Enhancement: There are two paths we consider for our future research. One is to further improve the quality of user comments by taking further local factors into consideration. The other is to explore the usefulness of segmentation-based representation for tasks such as quest, suggestion for hash tags etc.

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A Review on Workload Characteristics for Multi Core Embedded Architectures using Machine Learning Techniques

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ABSTRACT

Optimization of energy consumption in system on-chip (SoC) become a challenging task in real-time. Detection of best core for each workload is an additional critical task. To overcome these challenges, we developed the novel machine learning algorithms for mapping each workload on the Quad-core platforms. In this paper, we adopted support vector machines (SVM), naïve baize, random forest and KNN for prediction of the best core for each workload. Initially, we observe the workload characterization in terms of memory, instruction cycles, branch data's and developed as a database. In second phase, we deployed the ML algorithms with trained database to predict accurately the best core for each workload. In the third phase, prediction accuracy, energy consumption metrics are observed and compared with the traditional algorithms. The proposed model is executed on Rasp -pi Quad-Core hardware platform and ML algorithms are simulated on the python IDE. Simulation results illustrates the prediction accuracy is achieved up to 98% on SVM prediction for SPEC (CPU-2006) benchmark and 10.2% on the energy consumption metric when compared to other ML techniques.

KEY WORDS: CORE PREDICTION, EMBEDDED WORKLOADS, RASP-PI 3, MACHINE LEARNING, AND ENERGY CONSUMPTION.

INTRODUCTION

ML is a study of training PCs to act by taking care of the information and letting them gain proficiency with a couple of tricks, without being explicitly customized to do as such. AI (ML) frameworks, as a rule, can improve their presentation on a specific task with expanding experience (Mohssen Mohammed et.al (2016)). In a regular classification issue, the framework is taken care of

with preparing models comprising of information vectors (includes) and related result estimations (marks) which is by and large alluded to as administered learning. During preparing, the calculation makes expectations based on the information and is remedied if those forecasts don't coordinate the normal names. The objective is to manufacture an expectation model that sums up well on concealed models, which means it delivers the right result for inputs that have not been a piece of the preparation information. Unaided learning, interestingly, manages errands where no outcome labels are available (Benjamin Hettwer at.al (2018)).The learning algorithm tries to deduce useful properties or the underlying structure of the input dataset, e.g.by clustering it into different classes. Semi-supervised learning lies some place in the middle of regulated and solo learning and depicts settings at which result names are available for

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a piece of the preparation models yet not for the entire informational index.

Mixed tasks at hand are likewise expanding step by step, delivering some significant quality utilization and execution staying to be a genuine test. Few researchers use changing repeat and voltage enrolling in embedded structures which continuously decrease ordinariness and voltage and alongside these lines' essentialness (Carl Witt et.al (2018)). In any case, the DVFS diminishes the nearness of the way. From now on the appraisals use a couple of heuristics for the choice of the best scaling portion under the objectives. Additionally, fixing the least recurrence doesn't generally bring down the vitality utilization (Virender singh et.al (2018)). Static fixation of the operating metrics is not leads to the efficient results at runtime (V AKramar et.al (2018)). The proposed prediction model includes the ML techniques which classifies and predicts the workloads and best cores on the quad core platforms. ML adoption on the embedded multicore system is discussed in the remaining sections.

2.Related Work: (A.S. Kumar et.al (2012)) was particularly associated with building up a case for DVS calculations particularly focused on gaming applications. The proposed framework utilizes the power adjustment techniques by varying the voltage and frequency of the running application during execution. This optimizes the processors power consumption and the performance metrics. (A. Das et.al (2015)) has pretend a thought of movable strategy for energy minimization in computer vision applications on a multi center framework. In this paper, authors developed the regression models such as multinomial, linear and other regressions in order to detecte the video frames classifications at runtime. This framework includes the labelled data and pretrained heuristics. Multinomial Logistic Regression-based remaining task at hand differentiation system is essential to the previously mentioned technique.

(J. Kim and S. Yoo (2011)) proposed another sort of online extraordinary voltage and repeat scaling (DVFS) structure which thinks about computational outstanding weight, runtime circulation, slow down time, and program stage direct. The issue of online DVFS is overseen two distinct ways which are program stage area and interphases remaining task at hand pre-lingual authority. The program section identification is utilized to describe the present moment has a place with a specific program stage. Further, it is utilized to acquire the accepted remaining task at hand as indicated by the identified programming stage.

(K. Choi et.al (2004)) presents a framework known as "remaining tasks at hand decay" in the CPU outstanding burden its crumbled in various segments: on-chips and off-chip. The on-chip remarkable job that needs to be done features the computational clock cycles that are relied upon to execute heading in the CPU while the off-chip remaining weight gets the measure of external memory get the opportunity to clock cycles that are required to perform outside memorytrades. Exactly,

the power optimized based on the popular adjusting operation metrics technique (DVFS) withimperativeness use. This increases the static consumption of the energy and power during the idle state.

(Saravan chidambaram and sujoy saraswati (2016)) developed a movable and proficient update interim technique for recurrence the executives and dynamic voltage. Right now, voltage and recurrence of the strategy for the occasional remaining tasks at hand have been arranged including the upkeep of delicate constant cutoff times. So as to introduce the efficient level of the strategy, examinations between versatile, fixed interim and prophet DVFS frameworks have performed utilizing air conditioning tual remaining tasks at hand of the bundle preparing applications and decoders. The trial results demonstrated that the recommended adap-tive interim DVFS procedure can spare more power with low fre-quency refreshes in examination with the fixed interim DVFS frameworks. The drawbacks of the existing techniques are not efficient for mixed workloads and energie efficiency is less and also existing techniques are not adopted the machine learning algorithms for workload characterization and mapping.

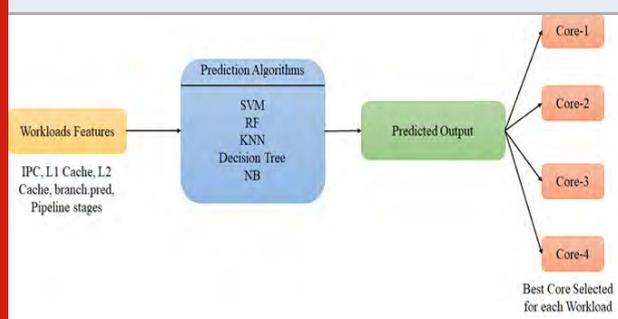
3. Embedded Workload Characterization: Workload Characterization can be utilized to foresee future asset prerequisites which help in scope organization, task planning, and asset provisioning in an effective way. The remaining burden portrayal is commonly performed by utilizing two unique methodologies i.e., execution -based ((A. Gandhi et.al (2014)) and (ANTON REY et.al (2016))) and model-based (Weinjianwang and changian men (2007)) philosophies. The model-based strategy is favored over follow based on the grounds that it is rationalist to the fundamental framework on which the follow has been recorded. The workloads are characterized using the performance tool (Xiang Gao et.al (2019)) in terms of memory occupation, registers, and other peripheral usages of execution of applications on the hardware platforms. We adopted those executed results as a feature and formed as an embedded database which utilized for this work as an input. The recent applications include the heterogeneous workloads (P.P.Ray (2018)). Building a brought together model that can foresee the future asset use of these different applications is an incredibly testing task. These errands show shifted conduct regarding periodicity, connection, and rehashing designs.

Table 1. Embedded Workload Characteristics

S.no	Features Metrics
1	Instructions Per Cycle (IPC)
2	L1 cache
3	L2 cache
4	Branch Mis-prediction
5	Pipeline stages

The extracted executed features are feed-forwarded as training data for the proposed framework in order to detect the optimal resource for configuration and execution at runtime. Table.1 illustrated the extracted important features of the workload execution.

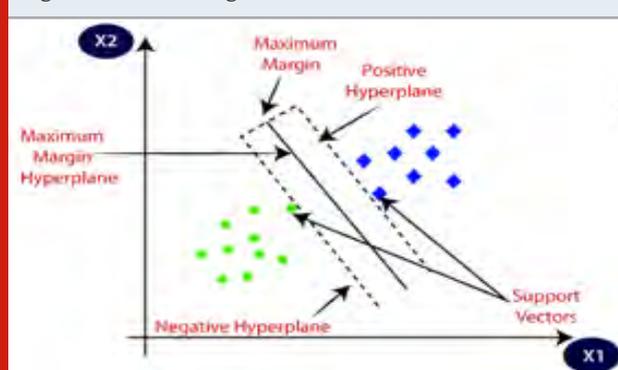
Figure 1: An Overview structure of Proposed Model



4. Exploitation of Machine learning Algorithms:In this section, diverse ML techniques are adopted for core prediction framework for embedded workloads on the Quad-Core platforms. We characterized the embedded benchmarks such as SPEC (CPU-2006) (Lee et.al (2014)) to comprehend the execution behavior of the workloads. Prediction Algorithms are discussed below.

4.1 Support Vector Machine (SVM): SVM is the most popular superlative classifier among other algorithms. This algorithm is utilized for predicting the cores for each workload based on the labeled data and features of the workloads. The workload feature extraction and pre-processing methods are mentioned in section 3. Table 1. Illustrates the feature extraction data are given. In this paper, we classified our workloads based on the input features within four diverse classes. Here classes represent the Cores.

Figure 2: SVM Categorization Model

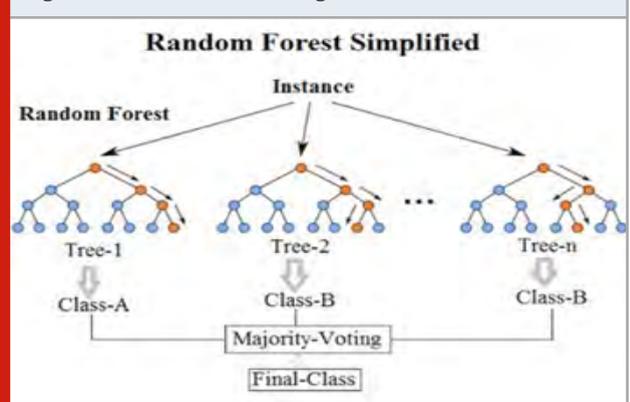


4.2 Random Forest Algorithm: Arbitrary backwoods, similar to its name infers, comprises of an enormous number of individual choice trees that work as a gathering. Every individual tree in the irregular timberland lets out a class forecast and the class with the most votes turns into our model’s expectation in Figure.3. The major concepts of the random forest algorithm are given below.

- Irregular testing of preparing information focuses when building trees
- Irregular subsets of highlights thought about while parting hubs

When preparing, each tree in arbitrary backwoods gains from an irregular example of the information focuses. The examples are drawn with substitution, known as bootstrapping, which implies that a few examples will be utilized on different occasions in a solitary tree. At test time, expectations are made by averaging the forecasts of every choice tree. This methodology of preparing every individual student on various bootstrapped subsets of the information and afterward averaging the forecasts is known as sacking, short for bootstrap accumulating.

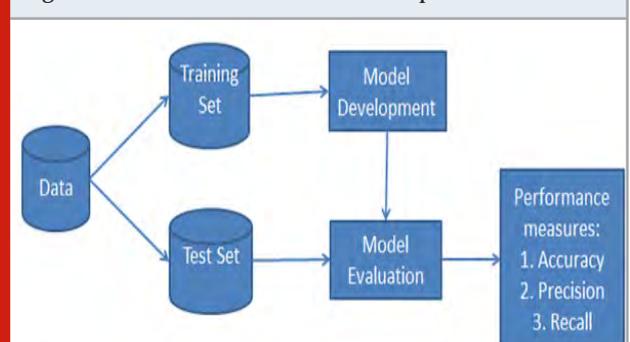
Figure 3: Structure of RF Algorithm



4.3 Naïve Bayes: A Naive Bayes classifier is a probabilistic AI model that is utilized for arrangement task. The essence of the classifier depends on the Bayes theorem. By means of Bayes hypothesis, we can discover the likelihood of an occurrence, given that B has happened. Here, D is the proof and C is the theory. The presumption made here is that the indicators/highlights are free. That is nearness of one specific component doesn’t influence the other. Thus, it is called guileless.

$$Q(D|C) = \frac{Q(C|D)Q(D)}{Q(D)} \tag{1}$$

Figure 4: Evaluation Model of the Proposed Framework



5.Experimental Set-up: The proposed algorithms are evaluated with the skilled and difficult codes which is segregated as 70% for preparation and 0.3 percentage for testing. We adopted SPEC CPU benchmark (A Daveedu Raju et.al (2019)) programs database for performance analysis. These algorithms are tested on the real-time quad core platform such as raspberry pi 3 using Scikit-learn -python IIDE

$$\text{Prediction Exactness} = \frac{DR}{TNI} * 100 \quad (2)$$

Energy Consumption=Workload Exec.time*Average Power consumption (2)

where DR and TNI represents number of detected results and total number of iterations. The proposed prediction framework is compared with the state-of-art classifiers such as random forest, naïve Bayes and AI networks. Results are illustrated below. From the above figure 4 and 5, Support vector Machines produces the highest accuracy in the prediction of cores with an efficient workload characterization.

Figure 5: Core Prediction Accuracy Chart for SVM

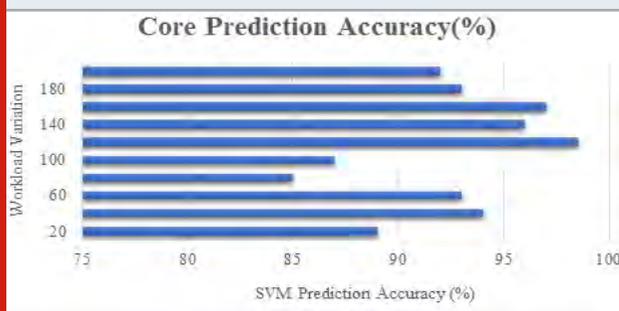
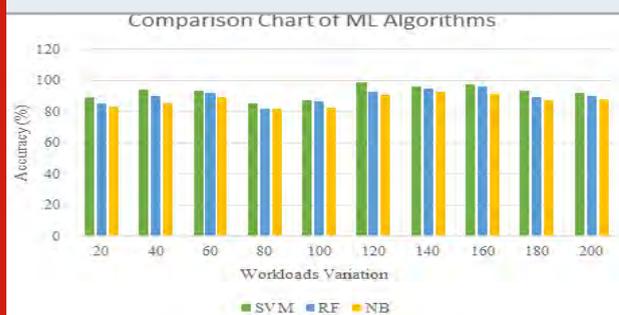


Figure 6: Comparison Evaluation of ML



CONCLUSION

This paper addresses about various machine learning techniques for core prediction of each workload before execution to optimize the energy consumption. In this paper, we adopted support vector machines (SVM), naïve baize, random forest and KNN for prediction of the best core for each workload. Initially, we observe the workload characterization in terms of memory, instruction cycles, branch data's and developed as a database. In second phase, we deployed the ML algorithms with trained

database to predict accurately the best core for each workload. In the third phase, prediction accuracy, energy consumption metrics are observed and compared with the traditional algorithms. The proposed model is executed on Rasp -pi Quad-Core hardware platform and ML algorithms are simulated on the python IDE. Simulation results illustrates the prediction accuracy is achieved up to 97% on SVM prediction for SPEC (CPU-2006) benchmark and 10.2% on the energy consumption metric when compared to other ML techniques.

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A Hybrid Method for Deduplication and Redundancy Checking in Cloud Storage with Side Channel Attack

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ABSTRACT

As one of the couple basic headways to distributed storage administration, deduplication grants cloud servers to save additional room by eradicating abundance document duplicates. With progress in advancement and its straightforwardness of accessibility, the utilization of processing gadgets is extended which leads to advancement in data. Be that as it may, it regularly discharges side channel data in regards to whether an exchanging record gets de-copied or not. Abusing this data, adversaries can without much of an extend dispatch a format side-channel assault and seriously hurt cloud clients' security. In our Framework actualizes, there are two strategies for taking out the monotonous information within the capacity framework, for illustration, information deduplication and data decrease. Information deduplication is one of the finest methodologies which removes abundance data, diminishes the data transfer capacity and moreover brings down the circle us and cost. Our planned framework exhibits its capacity of dispensing with knowledge deduplication-based side channel and in the meantime keeping deduplication advantages.

KEY WORDS: DEDUPLICATION, REDUNDANCY, SIDE CHANNEL ATTACK, PRIVACY, AES ALGORITHM.

INTRODUCTION

Cloud deduplication empowers the cloud server to clear repetitive duplicates of a comparative record which is exchanged by different cloud clients and space its stockpiling asset. By means of checking equity of records, deduplications can be clearly executed when all documents are exchanged and put away in plain content. Lamentably for this circumstance, cloud clients confront

a high threat of security perils since their information is completely presented to both inside enemies of the cloud(for case, deceitful staff) and exterior aggressors (for illustration, software engineers) who have viably ruptured the cloud. Regardless, deduplications over encoded records are troublesome for cloud server. At the point when different clients only scramble a comparative record with their own keys, the encryptions are exceptionally astounding and the cloud server can't perform deduplications with straightforward consistent examinations. In expansion, regardless of whether the server realizes two encryptions relate to a comparable record, it can't just delete one of them since document proprietors just realize their very own keys and how to translate their claim mixed records. As of late, different brilliant traditions have been organized by examiners to form deduplications over mixed records conceivable.

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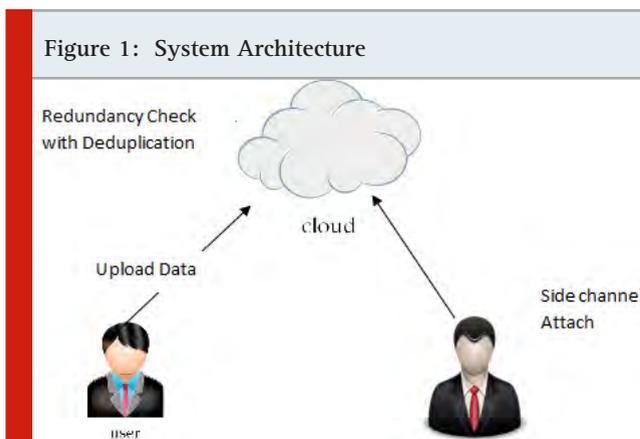
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While deduplications are empowered in above conventions and encoded records significantly improve cloud client's security level, deduplications could turn into a side-channel and foes can use it to dispatch format assaults (H. Cui et.al (2017)). An enemy can fill the individual data of its assaulting focus into a protection related format document (for example medicinal records, money related archives, and so on.), and transfer it to the cloud to see whether deduplication happens [Fig 1]. If deduplication happens, the enemy knows the document it made does exist, and the private data of the objective is uncovered or checked. For example, an enemy fills Alice into a solution for some particular sickness or an enlistment type of a center represented considerable authority in that illness, and discovers this record triggers deduplication.

All the more unequivocally, when a client should exchange an archive, Sender sends a duplicate check demand (dc demand) to the distributed storage. After accepting solicitation, the distributed server chooses in the event that it features a copy of the specified record in its stockpiling. On the off probability that a duplicate is found, it sends a selected duplicate check response (dc response) that illustrates the closeness of the document, and includes a relevance the present record, from this time forward the express transmission of record from the client to the distributed storage is never once more required; something else, the client exchanges entire record to the dispersed storage.



The root cause of the deduplication-based side channel is deterministically associated between the dc sales and dc reaction. All the more unequivocally, the cloud deterministically answers a positive dc reaction to deactivate all express record exchanging after finding the dc specified document in its stockpiling.

2.0 Related Work: (M. Bellare et.al (2013)) to allow definitions both to security and for a sort of respectability that we call label consistency. In view of this foundation, we make both commonsense and speculative commitments. On the down to earth side, we provide ROM security investigations of a characteristic group of MLE plans that consolidates sent plans. On the speculative side the test is standard show courses of action, and we make affiliations with deterministic encryption (J. R. Douceur et.al (2006)), hash capacities secure on related data sources and the

illustration then-extricate worldview to communicate plots under various suspicions and for different classes of message sources (C. Hazay and Y. Lindell. (2010)).

(J. Blasco et.al (2014)) to execute a novel course of action dependent on Bloom channels that gives an versatile, flexible, and provably secure reply for the inadequacies of deduplication, which overcomes the insufficiencies of existing techniques. We give a formal depiction of the plan, a cautious security examination, and look at our reply against numerous current ones, both deductively and by strategies for broad benchmarking. (R. Douceur et.al (2002)) proposed a framework to increase space from this unplanned repeated data's to make it open for well-ordered document replication. Our instrument consolidates 1) concurrent encryption, that authorizes duplicate records to mixed into the storage of a self-contained document, notwithstanding of whether the documents are preset with altered clients' keys, and 2) SALAD, a Self-Arranging, Lossy, related Database for storing up manuscript and expanse data in a reorganized, flexible, lack tolerant way. Tremendous scale generation tests illustrate that the duplicate record blending method is versatile, significantly active and imperfection understanding.

(R. Di Pietro and A. Sorniotti. (2012)) to display a new Proof of Ownership (POW) contrive that has entirely highlights the leading in class arrangement whereas bringing around a small amount of the overhead experienced by the contender (S. Halevi et.al (2011)); second, the security of the proposed components depends on data speculative as contradicted to computational suppositions; we furthermore propose viable streamlining methodologies that assist to progress the plan's exhibition. (T. Jiang et.al (2017)) to implement couple of plans: static plan and dynamic plan, where the final one grants tree alter by extending a few calculation cost. Our crucial trap is to utilize the instinctive tradition subordinate on static or dynamic choice trees. The bit of slack picked up after this is, by partnering with clients (M. Mulazzani et.al (2011)), the server determination diminish the complexity of time along with deduplication balance assessment since straight period to viable logarithmic period concluded the entire documents things within the records.

(S. Lee and D. Choi. (2012)) to propose a randomized answer for cross-client source-based deduplication, client's security is, in any case, still in peril with a high probability. We propose another cross-client source-based deduplication giving significantly upgraded security. (J. Li et.al (2015)) to form the vital attempt to ceremoniously state the problem of affirmed data deduplication. Not quite the same as standard deduplication systems, the benefits of clients stay along with the consideration in duplicate check further the data itself. We moreover show a number of different deduplication advancements with associated authorized duplicate check in a mixture cloud plan. Security analysis shows that our proposal is protected as distant as the descriptions determined within the offered safekeeping model (M. O. Rabin

(1989)). As per a confirmation of thought, we actualize an architecture of an approved duplicate check plan and coordinate testbed tests utilizing our model (V. Rabotka and M. Mannan (2016)).

(Y. Shin and K. Kim (2015)) propose a remote user deduplication convention. A capacity entryway licenses proficient information deduplication while reducing the threat of data spillage. Its security can be solidly guaranteed by the meaning of differential protection. We evaluate the amplex and effectiveness of the proposed convention through examinations.

3.0 Our System Model: The essential central point of this framework is on capacity proficiency of information records. Our point is to recognize duplicate information documents, before exchanging any unused record. This will incite proficient capacity use and clear reiteration.

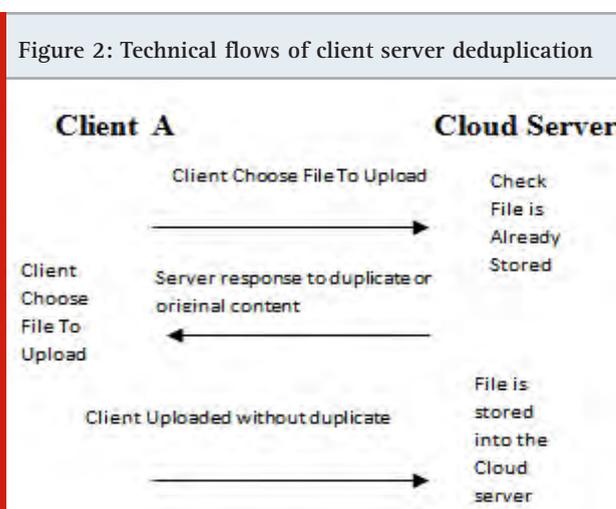


Figure 2a: Client can be upload into the Cloud server as de-duplicated one.

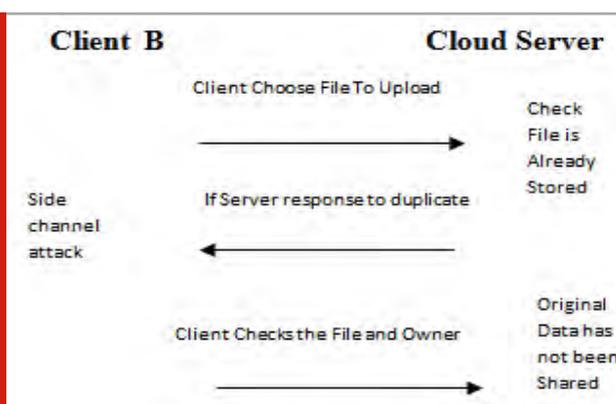


Figure 2b: Client B has been Side Channel attack whether his/her file is duplicate

A. The Server: An essential answer for expect the ambushes against Advanced Encryption Standards (AES) comprises of encoding the cipher texts coming about

because of AES with utilizing the proportionate entering measureable information. This course of action is perfect by means of the deduplication prerequisite later vague cipher texts coming about since of AES would abdicate vague yields even after the additional encryption action. We suggest joining the entrance control work with the instrument that fulfills the security against AES through an additional encryption action. In reality, get to control is an intrinsic capacity of any capacity framework with sensible security confirmation sown in fig.2.

B. Block-level Deduplication and Key Management: In spite of reality that the components of the storage area with the adjustment to the retreat inadequacies of AES, also the need for unique data at square dimension additionally promotes a concern regarding key administration. As a characteristic component of AES, the encryption keys are derived from data itself which don't dispose any necessity to the client to keep the estimated key every mixed data fragment.

C. Threat Model: The objective of the method is to assure information privacy devoid of dropping the upside of data uniqueness. Classification need to be ensured for every records, together with the anticipated ones. The security of the complete method don't rely on the retreat of a secretive part (only reason of disillusionment), and the safety level shouldn't drop once a secretive segment is undermined. We determine the storage area as a confided in portion regarding client affirmation, the safety along with the additional encryption. The server isn't believed as for the security of information put away at the distributed storage provider. Along these lines, the server can't perform disconnected word reference assaults.

D. Security: Within the proposed plan, just a single portion, that's the server, is trusted as for a limited course of action of tasks, in this way we mention it as partially-trusted. When the storage area associates the extra encryption, information are never again powerless against AES shortcomings. To be beyond any doubt, without having the typesetting information utilized to extra encryption, not even a single segment can achieve word reference assaults on the information put absent on the distributed server provider. The server could be fundamentally on partially confided segment that's conveyed over the client's properties and is dependable for carrying out client confirmation, get to control and extra symmetric encryption.

4.0 Implementation

A. User: The work of the client is confined to portion documents into squares, encoding them with the joined encryption procedure, stamping the subsequent scrambled squares and making the capacity demand. What's more, the client furthermore encodes every unique key received after comparing hinder along the past one and also with the private key so as to re-appropriate typesetting information continuing with just storing the key received through the foremost square associated with document finder.

B. Server: The server contains different essential jobs such as: approving clients in the midst of the capacity/recovery demand, executing entree mechanism by affirming square marks set in Along with the available information, scrambling/decoding information venturing out from clients to the cloud and vice versa. The server deals with including a bonus layer of encryption to the information exchanged by clients.

C. Cloud Storage Provider (SP): Cloud Storage Provider is the foremost fundamental segment in the framework. Foremost work of cloud provider is to manually store the information squares. The provider doesn't know about the deduplication and neglects any current association between at least two squares. In truth, the providers as no idea about which file(s) a square may be a piece of or in case two squares are a piece of a comparable record. This suggests regardless of whether SP is interested, it has no genuine way to deduce the primary substance of an information square to recreate the records transferred by the clients. It merits calling attention to that any distributed storage provider would almost certainly work as SP. In truth, ClouDedup is totally clear from SP's perspective, which does not work alongside deduplication. The most job of SP is to store information squares beginning, which can be considered as records of small estimate. Thus, it is conceivable to utilize doubtlessly understood distributed storage providers, for illustration, Microsoft Azure, GoGrid, Rackspace.

D. AES Algorithm

Step 1: Initialization setup

```
password, key, time, salt: string
time ← get_time
input ← (password)
key ← salt + time
```

Step 2: Encryption process

```
Ciphertext ← AES encrypt (password, Key)
output (Ciphertext)
```

Step 3: Decryption Process

```
key ← salt-time
for as much tolerance given time
if (key=get_time)
key ← salt+time
plaintext ← AES decrypt (Ciphertext, Key)
end if
end for
output (plaintext)
```

Side Channel Attack: The deduplication flag (i.e., duplication checker response), that mentions the client distinguishes facts that the lump is presently within the storage area, making a side channel. The assertion of-a-document (S. Lee and D. Choi. (2012))is primarily presented with respects to focalized encryption [8] yet can be normally connected to our unique circumstance. All the more definitely, with the objective of distinguishing the nearness status of a particular lump, an assailant affirms their suspicious by playing out the identical

verify the deduplication. The certification of-a-document is found as the foremost coordinate security spillage because of the side channel.

RESULTS AND DISCUSSION

A. Results: We performed test content records of a few substances with varied degree from 1KB to 5 MB. (J. Li, et.al (2014)) and (M. Li et.al (2014)) and (J. Liu et.al (2015)) File position utilized is '.txt'. Data File is examined utilizing examined work which restored the transferring time and deduplication results. Utilizing this, times esteem is determined to plot the substance record [Fig 3]. Before exchanging input content document, first its coordinate rate is decided with the records put away in database.

On the off chance that the coordinate percent is zero, at that point just the document is exchanged within the database else it illustrates a message as "Record as of now exist", where input exchanged is 'test1.txt' Testing on data record with different title however comparative substance has been performed, which gives exact result of document as of now exist, moreover records with comparative names however interesting substance has been attempted which demonstrates result as record don't coordinate (P. Puzio et.al (2013)).

Figure 3: Data Uploading time (Ms) with various File sizes (bytes)



Figure 4: Deduplication chart as Various Files with Various File Sizes

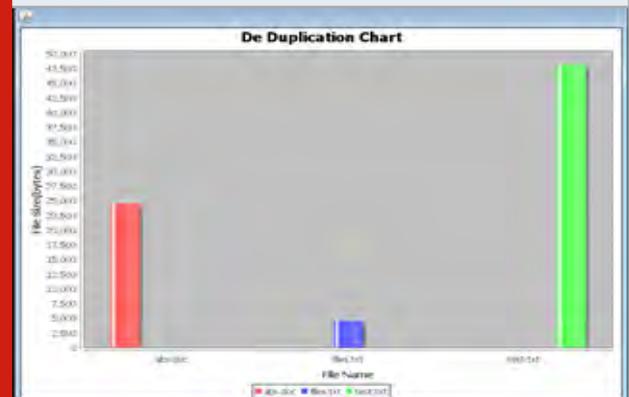
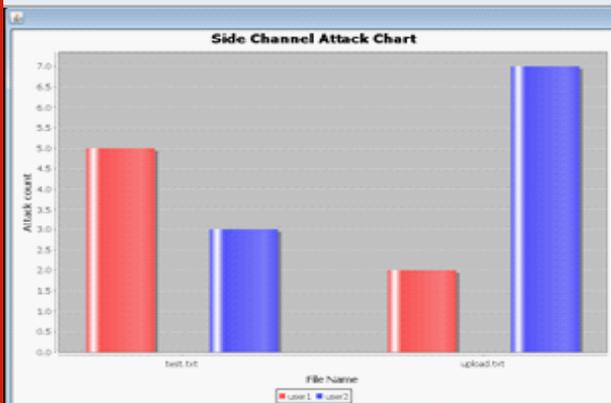


Figure 5: Sidechannel attack with various users as different files



B. Discussion: The deduplication strategy is executed in java and utilizations grouping matcher to find the coordinate level of the whole document. This result in finishing the deduplication of content documents put away in database. It furthermore prompts cost minimization of distributed storage framework. The use of deduplication can be utilized to preserve a strategic distance from theft of data, for illustration, in the event that any record is being transferred as an appropriated copy it exceptionally well may be ousted as copies won't be permitted to do as such [Fig 4]. This could moreover be connected to evacuate repetitive information put away on cloud and besides offer assistance to store information productively. Within the occasion that anyone can get to the side channel assaults suggests it'll secure the primary substance in addition.

CONCLUSION AND FUTURE SCOPE

The framework is intended to evacuate duplication and abundant of content documents. In this paper we fulfill this by finding the comparative substance of content documents. Typically the unused deduplication methodology for viable distributed storage of content records and moreover evading the sidechannel assault as well [Fig 5]. For future work, verified method for discovering comparability is by finding out hash of the content record, as the substance won't be miss-utilized while getting to the database for finding the coordinate. Furthermore closeness can be found by segregating the record substance into squares with the objective that it'll give the consequence of coordinated squares. Cloud innovation can be utilized to induce eventual outcomes of match rate faster, on the off chance that in the event that the database is in GB's.

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An 8-Bit Subranging ADC Using 48nm FINFET Technology for Low Power Consumption

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ABSTRACT

Electricity is an important source in day-to-day life of every individual. It is the essential source of this world. Electricity is generated from natural gas or coal. These natural resources are limited and non-renewable which is a fact that is not realized by the people of this society mostly. It is necessary to save electricity to conserve these resources for future generation. As an attempt to conserve power, we use Finfet technology to design electronic devices which consumes less power than other technologies. A 8 bit Sub ranging ADC is designed using a 48nm FinFet technology. This provides a major control over the leakage power. To design this sub ranging ADC, only a smaller number of comparators are used than parallel flash ADCs. Here, we combine a Time-based ADC architecture combining a Flash ADC and Vernier TDC to achieve both high speed & resolution. The pipelined Flash ADC and Vernier TDC increases the conversion speed. For low-power residue transfer, A charge - steering amplifier is used. The output of the charge steering amplifier is added with a common level adjuster to stabilize the output level. The parameters measured from this implementation is compared with the parameters achieved from the existing CMOS design of Subranging ADCs.

KEY WORDS: FLASH ANALOG TO DIGITAL CONVERTER(ADC), TIME TO DIGITAL CONVERTER(TDC), CHARGE STEERING AMPLIFIER(CSA), COMMON LEVEL ADJUSTER, SUBRANGING, VOLTAGE TRANSFER CURVE(VTC).

INTRODUCTION

As per the world data, the total consumption electric energy in India per year is about 1,137.00 billion kWh. An average of 841kWh is the Per Capita. Till now, India supplies it with the self-produced energy. In addition to this, India is trading energy with other countries. But, the total consumption of power increases every year as the world gets advanced day by day. If this situation persists,

India will run out of resources to generate electricity Hadi Aghabeigi et al., (2017). So, it's necessary to reduce power consumption in all the electrical, electronic & mechanical devices in use with research & discoveries and also to be aware about saving energy Deepa Jose, et al., (2017). Here, we have come up with one such idea of reducing power consumption in Analog to Digital Converter (ADC) which is an electronic device used in radio agronomy applications, medical equipment's and so on.

ARTICLE INFORMATION

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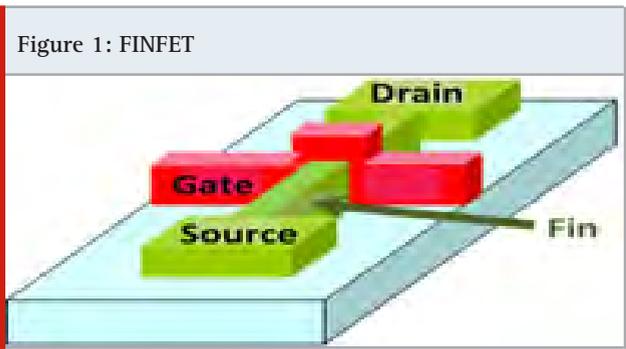
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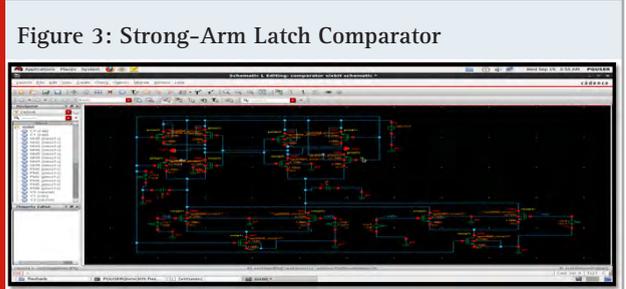
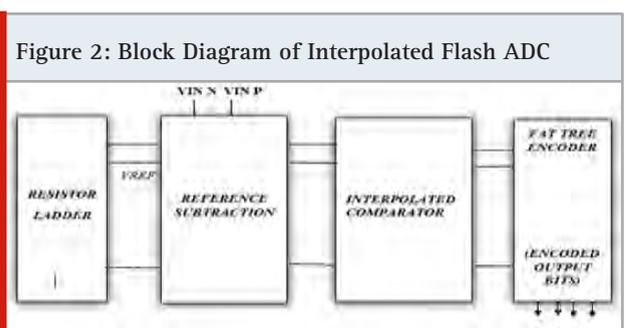
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formed by the source and drain provides more volume for the same area than traditional transistors. The channel length is determined by the thickness of the fin. It provides high performance at low power consumption S. Zhu et al., (2017).



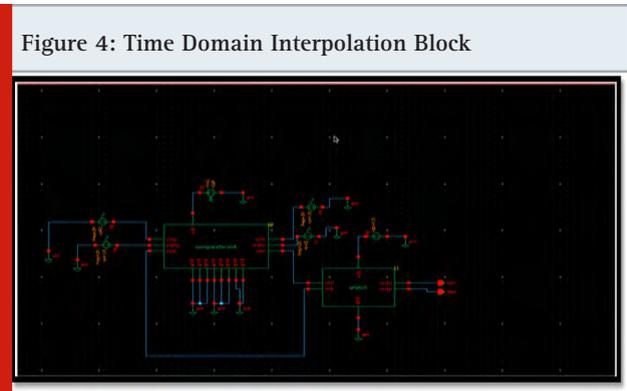
B) Subranging ADC: When the resolution is higher than 8-bit then instead of full-flash ADC, it can be more convenient to use a sub-ranging for a better speed-accuracy trade-off. In flash converter one comparator per LSB is used, but a sub ranging ADC uses less comparators, consumes less power, has lower input capacitance, and attains higher resolutions Kazuaki Deguchi et al., (2017).

II. Design of 4-Bit Flash Adc With Finfet Technology: A 4-bit flash ADC is designed using 48nm FinFet Technology. The ADC is comprised of a resistor ladder with $V_{refp_15:1}$ and $V_{refn_15:1}$ reference voltages, a voltage comparator comparing input analog signals & reference voltages, and a fat tree encoder converting the outputs of the comparators into binary code. A strong-arm Latch is used as the comparator which employs low-power in comparison with pmos & nmos latches. The design in FINFET results in good performance metrics such as reduced area, low power consumption, better resolution and etc.



A) Design Of A Strong-Arm Latch Comparator: In Figure 3, A strong arm latch comparator is designed using FinFet. This design consumes zero static power & produces rail to rail output. The design consists of two cross coupled pairs, a differential pair & four pre-charge switches.

B) Time Domain Interpolation Unit: Its performing interpolation on a sequence of time domain samples which is similar to zero padding of time samples Mahesh Kumar Adimulam et al., (2017). Time domain interpolation halves the number of comparators required for a Flash ADC (i.e) $\frac{1}{2}(n) - 1$ where $\{n=2^N\}$



In figure 4, A time domain interpolation block is designed using Finfet. Here, V_{inp} is compared with $V_{refp}(i+1)$ without using comparator $(i+1)$ by deciding which of $v_{cp}(i)$ and $v_{cn}(i+2)$ falls earlier by using an SR latch.

C) Fat Tree Encoder Unit: The Fat tree encoder reduces the leakage power & area consumption due to the reduction of short channel effects by the gate wrapped around the fin Ko-Chi Kuo et al., (2017). This is used to encode the thermometric code to one of n codes and then to binary codes and the speed is improved by a factor of 2.

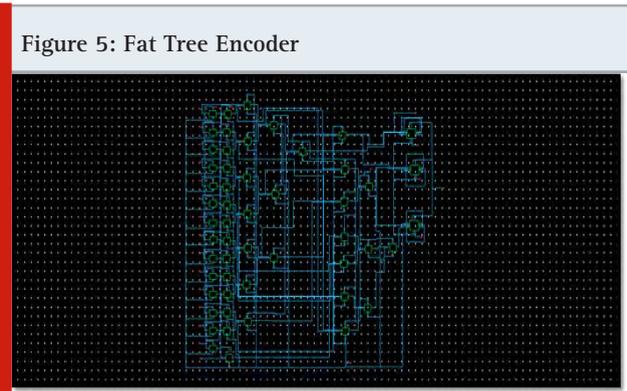


Figure 5, shows the Fat tree encoder designed using FinFet Technology, This encoder contains two encoding blocks such as a) one out of N coder b) encoder with NAND and NOR logic gates.

D) Implementation & Power Analysis of Interpolated Flash Adc: In Figure 6, An Interpolated high-speed Flash ADC completely designed using 48nm FinFet technology

is shown. Figure 7 shows the digital output of the flash ADC. The power consumed by the design is about 39.7 μW as shown by the power plot in Figure 8.

Figure 6: Design of Interpolated Flash ADC

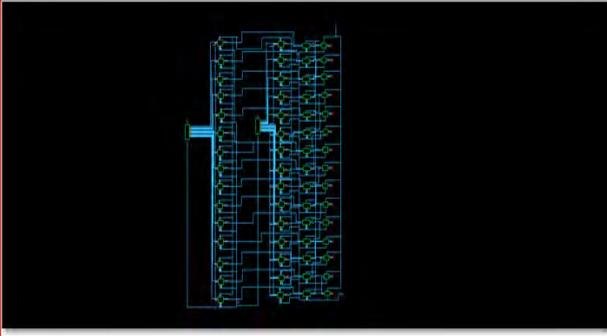


Figure 7: Output of the Interpolated Flash ADC

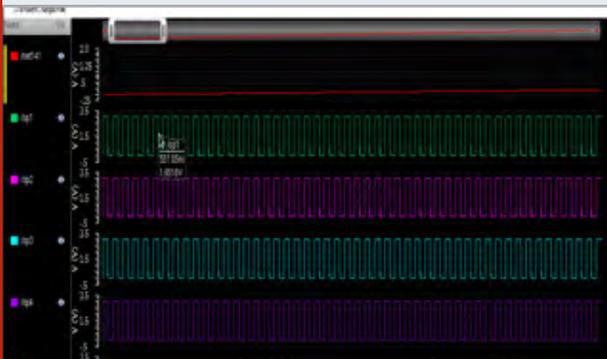
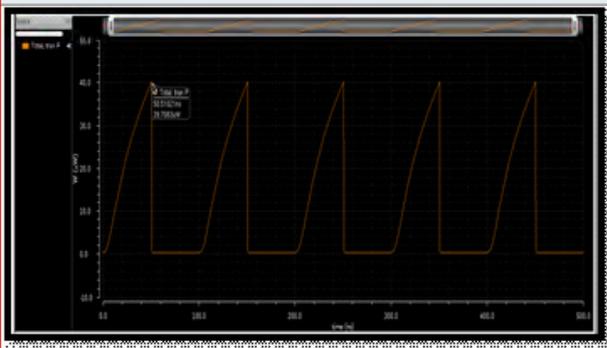


Figure 8: Power Consumption of The ADC Design



Reference Subtraction and Residue Generation: In Figure 9, The design of reference and residue generation unit is shown. Reference subtraction & residue blocks are merged to reduce consumption of area & to handle power dissipation. When S1 & S5 are ON - V_{in} is stored in capacitor. When S2 is ON - reference subtraction is generated ($V_{ref} - V_{in}$). When either S3 or S4 is ON then it is the residue generation phase. If S6 is ON V_{resp} is generated.

Design of Flash TDC: TDC is a Time to Digital converter. Here, the time difference between the rising edge of start and stop signal is measured.

In Figure 10, A TDC is designed with FinFet Technology. A delay line generating reference time signals $T_{ref_32:1}$, a time comparator which compares the stop signal and reference time signals, and an encoder are used. Figure 11, shows the output of the Flash TDC. High OUTH when T_{ref} rises before Stop, and high OUTL when the Stop rises before T_{ref} .

Figure 9: Reference Subtraction and Residue Generation Unit

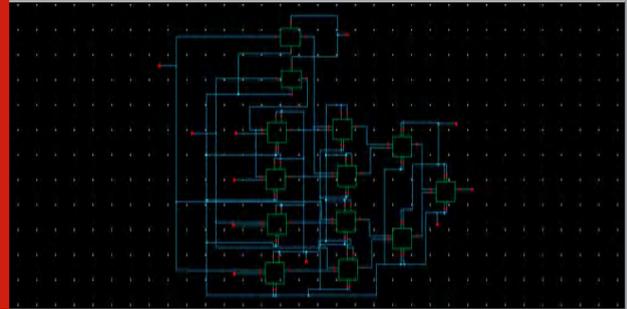


Figure 10: Design of TDC

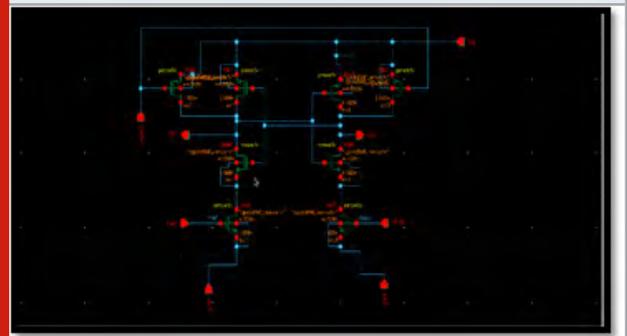


Figure 11: Output of Flash TDC

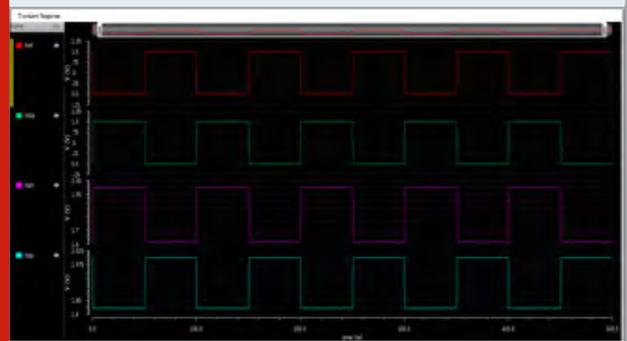


Figure 12 shows the Flash TDC for 5bit conversion. Here, we prefer to use a Vernier TDC to suppress the conversion gain and to improve the performance metrics. Figure 13 shows Design of Vernier TDC in FinFet. The Vernier TDC is comprised of two delay lines, the time resolution is determined by the time difference between the two delay lines. The dynamic delayer is used for delay lines. The speed is improved by this Vernier TDC.

B) Charge-Steering Amplifier With Common Level Adjuster: A charge steering amplifier (CSA) is used as

a residue amplifier. The CSA results in a low-power operation since it does not consume dc power. The residue signals are amplified by the CSA and transferred to the VTC.

Figure 12: 5 Bit Flash TDC

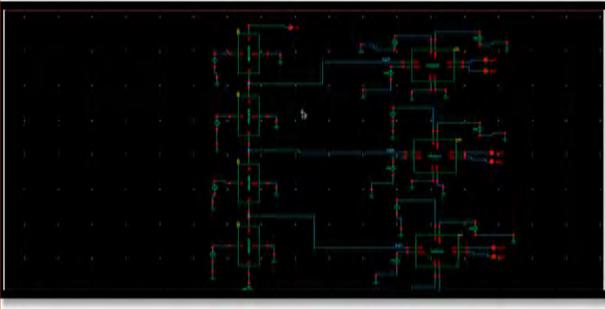


Figure 13: VERNIER TDC

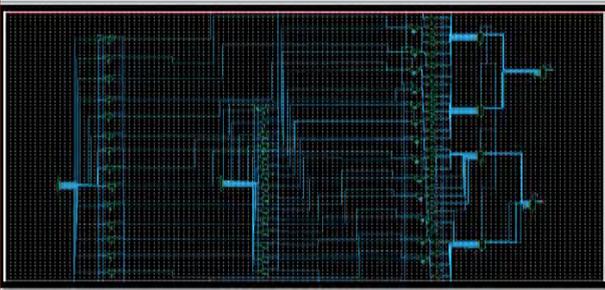


Figure 14: CSA

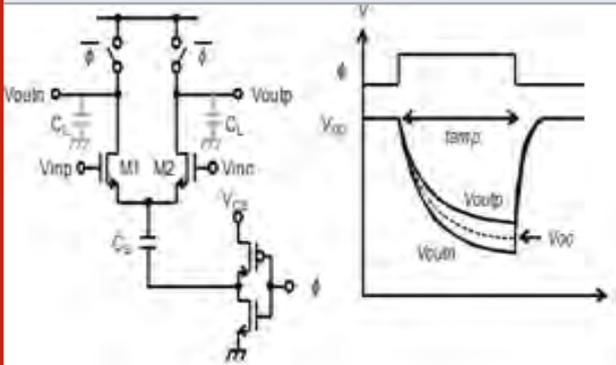
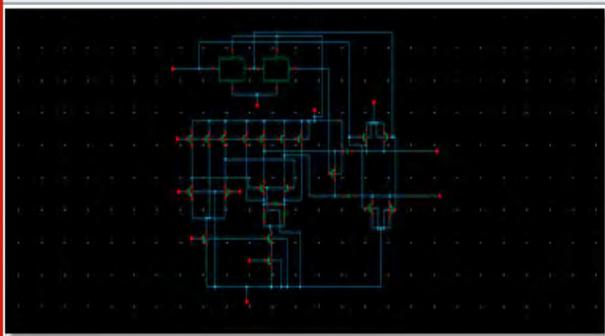


Figure 15: CSA With Common Level Adjuster



In Figure 15, A Charge steering Amplifier with common level adjuster is used. To transfer the residue between first and second pipeline stages, charge steering amplifier is used. To maintain the stability of output, we use a common level adjuster.

C. Dynamic VTC: The VTC converts the residue signal into the time difference between the rising edges of the START and STOP signals. The time difference is converted into 5-bit digital code by the TDC.

Figure 16: Dynamic VTC

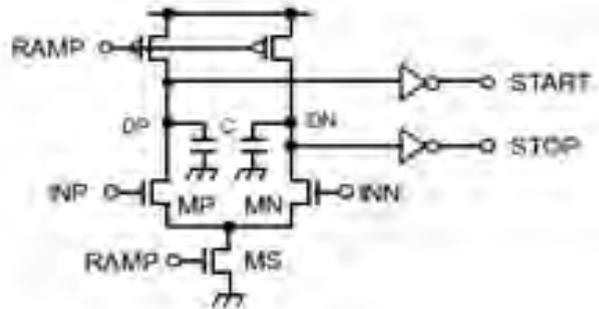


Figure 17: Design of Dynamic VTC In FINFET

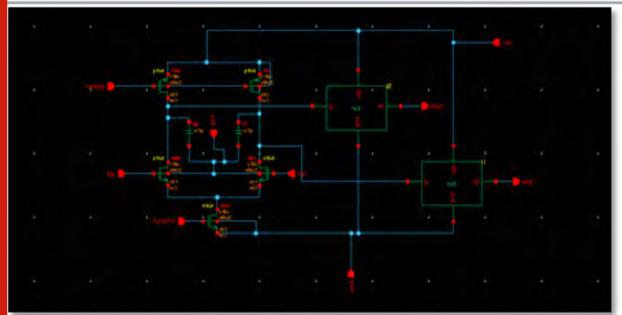


Figure 17 shows the design of Dynamic VTC using FinFet Technology. A careful design is required to avoid poor linearity. It is comprised of a differential pair with two load capacitances. It has two phases of operation, precharge phase and evaluation phase.

Proposed 8-Bit Subranging Adc Using 48nm Finfet Technology: We propose a Sub ranging ADC architecture using FINFET combining a Flash ADC and a Time-Based ADC which are pipelined to achieve a higher speed of operation. There is a twostep process inculcated within this Sub ranging ADC. At first step of conversion, Flash ADC is the coarse ADC. By comparing the V_{ref} signal with the V_{in}, the reference and residue block provides the reference output which is fed into the Interpolated Flash ADC and the residue is transferred to the second stage. At the second step of conversion, TDC is used as Fine ADC. The residue in CSA is processed and converted to time signal and the stability of the output is maintained by the common level adjuster. This output is passed through the dynamic VTC which generates the time difference between START and STOP signal. This is at

last processed by the Venier TDC, which converts the time signal into a digital output. The processed output is then given to the encoder block which provides the encoded digital output.

Figure 18: Block Diagram of 8-Bit Subranging ADC

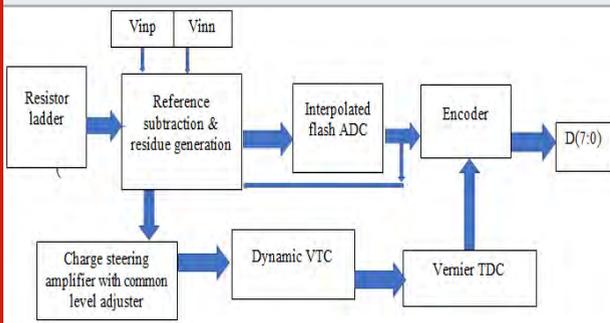
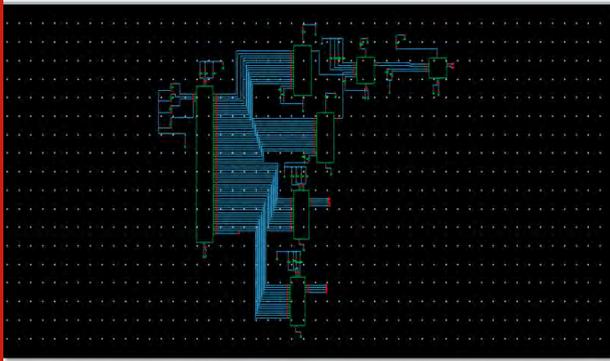


Figure 19: Design of 8-Bit Subranging ADC Using 48nm FinFet Technology



In Figure 19, A 8-bit sub ranging ADC designed is shown. The modules of This ADC is designed and simulated separately. After simulation, each module is converted into a block. This block are used in the final architecture of sub ranging ADC.

RESULTS

In Figure 20, The Input provided and the output obtained for the designed 8-bit Sub ranging ADC is shown. The analog input fed is converted into 8bit digital output.

Figure 20: Ouput of 8-Bit Subranging ADC

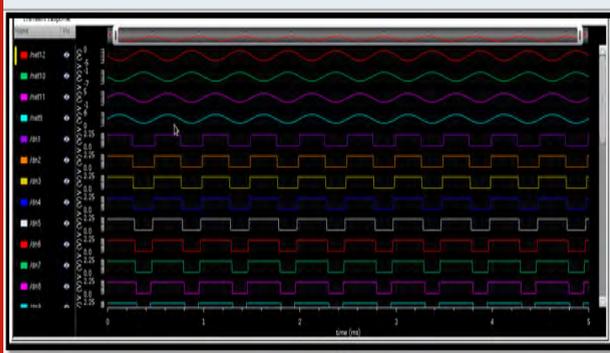
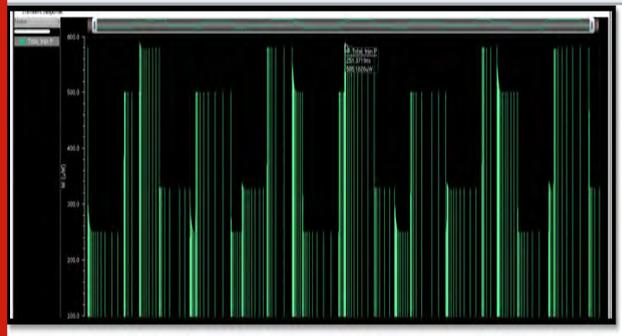


Figure 21: Power Plot of The Above (Fig 17.) Design



In Figure 21, the power plot for the designed 8bit sub ranging ADC is shown. The power consumption of the 8-bit sub ranging ADC is a about 585.1826µW.

Table 1. Parameter Analysed for the proposed 8bit Sub ranging ADC using FinFet.

Parameter Analysed	Proposed Design
Resolution	8
Power consumption	585.18µW
Sampling rate	1000MHZ
SNR	49.924dB
Architecture	Pipelined FLASH ADC and TB ADC
Technology	48 nm FINFET TECHNOLOGY

Table 1. shows the performance measures of the designed 8bit sub ranging ADC. The resolution of the ADC is 8bit. The sampling rate is about 1000MHZ and the signal to noise ratio is 49.924 dB. The area is reduced drastically since the number of comparators used is reduced to half. The transition time is about 251.37ns which shows the ultra-high speed of the designed ADC.

Table 2: Comparative Analysis of the proposed design in FinFet technology with existing designs in other technologies.

Parameter analysed design	Proposed	[4]	[10]
Resolution	8	8	10
Power consumption	585.18µW	3.5mW	68.3mW
Sampling rate	1000MHZ	900MHZ	100MHZ
SNR	49.924dB	-	56.4dB
Technology	48nm		
FINFET Technology	65nm		
CMOS Technology	90nm		
CMOS Technology			

Table 2. shows the comparative analysis of the 8-bit sub ranging ADC in FinFet Technology with Two step ADCs in other technologies. It shows the improved

performance metrics of the proposed design compared with the existing designs. In terms of power consumption, area and sampling rate, the proposed design is proven with better results.

CONCLUSION

The world today is mostly technologized which mostly inculcates devices and machineries which runs consuming electrical power. Without the existence of electricity, existence of the people in this world becomes complicated. So, it shows the necessity of electricity for our daily life. This fact has awakened the thought of reducing the power consumption to save electric energy. With this thought, an attempt to reduce power in electronic devices such as ADC has been made using FinFet Technology and its proven successful. The design of an 8bit Sub ranging ADC in FinFet Technology consumes a least power of about 585.1826 μ W & the transition time is about 251.37ns. It also has other parameter benefits such as high resolution, reduced area, good SNR ratio when compared to the CMOS implementations. In comparison with the CMOS Technology, The Fin formed provides a good electrical control as well as extended volume. Thus, FinFet plays a great role in overcoming channel effects such as leakage components to a higher extent.

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Decreasing Routing Traffic in Mobile Ad Hoc Networks Using Neighbor Nodes Coverage

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ABSTRACT

Mobile Ad-hoc networks are organizing and reconfiguring by its own, many times hopping wireless networks where, the structure of the network changes animatedly due to high movements of nodes in mobile ad hoc networks, and so exist recurrent link breakages which leads to recurrent failures of the path and invention of the routes. So, the traffic of a route discovery cannot be eliminated, and it causes Broadcast multicast traffic Problem. Neighbor coverage based probabilistic relayed broadcast protocol is a protocol is proposed for decreasing routing traffic in MANETs in order to efficiently make use of the knowledge of the neighbor coverage. Route is discovered by using a neighbor node coverage knowledge, the source sends packets only to the nodes which has more common neighbors and there to detect the good nodes and failure nodes. Therefore, by adding delay, the rebroadcast order is determined, to recover routes. Obviously, this route recovery reduces routing traffic and increases the performance of the routes.

KEY WORDS: ROUTING OVERHEAD, ROUTE DISCOVERY, NEIGHBOR NODE COVERAGE, RELAYED BROADCAST PROTOCOL.

INTRODUCTION

An ad-hoc wireless network is a group of wireless mobile portable hosts forming without an infrastructure network without the guide of independent framework or centralizes administration. Mobile portable Ad-hoc networks are self-sorting and self-reconfiguring multihop remote networks where, the structure of the network changes progressively. This is caused because of the node mobilization. Nodes present in these networks used same wireless networks, engaged in multihop forwarding .Then nodes present in the remote network act as host and the

routers and routers forward the information packets from/ to the nodes in the remote network.

In remote systems, portable specially appointed systems has no framework support just like the case with wired systems, and source transmitting packets, since a may be out of scope of a goal node; a steering method is constantly actualized to discover a way to advance the packets suitably between the source and the goal. A base station, inside a cell can arrive at all portable nodes without directing through communicate in like manner remote systems.

In Remote ad-hoc networks, unpredictable connectivity changes is created owing to dynamic topology because each node forwards data/information packets to all Mobile nodes in the remote network., A productive directing conventions are utilized to build up correspondence ways between the router as ad-hoc networks change because of portability of routers much of the time, without causing

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exorbitant control traffic overhead or computational devices on the force constrained gadgets. Numerous arrangements have already been proposed, some of them are depend upon to normalization within the IETF. A few proposed arrangements consistently endeavor to have a forward-thinking course to every other node. Toward the end on topological changes, these conventions trade directing control data intermittently.

II.Literature Survey: Ni et al., (2009) said For course disclosure, broadcasting is a viable system, however particularly in dynamic systems the overhead of the routing connected with the telecom can be very huge, S.Y.Ni,Y et al., (1999) considered the broadcasting convention scientifically and tentatively and indicated that the rebroadcast cost is high and uses an excessive amount of system asset. The broadcasting gets enormous overhead of the routing and causes numerous issues, for example, disputes, excess retransmissions and collisions. Consequently, to improve the steering execution, upgrading the telecom in course disclosure is a powerful arrangement.

W. Peng and X. Lu (2000) Each node advances a packets with a probability, proposed a gossip based methodology. They indicated Compared to the flooding; this methodology can set aside to 35% overhead. Be that as it may, The improvement of gossip based methodology is restricted when the system thickness is high or the traffic load is substantial, Z. Haas et al., (2002). Kim et al., (2004) proposed a probabilistic broadcasting plot dependent on neighbor affirmation and coverage region. This plan and uses the neighbor affirmation and utilizations the inclusion territory to set the rebroadcast probability and assurance reachability.

J. D. Abdulai et al., (2008) Proposed Scalable Broadcast Algorithm (SBA) a neighbor information conspire named. This plan tells whether this rebroadcast would arrive at extra nodes decides the rebroadcast of a packets as indicated by the reality. J. Chen, et al., (2006) A few vigorous conventions have been proposed as of late other than the above improvement issues for they called attention to that their plans can accomplish full reachability over a hopeful lossless MAC layer, and for the circumstance of node disappointment and portability. Chen et al., (2007) proposed an AODV convention with Directional Forward Routing (AODV-DFR) which takes geographic steering utilizes the directional sending in AODV convention. This convention finds the following jump node naturally for packets sending when a node breaks,. Keshavarz-Haddad et al., (2016) proposed Dynamic Reflector Broadcast (DRB) and Dynamic Connector-Connector Broadcast (DCCB).

III. Systemmodules

A. Route Discovery By Neighbor Coverage Knowledge: At first, the data about neighbor nodes is gathered by the nodes. The network monitor having the detailed data of neighbor nodes, for example, Routing table. This data comprises of nodes which has increasingly normal neighbors. It gives the association data to Route

administrator. It found the course by sending RREQ packets just to node of increasingly basic neighbors. The node which has a most extreme rebroadcast postponement may tune in to RREQ packets from lower nodes. For instance if node n1 gets a copy RREQ packets from its neighbor N, it realizes that what number of its neighbors have been secured by the RREQ packets from N. Hence, node n1 could additionally modify its UCN set by the neighbor list in the RREQ packets from n2. At that point the $U(n1)$ can be balanced. In the wake of changing the $U(n1)$, the RREQ packets got from n2 is discarded.

B. Failure Detection By Route Error The network monitor just gives the data about node subtleties. Channel analyzer gathering insight regarding channel capacity. On the off chance that there is any issue with connect channel two part harmony of disappointment node, it will create blunder message to educate about inability to the source node.

C. Good Node Detection By Transmission Range: At first, all nodes keep up their own transmission run. It has been expected that systems transmission go is 250 meters. Presently, transmission extends (NTr) of each no speak to in the system with the all out transmission of system. (TTrN) of the node is looked at. The transmission power is dictated by communicating something specific between node n1 and its neighbor n2. The Received intensity of hi message is determined to decide the transmission power. The messages from a neighbor node n2 is transmitted to and n1, By looking at the got intensity of hi message with most extreme transmit power n1 can assess the base force level that expected to reach n2 . Arriving at time is the time among node and its neighbor node. This is determined first. In light of their transmission go the location of node is put away into the neighbor table. In the event that ($NTr > TTrN$), at that point change vitality of this node as needs be, on the off chance that edge esteem is most extreme, at that point assess position of node and set clock for the equivalent.

D.Calculating Rebroadcasting Delay and Router recovery

Figure1: Calculating rebroadcasting delay and route recovery

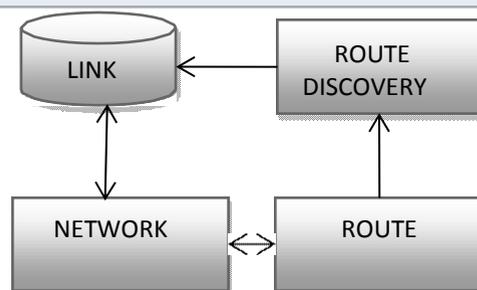


Fig 1 tells the best way to ascertain rebroadcast postponement and course recuperation, at whatever point a source node wants a course to a goal node, Route Discovery is utilized. To start with, the source node looks its course cachet as though it as of now

contains a course to the goal. At first, the data about neighbor node is gathered by the nodes. The Network Monitor having the itemized data of neighbor nodes, for example, Routing table. It gives the association data to Route administrator.

Calculating Resending Delay: At the point when a neighbor gets a RREQ packet as indicated by the neighbor list in the RREQ packet, the rebroadcast deferral can be determined. At the point when the quantity of neighbor nodes is high, the rebroadcast possibility would be low which means have is in thick zone. At the point when the quantities of neighbor nodes are low the probability would be high which means have is in insufficient region. While moving the RREQ, the copy packets can be viewed as that can maintain a strategic distance from the overhead in rebroadcasting.

Route Recovery: In this segment, with the information on route plan the sign handoff is finished. (RREP). The route manager advises the fading of the channel and discovery of the routes plot in specially appointed systems to decrease the delaying time and control overhead in the route recovery process. It is an essential issue to gather information from sensors with no interference. To endure conceivable nodes disappointments, nodes are regularly conveyed. The availability with the sink node is lost because of numerous disappointments inside same area that decreases the quality and productivity of the system activity. As indicated by the neighbor list in the RREQ packets and its own neighbor list rebroadcast postponement can be determined. The rebroadcast delay is characterized with the accompanying reasons: Firstly, the defer time is utilized to decide the node transmission request. At the point when no relative RREQ packets, every one of its neighbors get and process the RREQ packets to misuse the neighbor inclusion information.

Node has the biggest number of basic neighbors with nodes; as indicated by node n_k has the least deferral. Once, there are more nodes to get RREQ packets once, when node n_k rebroadcasts the RREQ packets, since node n_k has the biggest number of basic neighbors. To change their UCN sets, there are more nodes which can abuse the neighbor information. Relies upon rebroadcast probability determined in the following subsection, regardless of whether node n_k rebroadcasts the RREQ packets, To disperse the neighbor inclusion information all the more rapidly, the goal of this rebroadcast delay is that RREQ packets is rebroadcasted to more nodes, the node can set its own clock in the wake of deciding the rebroadcast delay.

Neighbor Knowledge and Rebroadcast Probability: The node tune in to RREQ packets which has a bigger rebroadcast delaying from the nodes which have lower one. For instance, if copy RREQ packets from its neighbor n_2 is gotten to n_1 , it realizes that from n_2 , what number of its neighbors have been secured by the RREQ packets. As per the neighbor list in the RREQ packets from n_2 . Thus, node n_1 could additionally alter its UCN set. At that point the $U(n_1)$ can be balanced as follows:

$$U(n_1) = U(n_1) - [U(n_1) \cap N(n_2)].$$

Subsequent to modifying the $U(1)$, the RREQ packets got from n_2 is disposed of. The request for dispersing neighbor inclusion information is controlled by the rebroadcast delay, to the nodes which get the equivalent RREQ packets from the upstream node. In this way, it is dictated by the neighbors of upstream nodes and its own. The node acquires the last UCN set When the node n_1 clock of the rebroadcast delay lapses, The last UCN node set are the nodes that need to get and process the RREQ packets. Note that, From its neighborhood, if a node doesn't detect any copy RREQ packets, its UCN set isn't changed. Presently concentrate how to utilize the last UCN set to set the rebroadcast probability.

Additional Coverage Ratio

$$Ra(n_1) = |U(n_1)| / |N(n_1)| \quad (1)$$

This measurement demonstrates the ratio of the number of additionally secured rebroadcast nodes to the complete number of nodes n_1 neighbors. The moreover secured nodes need to get and process the RREQ packets. More nodes will be secured by this rebroadcast when Ra increases, and hence the rebroadcast probability got higher. As n builds, the probability of the system being associated is moving toward 1, If every nodes interfaces with more than $5.1774 \log n$ of its closest neighbors where n is the quantity of nodes in the system. The availability metric of the system is $5.1774 \log n$. The proportion of the quantity of nodes is Assumed, that need to get the RREQ packets to the all out number of neighbors of nodes n_i is $Fc(n_1)$. So as to keep the probability of system network moving toward 1, Then heuristic equation:

$$|N(n_1)| \bullet Fc(n_1) \geq 5.1774 \log n.$$

iii. CONNECTIVITY FACTOR

$$Fc(n_1) = N_c / |N(n_1)| \quad (2)$$

where is the quantity of nodes in the system and $N_c = 5.1774 \log n$, when $|N(n_i)|$ is more prominent than N_c , $Fc(n_i)$ is less than 1. That implies no thickness is in the thick region of the system, at that point just piece of neighbors of node n_1 sent the RREQ packets could keep the system availability. Also, $Fc(n_1)$ is more prominent than 1 when $|N(n_1)|$ is not as much as N_c . That implies node n_1 ought to advance the RREQ packets so as to move toward organize availability when node n_1 is in the scanty region of the system. Consolidating the extra inclusion proportion and network factor acquired the rebroadcast probability $Pre(n_1)$ of node n_1 .

iv. Rebroadcast Probability

$$Pre(n_1) = Fc(n_1) \bullet Ra(n_1) \quad (3)$$

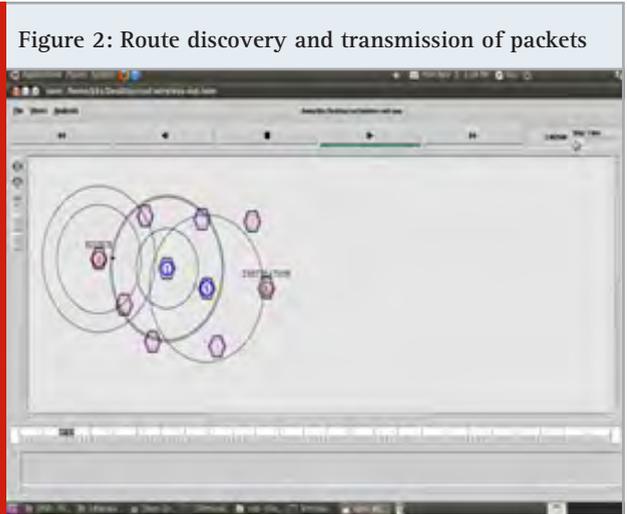
where is the quantity of nodes in the system and $N_c = 5.1774 \log n$, when $|N(n_i)|$ is more noteworthy than N_c ,

$F_c(n_i)$ is less than 1. That implies no thickness is in the thick territory of the system, at that point just piece of neighbors of node n_1 sent the RREQ packets could keep the system availability.

Also, $F_c(n_1)$ is more prominent than 1 when $|N(n_1)|$ is not as much as N_c . That implies node n_1 ought to advance the RREQ packets so as to move toward arrange availability when node n_1 is in the meager territory of the system. Joining the extra inclusion proportion and availability factor got the rebroadcast likelihood $Pre(n_1)$ of node n_i .

MAC collision rate: In spite of the impacts at the MAC layer every subsequent outcomes normal number of packets (RREQ, RREP, RERR and CBR information packets) dropped.

Normalized routing overhead: The proportion of control packet's complete packets size to the information packet's all out packets size conveyed to the goals. each single jump is considered one transmission for the control packets sent over different bounces. We utilize the size of RREQ packets to save decency rather than the quantity of RREQ packets, its size is greater than that of the first AODV on the grounds that in RREQ packets, the DPR and NCPR conventions incorporate a neighbor list



Packet delivery ratio: The ratio of the numeral of effectively received information packets by the CBR destinations

Average end-to-end delay: Average start to finish is the normal delay of effectively conveyed CBR packets from source to goal node. From the CBR sources to goals, it incorporates every single imaginable delay. The tests are partitioned to three sections and in each part and assess the effect of one of the accompanying boundaries on the presentation of steering convention

Number of nodes: Vary the quantity of nodes from 50 to 300 out of a fixed field to assess the effect of various system thicknesses. In this part, set the quantity of

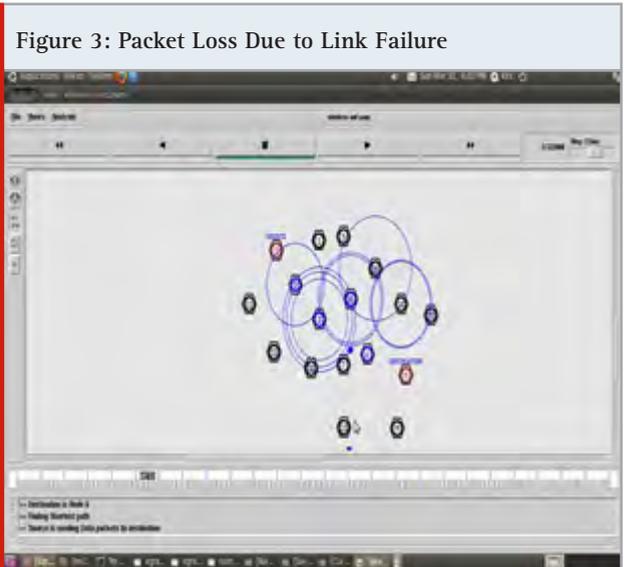
CBR connections with 15, and don't present additional packet loss.

Number of CBR connections: Vary the quantity of randomly picked CBR connections from 10 to 20 with a fixed packet rate to assess the effect of various traffic loads. In this part, we set the quantity of nodes to 150, and don't present additional packet loss.

Iv Output and Discussions

A. Route Discovery and Packet Transmission: Fig.2 Shows about creating a node using Network Animator and discovering a source and destination node for the packet transmission which is in mobility condition. Discovering a path from source and goal destination by sending a path request to neighbor nodes and accepting a reply from the routes from goal destination to source node by utilizing a base number of hop counts.

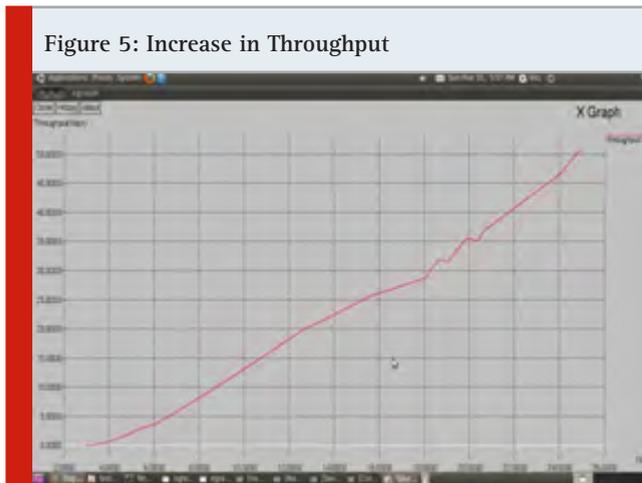
Packet Loss Due To Linkfailure: Fig 3 shows the dropping of packets due to failure nodes so packets from source will not reaches destination.



B.Route Recovery From Link Failure: Fig. 4 shows, the path gets recovered through Ncpr algorithm from the link failure by adding delay to the link.



C. Increase Inthroughput: Fig 5. Graph represents that throughput is increased by Ncpr by comparing to existing system, when time is increased



CONCLUSION

At first, all node gathers the information about neighbor nodes at that point network monitor having the information of neighbor nodes for example, Routing table and it give the associate information to Route manager so the route is transmitted through discovered route, if link gets failure and it is detected by generating error message by failed node and good node is detected by analyzing transmission range. Then route is recovered by adding delay.

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Virtual Human for War Field

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ABSTRACT

Technology is driving the innovation. Simple task is made much simpler by virtue of various innovations. One such innovation is virtual human, the definition of being human. Virtual human is tracked using RSSI (Received Signal Strength Indicator) technology to identify the location and position of the robot and hand gesture recognition is done using MEMS (Micro-Electro-Mechanical System) technology to have an effective squad communication. The hand gestures are recognized by the virtual human to make it a Telepresence robot. Night vision cameras are used to overcome the unavailability of vision during darkness.

KEY WORDS: RSSI, HAND GESTURE RECOGNITION, MEMS, TELEPRESENCE.

INTRODUCTION

Currently, humans are being replaced by robots as it was earlier predicted by Nickola Tesla, who stated that "In the 21st century, the robot will take the place which slave labor occupied in ancient civilization"[8]. One such innovation is implemented in war field with RSSI and MEMS technology. RSSI (Received Signal Strength Indicator) which automatically detects the strength of the received signal. It is predominantly used in the telecommunication domain since the loss of signal can be avoided and a good communication path is established between the radio transmitter and receiver.

Kinesthetic communication recreates the perception and manipulation of objects by the sense of touch. Kinesthetic

devices will incorporate tactile sensors (Device to measure the information that arises from physical interaction made by humans) to measure forces exerted by the user of the interface. MEMS (Micro-Electro-Mechanical System) are one such kinesthetic device which recognizes the hand gestures made by the human. MEMS are mainly implemented at Nano scale application P. Wieber and C. Chevallereau. (2006).

The MEMS and RSSI technology are employed in this framework for the design of virtual human in the war field. This framework consists of hardware and software implementation. The hardware module consists of two sections transmitter and receiver part. The transmitter transmits the information to the receiver either through MEMS technology or through a keypad. RSSI will measure the received signal strength in order to transmit the information without any losses Jacob Knoll et al., (2017). The receiver will receive the information and act according to it.

II. EXISTING METHODS: In the current era, the military application robots are controlled through commands

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being given from the transmit side. The Gesture control robots such as unmanned ground vehicles (UGV's) are employed in the war field thereby to increase the warrior's capacity Zain Murtaza et al., (2014). A research is being practiced to develop robots for various military applications in order to save lives. The currently available hand signal system for soldiers has some demerits such as unavailability in the darkness and hard to keep stealth.

III. PROPOSING METHODS: A robot, a machine resembling a human being which is able to replicate some of the movements and functions Winfield, Alan FT, (2014). One such application is employing a virtual human i.e., robot in the war field to have a Telepresence robot to recognize and to follow the hand signals such as halt, Crawl forward, Run forward, Retreat, Flank left/right, ammunition delivery etc. Hardcoded response will be executed by the virtual human at the war field. RSSI technology is used instead of GSM for an upgraded security purpose. MEMS are used for the receiver section to recognize the hand gestures rather than a biological sensor. To improve the efficiency of the virtual human in dark, IR Night vision camera is employed. All direction movement and 360° self-rotation are possible. AV system is used in order to hear the audio signal and to view the environment scenario with a wireless transmitter section. Artificial Intelligence detection for fire and bomb.

Figure 1: Transmitter Section

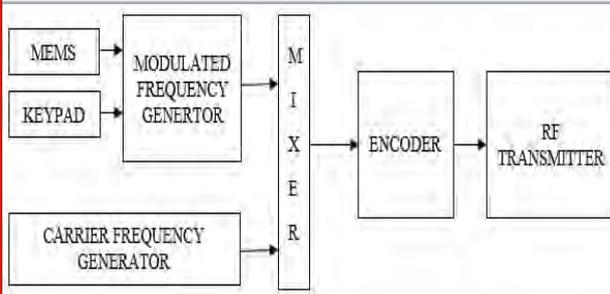
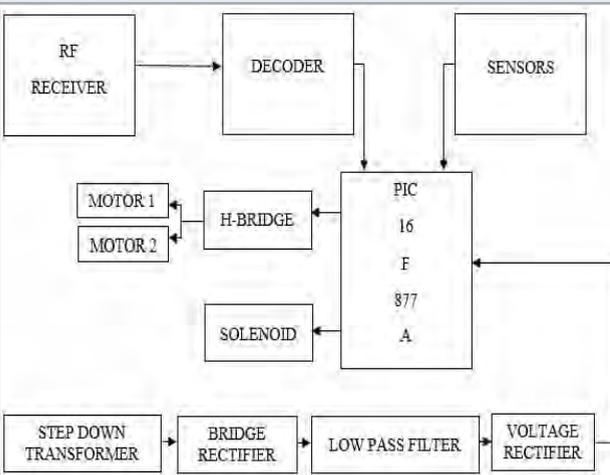


Figure 2: Receiver section



IV. HARDWARE PLATFORM: Virtual human, a software programmed hardware module designed as per the

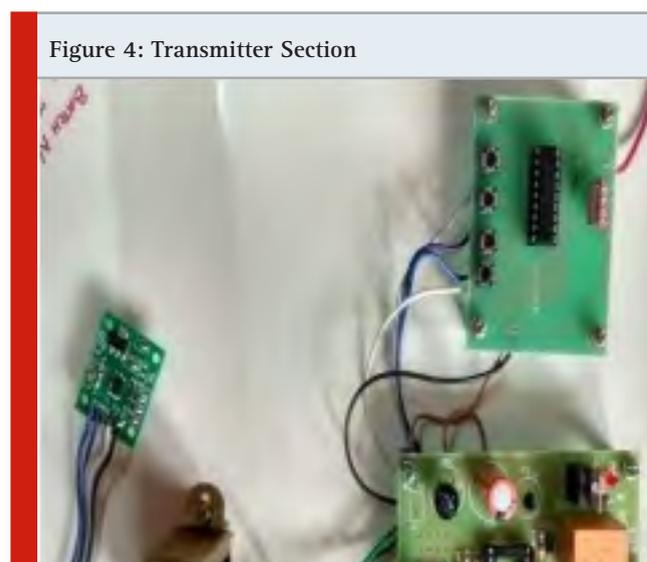
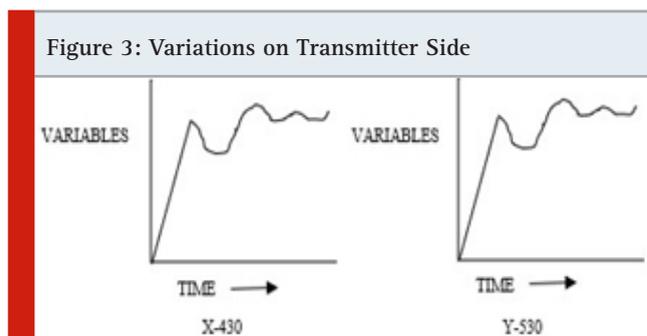
specifications required to employ in the war field to save the lives of many human beings. The transmitting section resembles like, "Fig. 1". The inputs to the virtual human at the receiver end can be either through Keypad or MEMS. In this prototype, four keys are available through which inputs such as forward, reverse, left, right can be given to the movements in the war field when concerned to keypad. MEMS based accelerometer, another form of giving inputs is employed to recognize the hand gestures being performed by the humans to be replicated by the virtual human at the receiving end using a PIC microcontroller which is being pre-programmed in advance. The output of MEMS is continuous and understandable by the encoder which is placed in the transmission section. The HT12E encoder used converting parallel inputs into serial outputs through an RF transmitter in a different code format. Finally, RF transmitter is used in order to transmit the data from the transmitter to the virtual human at the receiver end which replica like, "Fig. 2".

The RF receiver collects the encoded data, from the transmitter and thereby gives to the decoder to decode the decodes the data such as value of the axis of the gesture made in the pre-programmed microcontroller. The PIC16F877A is a programmable intelligent computer which includes a microprocessor, memories, I/O ports, timer and additionally has a 10-bit A/D converter. The Power Supply module to the microcontroller consist of step-down transformer, bridge rectifier, low pass filter and a voltage regulator for optimizing 230V AC to 5V DC. Step down transformer transforms 230V into 12V. Bridge rectifier is used for obtaining the pulse setting DC output which is given to the low pass filter to block the AC and allows only DC. Finally, a voltage regulator is used for a constant DC output in spite of fluctuations arising in at the input side. It is pre-programmed microcontroller using visual basics either to move or to switch on the relay as per the input given from the transmitter section. The mechanical movements are enhanced by the H-bridge which is a DPDT switch with 2 DC motors of 30rpm in addition to wheels. The supply to the motor is given by two 6V batteries.

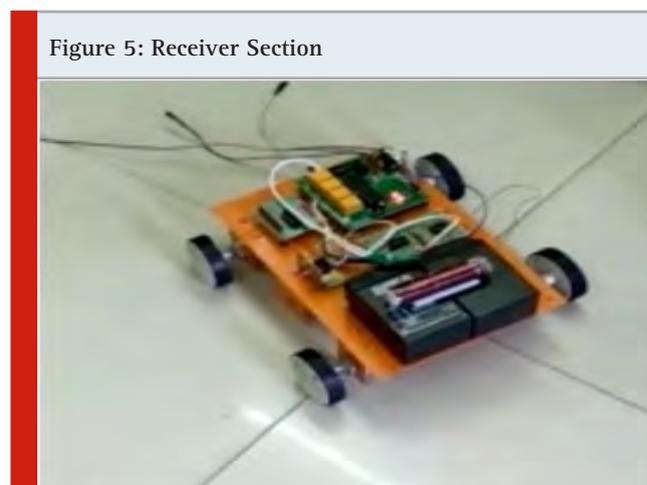
The applications are performed by the relay being attached to the microcontroller. The relay is being controlled by the OBC (On board Computer) to the receiver end. One of the relays is coupled with the Solenoid for the delivery of ammunition which is electromagnetic in nature with a power rating of 50 Watt therefore it is capable of throwing pellets or stones at high force of the opponent. In addition to all, Sensors are used to sense the environment and to report to the microcontroller to act according to it. To measure the changes in the infrared level PIR (passive infrared) sensor is used. Similarly, electromagnetic field sensor is employed to detect the presence of any sharp equipment or weapon.

V. SOFTWARE PLATFORM: Visual Basic 6.0 is an event driven programming language used to program the microcontroller, both in transmitter as well as receiver section. In the transmitter section, the MEMS control is

pre-programmed and embodied along with the encoder. The variations on the transmitter side can be viewed on the PC being connected which will be resembling like, "Fig. 3".



The PIC at the receiver end is also programmed using Visual basics which controls the Relay and H-Bridge module based on the inputs being given through keypad or MEMS. The fire sensing and metal detector sensors are also programmed and monitored via PC. Alarm arises when fire or any other obstacle present in the war field.



RESULTS

The hardware and software implementation are enhanced for the war field. The hardware includes "Fig. 4" and "Fig. 5".

CONCLUSION

Virtual human for war field is designed using MEMS technology with a simplified control block which can be extended for further more operations. The data transmission is faster and safer since RSSI is employed. The main objective of developing this prototype is to replicate the action of a human without any human loss. The previous standalone system is now made dynamic which can be altered as per the requirements. The night vision camera is used to have an efficient vision system during darkness and an AV system with a built in trans receiver module is used to hear and visualize the war field from the control room.

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An Effective Analysis and Prediction of Diabetes using LightGBM Algorithm

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ABSTRACT

Diabetes is a disease resulting from high blood glucose level. In world nearly 9.3 percent of population suffered from diabetes in age range from 20 to 60. It may cause health difficulties such as damage of heart, kidneys, eyes, nerves and blood vessels. The usual way of identifying diabetes by visiting a doctor is way tedious. A rise of machine learning in a way of approaching a dataset provided a way to solve this problem. We used pima indian diabetes dataset for analysis and prediction. Firstly, dataset is compensated by replacing missing values and introducing new columns based on the analysis done on the dataset using Exploratory Data Analysis(EDA). Secondly, dataset is given to randomsearchCV to provide best suitable parameter values to be used by classifier to improve performance. At the end, LightGBM classifier is applied to the dataset and performance is evaluated, results have shown better performance than other methods.

KEY WORDS: LIGHTGBM; RANDOMSEARCHCV; EDA.

INTRODUCTION

Diabetes mellitus often referred as diabetes is caused due to high blood sugar level for a large period. The following are the common symptoms which includes urination, extreme fatigue, increased thirst and hunger. Acute complications of the diabetes can include hyperosmolar hyperglycemic state, diabetic ketoacidosis, or death Kleinert, M et al., (2018). Chronic kidney disease, foot ulcers, stroke, damage to the eyes and cognitive impairment Saedi, E et al., (2016).

Pancreas not making enough insulin for body or body not correctly utilizing the insulin produced will be the main cause for diabetes. There are 3 kinds of diabetes Type1, Type2 and Gestational diabetes. The main cause of type1 diabetes is due to pancreas failure to produce enough insulin. It is the result of immune system attacking the cells in pancreas and destroys it. It is often found in children and young adults. People with type1 diabetes have to take insulin daily to live. Type2 diabetes is the normal kind of disease which usually occurs in middle-aged and older people. It is resulting from body's incapability of make or use insulin well. The main cause of this diabetes is due to overweight and insufficient physical exercise.

Diabetes can be prevented by maintaining good physical health, taking proper food, normal BMI and avoid using of drugs. People with type1 diabetes have to manage themselves using insulin injections. People with type2 diabetes can be treated with or without using insulin.

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Gestational diabetes occurs when one woman is pregnant and usually goes off after birth of the baby S. S. aahan, et al., (2005). Trends suggests that diabetes rate will continue to increase unless and until people be aware about it and take preventive measures.

2.Related work: Diagnosis and classification is applied with various techniques.An attribute weighted artificial immune system was constructed by Sahan et al., (2005) the weights of the ,for Euclidean distance calculation. An accuracy of 75.9% for diabetes classification was obtained By using 10-fold cross validation .Diverse approaches for diabetes resolve using artificial neural network (ANN) and artificial immune system (AIS) was compared by Bozkurt et al., et al., (2014) an accuracy of 76.0% is achieved. linear discriminant analysis (LDA) is compared with support vector machine (SVM) for diabetes diagnosis using the Pima Indians diabetes dataset, Parashar et al., (2015) and improved the accuracy to 77.6%. The same SVM was used by Kumari and Chitra (2013) but combined with radial basis kernel function (RBF) to improve classification accuracy to 78.0%.Class-wise k Nearest Neighbor (CkNN) was used by Christobel and Sivaprakasam (2013).

which interpolated lots of missing values existing in the diabetes dataset through data normalization. Accuracy of 78.2% has been reported by CKNN. An accuracy of 80.0% was achieved by applying a hybrid classification model of multilayer perceptron, utilizing the soft computing advantages of fuzzy logic, by Khashei et al., (2017). Comparisons across techniques such as K- Nearest Neighbor (KNN), Naive Bayes (NB), Iterative Dichotomiser 3 (ID3), Classification and Regression Tree (CART) and SVM to classify the diabetes data, achieving a best performance of 81.8% is achieved by Farahmandian et al., (2015) Maniruzzaman et al., (2017) found that most medical data shows, a structure of non-normality, non-linearity and inherent correlation. They improved classification accuracy to 82.0% by adapting Gaussian process-based classification technique, with three kernels of linear, radial basis and polynomial. To the best of our knowledge, accuracy of 84.7%,is achieved by Karegowda et al., (2011) through using a hybrid model, which integrated genetic algorithm (GA) and back propagation network (BPN).From the above literatures the following conclusions can be drawn. Challenging problem is the prediction accuracy of diabetes diagnosis. Machine learning is effective for diabetes prediction since most of the existing algorithms are based on machine learning methods.

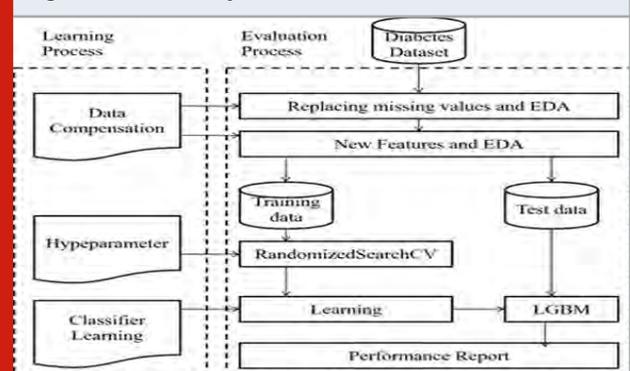
The diabetic class is a minor class compared to the nondiabetic class. The diabetic class is a minor class compared to the nondiabetic population (a major data class). The above algorithms have not highlighted the class imbalance problem in medical data.fuzzy-based information decomposition (FID) method [15] to simultaneously address the problems of missing values and class imbalance was proposed by Shigang Liu et al., (2016) and observed these two different problems as a missing data approximation problematic.

Methods from various fields have been applied to data sets, such as software development, medical data sets, etc. And they worked better than many classic algorithms. However, the missing values were reconstructed from the contribution of the data observed by the FID and the relationship between the compensated values and the class label was not considered. Accuracy that indicates completeness with patients with and without diabetes in extreme cases in the imbalance data set, even if all younger level samples are misinterpreted, most samples are largely predicted accurately, as it is still possible obtain greater precision with large proportions of class Z. Mahmood et al., (2015). Therefore, we conclude that class imbalances play an important role in the classification process and that a level of accuracy cannot represent the efficiency of the classification.

Naive Bayes (NB), Adaptive Synthetic Sampling Method (ADASYN) AND Rf Classifier was used DMP_MI proposed by Qian Wang, et al., (2019).The dataset was preprocessed using Naive Bayes then they used Adaptive Synthetic method to oversample the data, oversampling enables the dataset to be balanced. Finally, they applied Random forest and achieved accuracy of 87%.Before applying algorithm we preprocess the dataset and add new features through EDA to increase the accuracy rate in this paper we proposed Randomized SearchCV + LightGBM.To validate the algorithm we used k- fold validation strategy. Accuracy of 89.8% is achieved using this.

3. System Architecture

Figure 1: Flow of System Architecture



There are three main activities in the core algorithm. They are:

1. Data Compensation
2. Hyper Parameter discovery
3. Classifier Learning

1. Data Compensation: The data set that the system receive as input may have missing values. So, to compensate the null values in the data set, Exploratory data analysis is a method to describe meta characteristics of data sets which will give broad understanding of dataset, so that we can handle it in efficient manner. We can compare dataset column with diabetes column to get the average value to replace missing values for which EDA results will be the important one. Dataset is

compensated by performing EDA and replacing missing values which gives us the ability to achieve high accuracy and performance. We can also add new columns in aim to improve accuracy and give best parameters to algorithm in order to achieve accuracy. There is another analysis called IDA which is different from EDA that mainly focuses on model fitting and hypothesis testing P. C. Thirumal and N. Nagarajan (2015).

2. Hyper Parameter Discovery

2.A Hyper Parameter: Hyperparameter is one which controls the learning process of algorithm. There are many parameters and everyone is different and specific for particular algorithm, if you take LGBM algorithm `n_estimators`, `learning_rate`, `num_leaves` are some of the hyperparameters which will be used by it, like these there are different parameters specifically used for algorithms. Tuple of hyperparameters is taken by objective function and returns the associated loss. So, to deduce the optimal hyper parameters, the system uses Random search Cross Validation.

2.B. Hyper Parameter Optimization: Hyperparameter optimization is a method of selecting optimal parameters for algorithm, as we have seen above hyperparameter controls the learning process of algorithm and values of other parameters are learned by using node weights. Here we RandomSearchCV for selecting the hyperparameters for our algorithm, it selects the parameters in random and eliminates the searching of all combinations of parameters. Grid search can be used for selecting small number of parameters which affects final performance of algorithm otherwise we have to use RandomSearchCV. Dataset is given to RandomSearchCV to use to find hyperparameter. Finally hyperparameters and their values are passed to LGBM algorithm for prediction.

3. Classifier Learning:

3.A Classifier: Classification is implemented by classifier algorithm, especially in a concrete implementation. Mathematical function is sometimes referred by this category is mapped by an input data. In machine learning, the explanatory variables are termed features (grouped into a feature vector), the observations are known as instances, and the possible categories to be predicted are classes. LightGBM is employed by this system for classifier learning.

3.B LightGBM: Tree-based learning algorithm is used in this gradient boosting framework. It has following advantages Higher efficiency and faster training speed Memory usage is lower

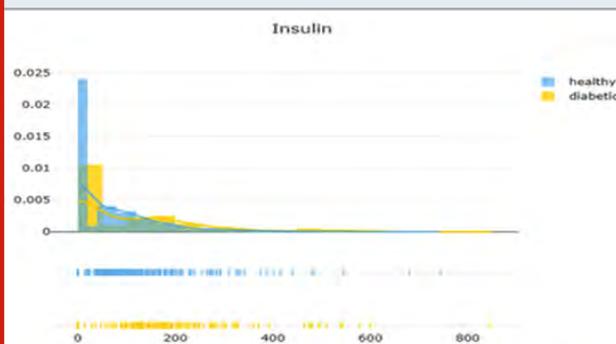
**Accuracy is better
large-scale data is handled.**

Design Methodology

1. Preprocessing
2. Adding new features
3. Preparing dataset
4. Prediction

1. Preprocessing: The dataset is loaded with pandas(pd), the data-head and therefore the information are checked. The datasets consist of several medical predictor variables and the target variable which is Outcome. The independent variables are the number of pregnancies the patient has had, the Body Mass Index [BMI] of the patient, insulin level, age, and so on. The dataset may contain missing values represented by 0 which are replaced by NaN. Plotting is done to find the number of missing values. A correlation matrix is formed each variable is correlated with another to replace missing values we use median by target median_target function.

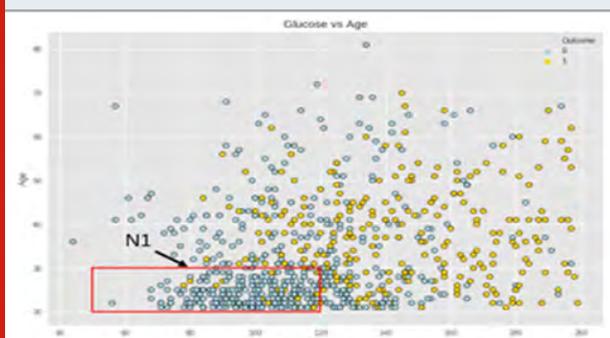
Figure 2: Analysis of insulin data



2-Hour serum insulin (μ U/ml) is taken and plot_distribution function is used and a graph is drawn and found that 102.5 for a healthy person and 169.5 for a diabetic person. The same procedure is carried for other parameters such as glucose, skin thickness, blood pressure and BMI is calculated.

2. Adding new features: Exploratory Data Analysis (EDA) is used and three plot functions are defined. They are plot_feat1_feat2, barplot, plot_pie.

Figure 3: Comparison between Glucose and Age



Using plot_feat1_feat2 function a cluster graph is drawn and found that healthy persons are concentrate with an age ≤ 30 and glucose ≤ 120 .

Using Barplot function a bargraph with glucose and age is drawn and found that healthy persons are concentrate with an age ≤ 30 and glucose ≤ 120 . The cluster region N1 is found.

A pie graph is drawn using pie function. Other parameters such as glucose, blood pressure, insulin are also subjected to this above functions and desired graph is obtained.

Figure 4: Comparison of healthy and diabetic patients using barplot with age<=30 and glucose<=120

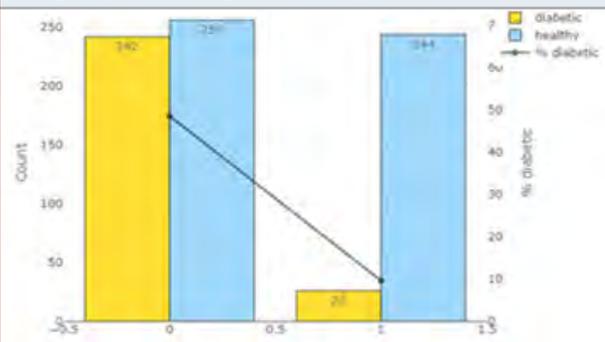
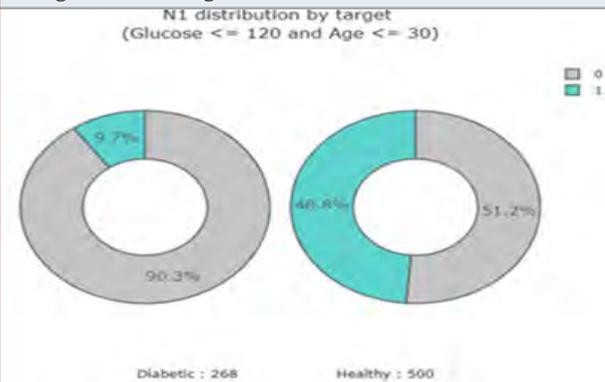


Figure 5: Bargraph comparison of diabetic records with an age <= 30 and glucose <= 120



3. Preparing dataset: First, we standardize the dataset using StandardScale. Dataset may misbehave when the individual features are not similar to standard normally distributed data. Before we feed data to algorithm, we encode it using labelencoder. Target column is kept separately and other columns were divided into numerical columns, binary columns and multivalued columns. Numerical columns were scaled and replaced with scaled values. Next correlation matrix is plotted to understand which pairs have highest correlation. Dataset is then split into X and y where X represents independent columns and y represents dependent columns, then dataset has been given to lightgbm algorithm. Model performance function is defined, which Contains implementation for accuracy, precision, recall etc and it does fit and predicting of training and test data. Scores_table is then defined which lists out the performance analysis of our LGBM algorithm.

4. Prediction: Hyperparameters were analysed for the dataset and best suitable value is found to increase the accuracy. RandomizedSearchCV is used to find best suitable solution for hyperparameters, when compared to gridsearchcv it is faster and more accurate.

In random grid we can specify number of combinations that we want. The hyperparameters are

- learning_rate
- n_estimators
- num_leaves
- min_child_samples
- min_child_weight
- subsample
- max_depth
- colsample_bytree
- reg_alpha
- reg_lambda
- early_stopping_rounds

The impact of each tree on the final outcome will be determined by learning_rate. An initial estimate is used by GBM which is later updated with reference to the out-put of each tree. The magnitude of the change in the estimates is controlled by the Learning parameter. n_estimators determines number of trees (or rounds), num_leaves is used to determine number of leaves in full tree, the default value is 31. min_child_samples tells the minimal number of data in each leaf. It also can be used in dealing with over-fitting. min_child_weight determines minimal sum hessian in one leaf. subsample: randomly select part of data without resampling. max_depth describes the maximum depth of tree. This parameter is used to handle model overfitting. If colsample_bytree is smaller than 1.0, colsample_bytree helps LightGBM to randomly select part of features on each iteration. Say, if we set the value to 0.7, LightGBM will select 70% of features before training each tree. reg_alpha determines regularization. reg_lambda determines regularization. early_stopping_rounds helps to improve the speed of the analysis.

If one metric of validation data doesn't improve in last early_stopping_round rounds, model will stop training. This reduces the excessive iterations. After finding best solution for the hyperparameters, it has been given to LightGBM which will use it for prediction. LightGBM uses tree-based learning algorithms and it is a gradient boosting framework. After predicting the test data k-fold cross validation strategy is used to evaluate the performance of our algorithm. Using RandomizedSearchCV+LightGBM we fit and predicted the dataset, hyperparameter learning plays a major role in achieving higher accuracy, k-fold cross validation is used to evaluate accuracy, precision, recall, roc etc. Confusion matrix is listed below:

Table 1. Confusion matrix

		Actual	
		0	1
Predicted	0	464	36
	1	42	226

Confusion matrix tells us that 464 positive records and 226 negative records were predicted correctly. 36 positive records and 42 negative records were predicted wrong. So around 690 records were predicted correctly and 78 records were predicted wrong. RandomizedSearchCV + LightGBM has outperformed all other algorithms and achieved accuracy of 89.8%.

4. Experimentation and Analysis

4.A DATASET AND EXPERIMENTING ENVIRONMENT:

Dataset is taken from National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK) Repository and performed predictions. It contains 768 rows and 9 columns. 392 samples have missing values out of 768 samples. Diabetic samples are 268 and Non-Diabetic samples 500, which shows class imbalance. It has 8 numeric valued features and a class label, where the value 0 represents negative and 1 represents positive for diabetes. Experiments are carried on a PC with Intel Core i7 8GB memory running on windows 10. Programs are written in python using Jupyter Notebook on the version of Anaconda3.

4.B Performance Evaluation: To measure the performance of a model, we need several elements: This part is essential Confusion matrix: allows visualization of the performance of an algorithm and it is also known as error matrix.

- true positive (TP): Diabetic correctly identified as diabetic
- true negative (TN): Healthy correctly identified as healthy
- false positive (FP): Healthy incorrectly identified as diabetic
- false negative (FN): Diabetic incorrectly identified as healthy

Metrics that are used:

- Accuracy: $(TP + TN) / (TP + TN + FP + FN)$
- Recall: $TP / (TP + FN)$
- Precision: $TP / (TP + FP)$
- F1 score: $2 \times ((Precision \times Recall) / (Precision + Recall))$

Table 2. LGBM algorithm comparison with other algorithm

k-fold	Algorithm	Accuracy	Precision	Recall	F1-score	AUC
k=10	NB	76.3%	0.759	0.763	0.760	0.819
	SVM	65.1%	0.424	0.651	0.513	0.500
	DT	73.8%	0.735	0.738	0.736	0.751
k=5	RF	78.6%	0.733	0.630	0.673	0.870
	DMP_MI	87.1%	0.806	0.854	0.830	0.928
	LGBM	89.8%	0.858	0.844	0.85	0.947

To train and test the algorithm we'll use cross validation K-Fold, 5-fold cross validation, where the initial sample is differentiated into 5 subsamples randomly. Among these subsamples, single subsample will be retained for the validating data for the testing model and the remaining four subsamples are used as training data. Then this process gets repeat 5 times by using each of the subsample using exactly one time as the validation data. All these 5 results will be then averaged for the single estimation output. Each observation is used for validation exactly once which is the advantage of this method over repeated random sub-sampling and also all observations are used for both training and validation.

In above table LGBM is compared with other algorithms which shows higher performance in all aspects than others. As we used 5-fold cross validation other classifier such as RF, DMP-MI is compared with LGBM and even in 10 folds all algorithms were shown lesser accuracy than LGBM. In below table accuracy, precision, recall, F1_score and Roc_score of our algorithm are given.

Table 3. LGBM algorithm crossvalidation results

Cross Validation - 5 folds LightGBM					
Fold	Accuracy	Precision	Recall	F1 score	Roc auc
1	0.903	0.915	0.796	0.851	0.945
2	0.864	0.789	0.833	0.811	0.926
3	0.896	0.865	0.833	0.849	0.949
4	0.889	0.846	0.83	0.838	0.944
5	0.928	0.875	0.925	0.899	0.972
mean	0.896	0.858	0.844	0.85	0.947
std	0.021	0.041	0.043	0.029	0.015

CONCLUSION

We use LightGBM algorithm with RandomizedSearchCV to predict and missing values are handled using EDA. This algorithm has achieved more accuracy compared to others. Dataset was properly obtained by replacing missing values. The algorithm validation is done using k-fold cross validation strategy. Performance evaluation is comprehensively understood based on the indicators such as precision, recall, F1-score and AUC. In future works, we will improve the preprocessing stage and try implement for other types of diseases.

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Convergence Heuristic Function based Route Planning Algorithm for Energy-Efficient VANET GPS Navigation System

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ABSTRACT

Most existing Global Positioning System (GPS) navigation tools or applications only receive static info for route planning. While some have an RDS-TMC receiver that is equipped to receive real-time traffic events, many of these live traffic events are irrelevant to the vehicle. This article offers three main contributions. First, a heuristic route planning (RP) algorithm is proposed the Convergence Heuristic Function vehicular-ad-hoc-network- (VANET) to compute the route using the shortest travel time or the shortest fuel consumption based on two sources of information. Real-time traffic. It is not used in traditional GPS navigation submissions. The first source of traffic data is the recorded traffic info of the road segment through which the vehicle has driven. It is also transmitted between vehicles via the IEEE 802.11p wireless connection. Google Maps offers second traffic information. A GPS navigation application is applied on the Android platform to make VBA a reality. Finally, the VANET simulator performs simulations for the six root planning algorithms. In summary, it can be said that the proposed route provides a significant reduction in the average travel time and fuel consumption compared to conventional RP algorithms.

KEY WORDS: (VANET-), CONVERGENCE HEURISTIC FUNCTION, RP ALGORITHM, GLOBAL POSITIONING SYSTEM (GPS) AND TRAFFIC INFORMATION.

ARTICLE INFORMATION

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INTRODUCTION

While the exactness of the GPS Hofmann-Wellenhof B et al., (2012) improves by a couple of meters, GPS applications have gotten progressively well known in our everyday lives. In these requests, the GPS route framework is one of the best utilized. Before creating GPS route frameworks, individuals needed to utilize paper maps for bearings. Be that as it may, with voice-initiated GPS route frameworks, clients can design their courses continuously on an electronic guide to arrive at their goals productively and successfully. Be that as it may, if the electronic guide data is obsolete, or there is a constant traffic occasion or a street fix occasion, the GPS route framework might be arranging an inappropriate course. A number of methods have been developed in recent years to solve this problem, including real-time online traffic data supported by the Radio Data Traffic Message Channel (RDS-TMC) Kopitz D, Marks B, the FM channels for providing traffic used. Real time. Vehicle data. Most of the traffic data provided by RDS-TMC is intended for certain streets in urban areas or highways.

As a result, integrated GPS navigation schemes may not get beneficial road info from RDSTMC to facilitate RP. In addition, due to RDSTMC's low bit rate, it is not possible to transmit large amounts of traffic data on acceptable delayed vehicles. GPS navigation apps such as Garmin Street Pilot on board Chang et al., (2013) for iPad or Mobile/ Apple iPhone Sumi L et al., (2018) for Android are becoming increasingly popular in today's market. Offline maps are pre-installed in these apps to search for user addresses, millions of points of interest (POIs) such as petrol stations, restaurants and parking lots without wireless exposure. When a wireless connection is offered, these apps can also download real-time traffic and traffic info from the Internet to avoid highways to the destination and avoid buildings or busy streets. However, it has the same problems as RDS-TMC, which means that all roads have no real-time info and a wireless internet link is essential.

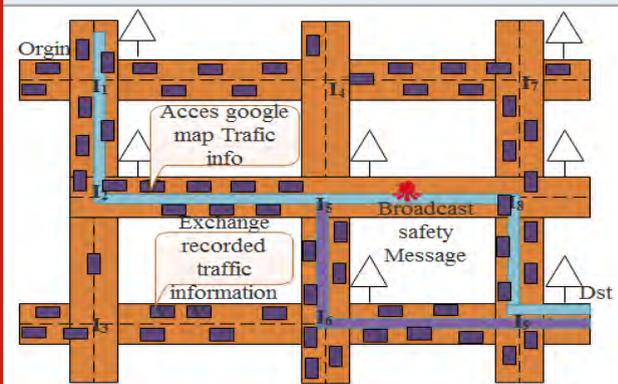
Wave Architecture Fazio et al., (2006) is an alternative communication knowledge for real-time data transmission via short-range (V2V), 3G / 4G and IEEE 802.11P communication. Vehicles can communicate with each other through a special VANET. If a vehicle collides with a traffic accident, it may send safety memos to alert nearby vehicles, as well as the time, location and condition of the accident Zhao et al., (2020). These cars in the neighborhood send safety memos to neighbors, who can change course in real time to avoid accidents. Therefore, it can reduce vehicle travel and fuel consumption. On the other hand, the algorithm digests with a short route Singh et al., (2020) and star A Sturtevant et al., (2020) is frequently used for RP in GPS navigation systems.

The short A-Star computation time is obtained using heuristic functions compared to dijkstra. Find the path from the initial node to the destination node with minimum tools necessities using the first best search. Late investigations Zammit et al., (2020) have stretched

out A-Star to new RP systems. Notwithstanding, these customary RP calculations utilize static data, for example, speed limit rather than the constant speed of every street section, which decreases typical travel time and fuel utilization for RP to goal. Therefore, dynamic RP schemes that respond to highway dynamics are more reliable in combining real-time traffic information than static schemes to reduce congestion E Adachi et al., (2020).

System Design: This section contains the characteristics of driving information, real-time traffic distribution mechanisms between minibuses and time travel, and the calculation of actual traffic information. Subsequently, both parts of the VBA Route Plan discrimination plan were introduced, which was based on information about traffic jams between cars and access to Google Map, with minimal.

Figure 1: Network topology for the proposed VBA.



2.1. The VANET-Based Traffic Info Estimation and Distribution

2.1.1. Two Traffic Data Sources: Figure 1 shows the network topics for the VBA presented for the roadmap with the shortest time and the lowermost fuel consumption. A hierarchy for communication of devices in network infrastructure. The file has two different traffic source. The first is an online GPS device and electronic track data, which allows the car to detect its current GPS location and access info as fast as the car starts to drive on the road.

Agreeing to the traffic info recording flow displayed in Figure 2, the vehicle's GPS device detects the intersection of an intersection, indicating the end of the road segment. In this case, all noted driving speeds are stored with the correct values listed in Table 1 of the average three-speed format speed for traffic info for this road segment. Road segment identification and logging time fields, specifying the departure time of the vehicle from this road segment.

Since MSW's wireless range is controlled by a vehicle like the Car V1 in Figure 1, historical traffic information can be accessed from Google Maps as a second source in real time via MSW. The green, yellow, red or red-black section of the road indicates that your speed is

too slow, medium, low, or crowded. In any case, Google Maps doesn't give traffic data on all segments of the street, however just on significant streets in urban zones or interstates. Consequently, Google Maps data is incorporated with the accompanying VANET Traffic Information Distribution System and the VBA Planning RP Algorithm totals these two traffic sources to give extra traffic data, which will be clarified later. As a outcome, the planned breakthrough on VBA routes is more exact and reliable than conventionally RP.

of another vehicle. For instance, if the vehicle connects to V2V3 in Figure 1, the VANET-based traffic information distribution system specified in this document is activated. As displayed in FIG. 4, each vehicle can transmit historical traffic info on road segments when transmitting IEEE 802.11p frames that contain traffic information together in the format shown in Table 1 for the last time zones of each road segment with which the vehicle has crossed nearby vehicles.

Figure 2: The traffic data recording flow of the vehicle.

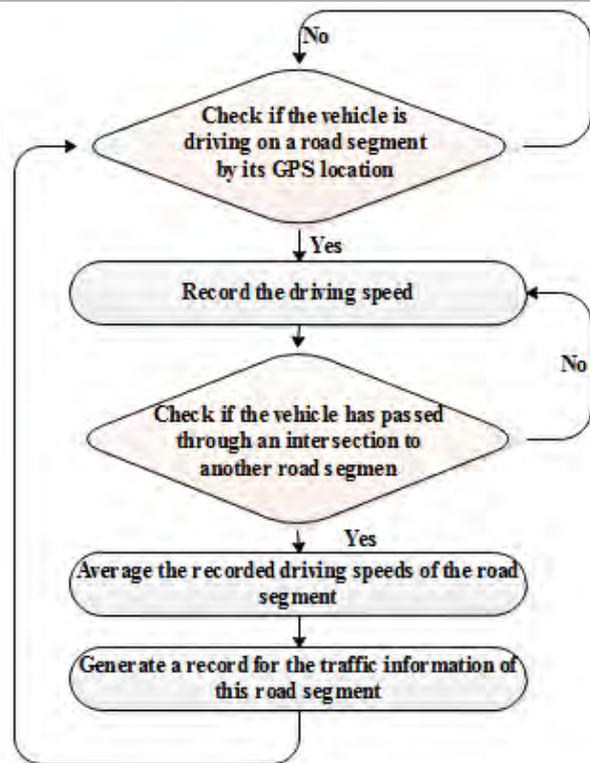


Figure 3: Google Maps Real-time traffic info

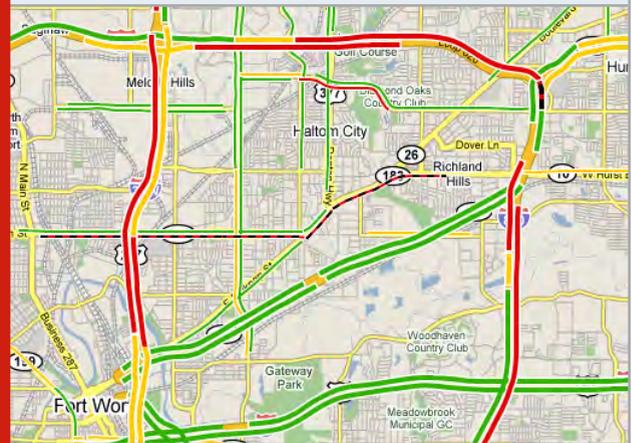


Figure 4: The traffic info distribution flow.

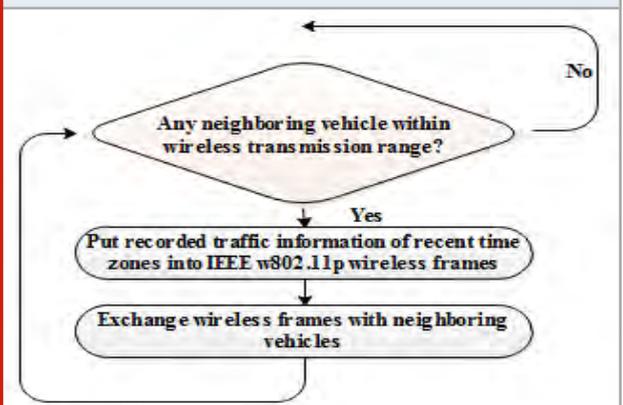
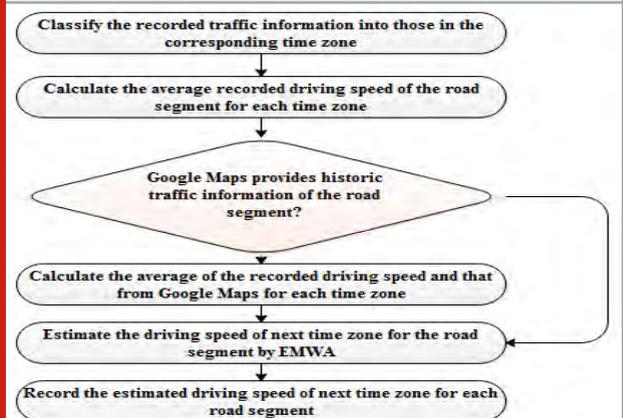


Table 1. The three-field format for traffic info of a road segment.

Field name	Description
Road segment ID	The unique ID of the road segment between two adjacent intersections. For example, a road segment in Shimon Blvd, Taipei, Taiwan is tagged with 6300009004232 as its ID
Record time	The time at which traffic information is recorded
Average speed	The average driving speed of this road segment

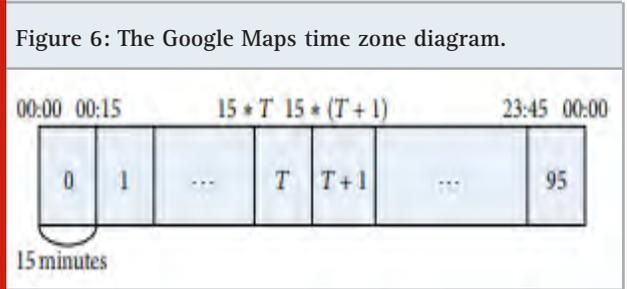
Figure 5: The flow to estimate traffic info of the next time zone.



3.1.2. The Traffic Info Distribution Tool through the VANET: As already stated, traffic information is constantly recorded when the vehicle is on the road. If another vehicle is in the IEEE 802.11p transmission kind

3.1.3. Traffic Info Estimation of the Next Time Zone: As shown in Figure 1, once the driver tries to trace a route from his origin to his destination using the proposed VBA procedure, traffic data, i.e. driving speed, the next time zone of each segment is initially calculated street 5.

According to the Google Maps time zone diagram shown in Figure 6, the recorded traffic information is divided into the consistent time zone of 15 minutes. The recorded average speed driving of the road segment is then calculated for every time zone.



Driving give Google Maps has already been recorded in the historical traffic information to estimate the speed of a road segment, these two values, that is, the sector recorded an average driving speed, each time driving at the speed of a dijkstra road segment at an average α of the factors and speed to recover from Google Maps ASEAN, is (1) developed here, A_t^i, G_t^i, Y_{t-1}^i and recorded an average driving speed, the savior is observed of speed, time and time zone of the road segment from Google maps driving speed, respectively,:

$$Y_t^i = \alpha \times A_t^i + (1 - \alpha) \times G_t^i, \text{ where } 0 \leq \alpha \leq 1. \tag{1}$$

After this, the driving speed S_t^i of the following time zone for the road segment can be calculated using the EWMA function, which is plotted in (2), where α is the weight factor and $S_t^i = \beta \times Y_t^i$ for the road segment i I signify the estimated and detected driving speed of the time zone $t-1$. With EWMA, it gives less weight to the driving speed of the old time zones and adds more weight to the driving speed in the new zones. Finally, S_{t-1}^i , records the estimated driving speed of the following time zone for the road segment i and uses the subsequent RP algorithm in the VBA:

$$S_t^i = \beta \times Y_t^i + (1 - \beta) \times S_{t-1}^i, \tag{2}$$

Where $t = 1, 2, \dots, n, 0 < \beta < 1$.

3.2. The Proposed RP Procedure: This document uses the pre-RP method, which means that the route is pre-planned based on the state of the UAV and the destination to be tracked and the drone is guided to travel on the default route. Contrary to the global planning from point A to B, where the objective pursued is a strategic objective, the RP cannot even be carried out offline and, depending on the position and purpose of the FVO, it must be carried out online in real time. And plan to fly so that the planned route responds in time to the destination ship. The A-Star search algorithm is an

optimal heuristic search procedure that computes the cost of all neighboring positions that the cost function can reach and places the lowest cost in the search space. In the search space, each newly added location creates as many new routes as possible. The above location for each of the routes within the search area is clearly marked. To reduce the size of the search and lessen the difficulty of the difficult, a heuristic search is used to guide the search for problematic heuristic information. Heuristic search requires defining a validation function:

$$f(k) = w_g g(k) + w_h h(k) \tag{3}$$

In this equation, the estimated cost of point F (k) is from the initial point to the goal. Actual weight $g(k)$. The actual price k from the starting point to the present point. Estimated costs $h(k)$ Estimated costs $w_$ weighting from the current point k to the target point. The estimation function $F(k)$ of the A-Star algorithm comprises the consumption costs $g(k)$ and the valued costs $h(k)$. Since the UAV tracks objectively, fuel consumption can be ignored and 0 can be spent in a non-threatening situation. The estimated cost $h(k)$, sometimes a heuristic function, is chiefly used to choose the appropriate address. Therefore, the appraised costs play a key role in determining whether the algorithm can be converted quickly and reliably. Many publications choose the Euclidean distance directly between the current location and the destination as a heuristic function. The heuristic function is applied to the problem of tracking:

$$h(k) = |\rho_i - \rho_d| \tag{4}$$

However, condition (4) as a heuristic capacity doesn't speak to the surveyed cost of the momentum point well indeed, and the estimation of the past pursuit point is handily belittled. Also, as the emphasis expands, the estimation of the later included point increases, coming about in the more slow combination of the calculation. To develop this, this study chooses the heuristic capacity as follows:

$$h(k) = \sum_{i=2}^k (|\rho_i - \rho_d| - |\rho_{i-1} - \rho_d|) \tag{6}$$

RESULT AND DISCUSSION

5.1. Simulation Environment: In fact, these VBAs and other traditional RP algorithms make it difficult to make a large-scale assessment of the actual travel distance, time, speed, and fuel consumption of navigated vehicles. Therefore, we compared the simulation outcomes of time, travel distance, and fuel consumption for two RP procedures: digester simulation and the proposed system. The model factors used are enumerated in Table 2.

5.2. Simulation Results: Below are four enactment metrics from six RP procedures, namely average travel time, distance, speed and fuel feasting. First of all, Figures 7 and 8 display your average travel time results with four values for periods 1 and 2. Regardless of the value of the simulation, the highest of the six algorithms is the runtime of dijkstra, Original AI and TTU-Angle

(Angle), since their Design criteria are instead to get the shortest travel distance the shortest. Time. High TTU-A Winkel (angle + speed) segments give road segments a

high driving speed and small angles, thus shortening your travel time.

Table 2. Simulation parameters.

Parameter	Value
Simulation time	Time period 1 (23:00~07:00),
Simulation area	3800 m × 2300 m (2742 road segments and 1720 intersections in Taipei City, Taiwan)
Number of vehicles with GPS navigation	10
Number of traffic accidents	3
Wireless transmission range	250 m
Vehicle velocity	0 m/sec ~ the speed limit of the road segment that the vehicle is driving on
Speed acceleration	Uniformly within 1-2 m/s every minute
MAC protocol	IEEE 802.11 DCF RTS/CTS
Physical propagation	Two Ray Ground
Data packet size	512 bytes

Figure 7: The time period 1 average travelling time.

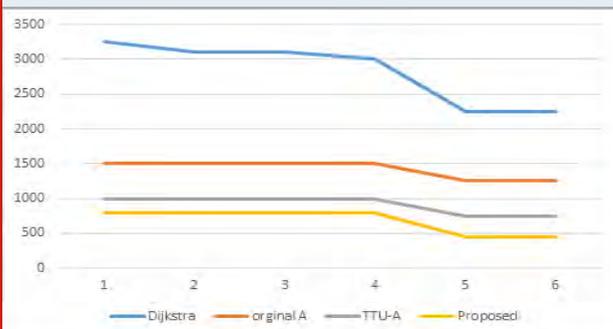
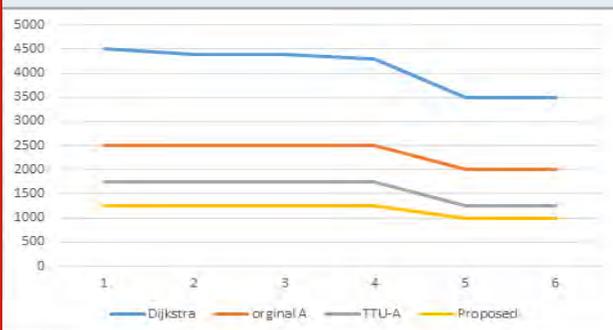


Figure 8: The time period 2 average travelling time.



CONCLUSION

In this document, a RP procedure is proposed to compute the route dynamics that meet the minimum travel time or minimum fuel intake criteria. It uses two real-time traffic information sources, road segment transmission, recorded traffic and traffic info from Google Maps to find a improved way than standard algorithms that only

accept static info. Snapshots of the GPS Navigation app running on the Android platform are shown to execute the root planning algorithm. Lastly, the proposed simulation outcomes expression a significant reduction in the average travel time and fuel feasting of the deliberate route compared to the conventional overload and congestion RP algorithms.

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Medical Report Management and Transaction using BlockChain

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ABSTRACT

A Medical Report management mainly focuses on the medical history of the patient, treatment, and transaction of money. A patient's medical report basically carries surgical history, obstetric history, medications and medical allergies of the patient, immunization history, and so on. These patient's records are managed using a traditional centralized database, this results in the infringement of medical reports by the unauthorized users. To overcome this problem the management of records can be done using BlockChain Technology. This paper proposes medical record management of the patients using BlockChain technology. The BlockChain deals with the sensitivity of the data and keeps the records in a more secure way. Here we take the advantage of BlockChain (BC) special features like immutability and anonymity of users. In this paper, we have provided permission access to the every participants involved in hospital management, so it provides limitations to whom to access the data. The proposed paper also uses the concepts of Hyperledger Composer and Hyperledger Fabric to provide a framework to develop an application and to implement the permissioned BlockChain and Chaincode. We implement the involvement of a private Database of BlockChain system.

KEY WORDS: BLOCKCHAIN, HYPERLEDGER COMPOSER, HYPERLEDGER FABRIC, MEDICAL REPORT MANAGEMENT AND CHAINCODE.

INTRODUCTION

A patient's medical report should contain the detailed medical information about the patient. It contains medical history of patients like patient's medical prescriptions, test results, x-rays, and so on K. M. Hossein, et al., (2019). The information present in these records should be trustworthy so that doctors can treat them accordingly

.A patient's medical report is sensitive to maintain and also should be confidential so that it can be accessed only by the trusted authorities in the hospital Y. Jeong, et al., (2019). The disadvantage faced in a traditional database system is that there is no accessibility condition, any member of the hospital can easily fetch the data or can even modify it A. Shahnaz, et al., (2019). Another con of using a traditional system is, it does not provide any identity for the particular participant to access that file L. Ismail, et al., (2019).

To overcome this we use the BlockChain technology to maintain and give access to the records in a more secured way. A BlockChain is a decentralized, distributed and peer to peer network, has distributed time stamping network

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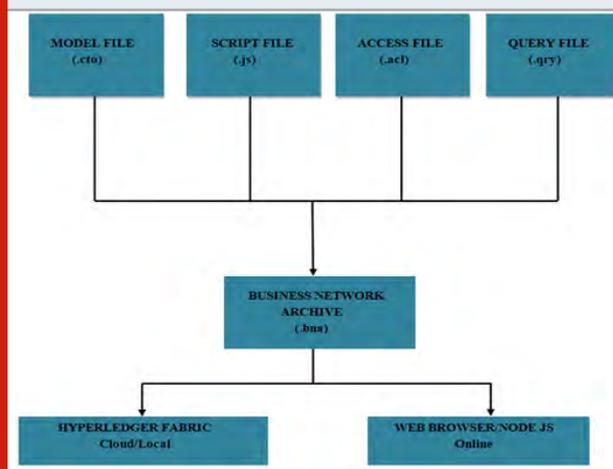
and transaction id .Unlike centralized servers the data in the BlockChain are not stored in the same location A. R. Rajput, et al., (2019). In BlockChain the data is stored in a chain of blocks and can be accessed by hash values which are unique like a fingerprint. Once the data is stored in the BlockChain it is difficult to modify it, the data are also automatically updated. They also provide transparency of the data, so that users can know the entire process. With this technology the admin can also provide accessibility permission to the trusted users to access the data. In this paper, we propose the management of a patient’s medical record using BlockChain technology. Our proposed system is a Hyperledger based BlockChain application. The access to these records are given to the participants using the smart contracts Nitin Gaur et al., (2019). We have developed this as a web application so that the particular doctors and other assistants can access the system via the application.

Related Work: Still now we are using the Centralised database system for managing any information in the current situation. Due to security issues, data prevention, control over the central system and redundancy of data over the system, so many problems are aroused over the centralized database system. So many advanced security systems have also been developed but no assurance of security of data in the world. Comprehensive informations are involved and handled in the patient’s medical report where every information such as doctor’s prescription ,pharmacy details ,laboratory test reports , and scan report of every patient are stored in a single and separate database where this leads to more effort of collecting every report patient in the hospitals Sachin S.et al., (2019). To which we are introducing BlockChain technology to overcome the centralized database system problem, this leads to maintenance of data over secured and permissioned ledger over the consortium system. We are using Hyperledger composer for performing application framework and Hyperledger fabric for maintaining authentication over the medical system.

and Hyperledger Fabric which used to create consortium networks among hospital management staff .By which creating private BlockChain for the distributed ledger. The Hyperledger Fabric is permissioned and private BlockChain, which allows only authorized participants to access the network. It also used to create subnets called channels. The Hyperledger Fabric contains node entities. Since it is a private BlockChain all the participants cannot directly access it, to be a member of a private network, requests should be made through Membership Service Provider.

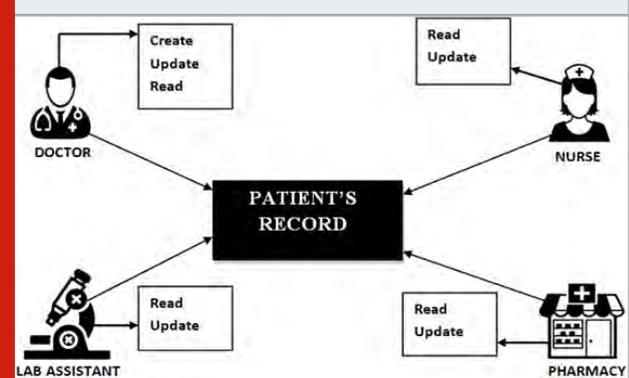
The most important data should be transferred from one node to another, this can be done through application with the help of smart contracts. The smart contracts can be created using Hyperledger Fabric with the help of chaincode. The chaincode can be programmed using languages like JavaScript , GO and Java .The data created are usually stored in the ledger, this ledger can be partitioned into two parts using Hyperledger, they are world state which will have the current data and transaction log, it contains the transaction details. This Hyperledger Fabric can be supported using a framework called Hyperledger Composer. It is an open developing tool to develop networks, and also used to create applications. The Hyperledger Composer is exported as an archive and can be used using (.bna) file support. The business network (Fig1) created has four principle files – model file, script file, access file, and query file.

Figure 1: Hyperledger Composer for Creating a Business Network Archive



Proposed System: We proposed system architecture for medical report management using Hyperledger Composer

Figure 2: Proposed System Model



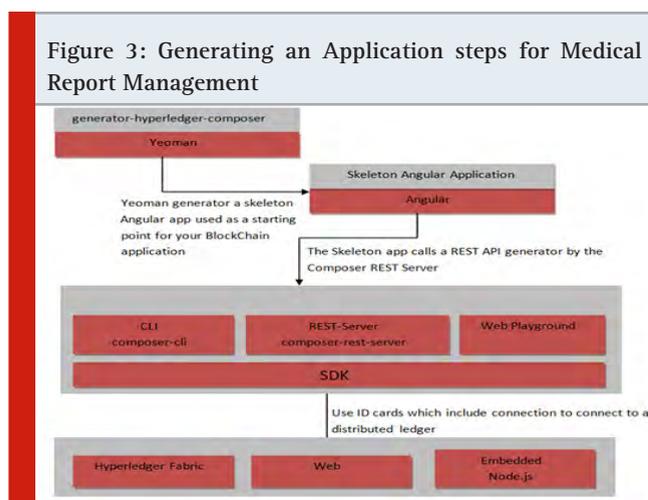
Model File: It is used to construct an outline structure of an application. It has three components: assets, participants, transactions. Assets are like variables stores in the network, participants makes nodes to interact with assets and transactions and transactions defines the functions that takes places in the network

Script File: This file is used to perform various transaction functions, coded in javascript. It handles transaction logic and also gives accessibility to the participants.

Access File: The main use of this file is used to assign a role to the participants in the network, it allows to create, read, update, and fetch. Once the business network is built it is downloaded in the form of an archive file and it can run on other machine. Network Cards are the cards used to connect to the system. This card chooses the type

of node that makes use of this card to get connected to the network, this allows the doctors or other participants role the node plays.

In our Medical report management system, the proposed system model (Fig2) contains participants such as doctor, patients, lab assistant, and pharmacy and separate function for participants for accessing it. In Hyperledger Composer, these participants are created in a model file. The creation and deletion of new participants is done in participant registry. Steps to create an application to manage the patient's medical it can run on other machine. Network Cards are the cards used to connect to the system. Report management using Hyperledger Composer (Fig3).



Step 1: Creating a Business Network Structure: The main concept for Hyperledger Composer is to have the business network definition (BND). It basically defines the data model, transaction logic, and access control rule for the patient's report Blockchain network. The easiest way to start is to use a Yeoman generator to build a skeleton business network structure, this creates a directory containing all the components of the business network.

Step 2: Defining a Business Network: In the skeleton business network thus created, there is a model file (.cto) which will contain the class definition for all assets, participants, and transactions in the business network for the patient's report. The skeleton business network also contain an access control rule file (.acl) for every participants involved in maintaining patient's report with basic access control rules over the hospital managements, a script file (.js) containing transaction processor functions which used to creating function for the patient's report, and a package.json file containing business network metadata.

Step 3: Generate a Business Network Archive: Business network has been defined, and must be deployable business network archive (.bna) file.

STEP 4: Deploying the Business Network: Once a .bna file has been created, it can be deployed to instances

of Hyperledger Fabric. The Fabric controller is required to create "PeerAdmin" identity with privilege to install ChainCode of Hyperledger Fabric to the peer. And also starts a ChainCode on the "Composer Channel". A "PeerAdmin" identity has been created before itself. After the business network of the patient's report has been installed, the network can be started.

Step 5: Generating a REST Server: Hyperledger Composer can develop an indication of REST API based on the business network of a patient's report, to develop a web application for hospital management the REST API provides language neutral abstraction.

Step 6: Generating a Skeleton Angular Application: Hyperledger composer generates an angular 4 application which runs against the REST API.

The Angular generator will then create a Scaffolding for the medical report management and to run the application against your REST API.

CONCLUSION

This paper proposes an Medical Report Management which gives secured protection towards patient's medical records. This application is based on the Hyperldger Composer network, a permissioned blockchain. This allows only authorized participants accepted by the admin to access the network in the hospital. This proposed framework provides access to the participants like who should fetch, create, and delete the records with the use of Hyperledger Fabric and Hyperledger Composer. The Blockchain technology maintains a patient's record in an immutable and transparent manner in the distributed ledger. We have executed this in the form of a web application and the experimental results give that this system provides security to maintain the patient's medical records which is a sensitive and confidential manner for hospital management.

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Detection of Diabetic Retinopathy in Retinal Images with Advertent Information

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ABSTRACT

An eye disease Diabetic Retinopathy (DR) which is one of serious eye disease that can cause loss of vision i.e, blindness which is caused by increase in levels insulin in blood and leads to loss of vision. Also Diabetes mellitus, a metabolic disorder, which is popular, also current health threat in India and across the world. Medical image analysis, current trend research area now a days and here images are analyzed and it plays a major role in finding diagnosis for different medical problems. Early detection of these disorders may help the patients to save their vision, prevents visual impairment and blindness. By developing an automated system we can the examiner to examine Diabetic Retinopathy condition, which is having different types, stages and lesion, i.e., micro aneurysms, hemorrhages, exudates. Here we present a method for detection and exudate classification in retinal images. By removal of optic disc region ceases the division of exudates region. For the early detection of DR several image processing techniques has been developed. DR can be detected based on symptoms such as micro aneurysms, hemorrhages, exudes and blood vessels. the use Image processing techniques DR feature detection this project presents its latest work as review. Based on their results the image processing techniques are evaluated. Using high gray level variation exudates can be detected and the classification can be done with exudates features and SVM classifier

INTRODUCTION

Diabetic Retinopathy (DR) is commonly used to show vascular problems in the retina of the patients with diabetes. The retina is present at the end of the eye, the image of objects is viewed passing through the pupil, the cornea, and the space in the eye, is passed to the brain as a message so that we can see it. Diabetic retinopathy

is one reason for blindness and diabetic complications. In most cases, the vision of a person is affected so early diagnosis of diabetes can prevent blindness and blurred vision. Retinal diseases are monitored using FUNDUS images. Analysis of retinal vascular properties is done by image processing technique which increases the speed, accuracy and reliability of the diagnosis and treatment cost gets reduced. Abbadi et al., (2008) and. Zhang et al., (2007) expressed about lesion detection exudates present in retinal image and two-dimensional Gabor filters for segmentation.

The σ with large value is used for larger vessels and a smaller value for smaller vessels. The hysteresis threshold is used to check all kinds of blood vessels. The proposed method is tested on the DRIVE database and with acceptable outcome. An initial segmentation on the loaded images is performed using edge detection

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algorithm and feature- based algorithm are used to detect more precisely the blood vessels. The features such as brightness, width and direction are taken by this algorithm for the requirement of segmentation.

II. Literature Review: Masoud Khazaei et al., (2006) proposed that AUC method was 0.9012, which is having highest value when compared to other methods. It indicates the proper function of this method that which helps us to determine the correctness of image prominently. The proposed algorithm gives positive result based on image processing techniques and also inspired by the human visual system. So we can suggest that using method can help ophthalmologists to determine faults and diagnose it fast, accurate, diabetic retinopathy. Godlin Atlas L1 et al., (2009) proposed that, taking into consideration the complexity between the veins and encompassing foundation the retinal vascular division can be done. Utilizing the strategies like bouncing box and thickness examination discharge hopefuls were recognized. The strategy Random Forest in the light of the territory and veins borders, hemorrhages are utilized to finish the arrangement of distinctive phases of eye alignment.

The calculation has been put into effort on a picture information, contrasted, execution human grader. Thus we obtain mean persistent estimation of 92.4% and mean affectability of 92.8%. The changes in parameters which are required for the calculation are also been assumed. For the purpose of classification of retinal images the proposed system utilizes a vessel segmentation, which is to identify vessels and obtain required imaging feature from detected vessels. In analyzing images got from standard fundus image database, the information found from them has been useful to the system.

Here our main notion is to identify either input images are normal or abnormal. If our input is abnormal the analysis for further DR stage is done. Various techniques and methodologies were used in image mining to detect the abnormal images. Image mining is an extension of data mining technique. For preprocessing of image mining most of the image processing algorithms are used. Preprocessing stage is used in image processing for image enhancement. While detecting experimental results its features are also been extracted. Classifying algorithms are used after extracting the features. Finally when result is obtained, the result will display that image how it is, whether it is normal or abnormal. Web based system are most useful now. So, if we implement web system for our detection method of diabetic retinopathy, then it will be very beneficial for rural patients and it also save time and money of diabetic patients.

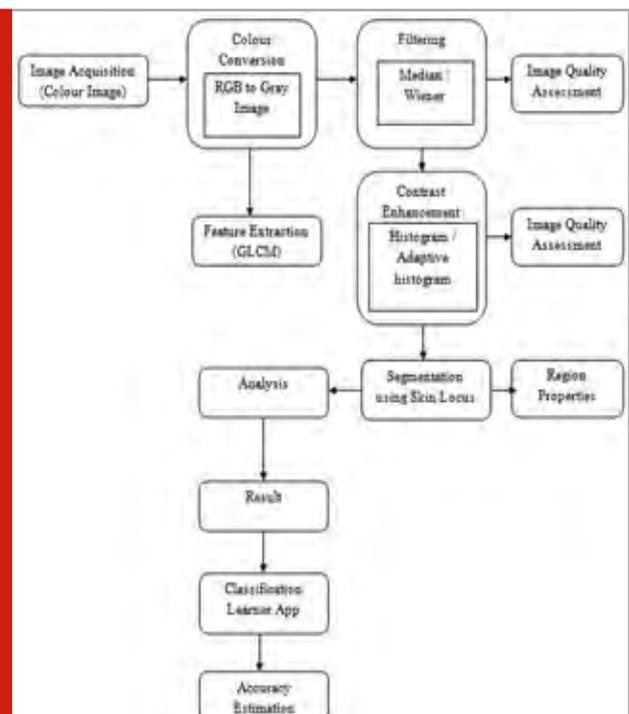
III. Existing System: The computer-aided screening and the grading system depends on the detection of lesions. Fundus image with DR (Diabetic Retinopathy) exhibit red lesions, namely micro aneurysms (MA) and hemorrhages (HE), and bright lesions, such as exudates and cotton wool spots. The Existing method takes color fundus image as input along with the binary mask of the region

of interest (ROI). The ROI is the circular area which is surrounded by black background. The probability color map is the output for red lesion detection. Initially, various image resolution is supported by applying spatial calibration. Next, the input image is preprocessed through smoothing and normalization. Finally, the optic disc (OD) is detected automatically, in order to discard this area from the detection of lesion. The prediction of Retinopathy is quite difficult. Segmentation method may produce unwanted noise. PSNR value is high Image Assessment analysis provides poor performance. Segmentation covers unwanted region.

IV. Proposed Work: Diabetic Retinopathy cause changes in eye and damage the blood vessels. Image undergoes a standard method of applying image processing which include.

- image acquisition,
- pre-processing like filtering (Median/Wiener/Gaussian),
- Contrast enhancement (Histogram Equalization/ Adaptive Histogram),
- feature extraction like GLCM,
- Region Properties
- Image Assessment techniques followed by exact identification of disease.

Skin locus model and color histogram are used for the classification of the retinal images into category of Normal. The proposed work classification will provide better efficiency and accuracy of identifying the disease with reference to existing systems. After getting results, patient can receive their report via e-mail. After getting result, records will be sent through E-mail and SMS through GSM module.

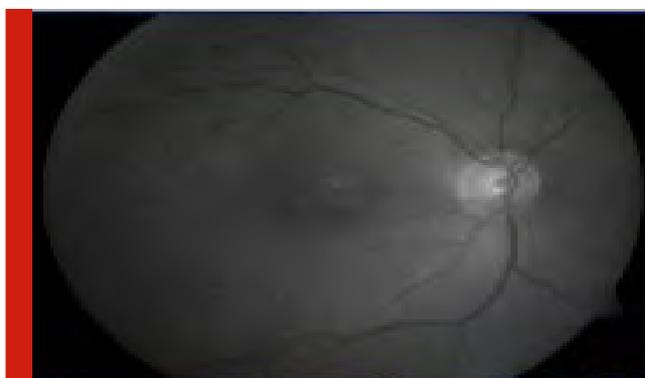
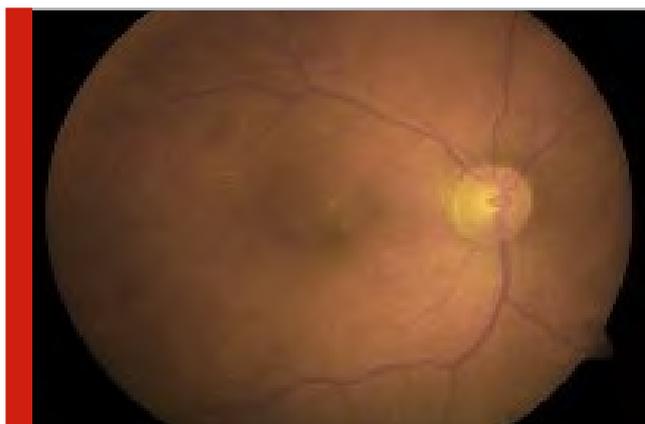


V. System Framework: In digital signal processing, the Wiener filter is used to give an estimate of desired or target random process by a technique called linear time-invariant (LTI) filtering of an observed noisy process, assuming known stationary signal, noise spectra and additive noise. The Wiener filter reduces the mean square error between the estimated random process and desired process.

VI. Modules

1. Image Acquisition and conversion
2. Filtering
3. Contrast Enhancement and Segmentation

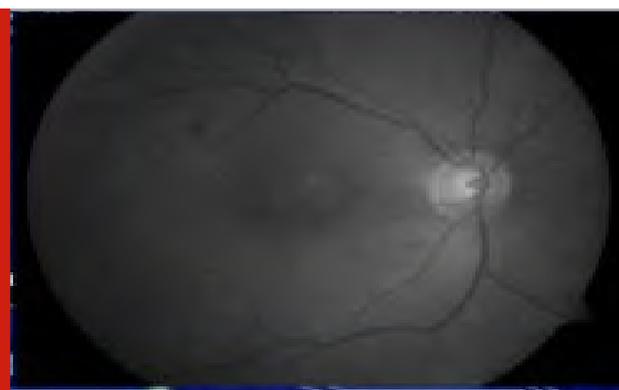
1. Image Acquisition and Conversion: Image acquisition is a process of loading image from dataset. Once the image has been acquired, several methods of processing are applied to the image in order to perform various vision tasks which are being required today. If the image is not acquired properly, then the necessary tasks will not be achievable, even with the help of image enhancement. Once image has been loaded, it is converted into Gray Image because the image which we have acquired is of the type RGB whose intensities are more and it takes more time for calculating and detecting the disease. So we are converting RGB image to Gray image since Gray image consists of two colors so the intensities and accuracy estimation and detection of disease will be easy.



2. Filtering: There are two techniques used for filtering a gray image. They are Median filter and Wiener filter.

Median Filter: To remove noise from an image or signal a nonlinear digital filtering technique called Median

filter is used. This type of noise reduction is a typical pre processing step which is commonly used to improve the results of further processing like edge detection on an image. In digital image processing, Median filtering is broadly used, as in some conditions, it preserves edges while removing noise and also applications in signal processing.



Weiner Filter: Wiener filter is the most widely used since it provides more accuracy than previously mentioned Median Filter. In digital signal processing, the Wiener filter is used to estimate the desired or target random process by a technique called linear time-invariant (LTI) filtering of an observed noisy process, assuming known stationary signal, noise spectra, and additive noise. The Wiener filter decreases the mean square error between the estimated random process and the desired process.

GLCM	
CORRELATION	0.968451
CONTRAST	0.0407786
ENERGY	0.332002
HOMOGENEITY	0.979611

GLCM: Gray Level Co-occurrence Matrix (GLCM) is articulated to obtain statistical texture features. Various texture features can be drawn out from the GLCM.

It includes four factors namely

1. Correlation
2. Contrast
3. Energy
4. Homogeneity

Correlation: The correlation value of the positively or negatively correlated image is 1 and -1. The constant image value is NaN..Range= [-1, 1] and the the mathematical formula is ,

$$\text{Correlation} = \sum_{i,j=0}^{N-1} P_{ij} \frac{(i - \mu)(j - \mu)}{\sigma^2}$$

Contrast: The contrast is used to pass the pixel correlation and its neighbour's calculation the the whole image which means it shows only the linear dependency on gray level on those of neighbouring pixels. The mathematical formula is

$$\text{Contrast} = \sum_{i,j=0}^{N-1} P_{ij} (i - j)^2$$

Energy: The work is done by the energy, thus orderliness. The energy mostly uses the texture for calculating orders in an image. When The energy value is maximum the window is ordered proficiently. The ASM (Angular Second Moment) texture character is used as Energy and its range is 0 to 1. The range of constant image is 1. The energy is calculated by the following equation

$$\text{Energy} = \sum_{i,j=0}^{N-1} (P_{ij})^2$$

Homogeneity: Homogeneity is used to pass the value which calculates the tightness of element distribution in GLCM to the GLCM diagonal. The weight retained in contrast is $(i-j)^2$ and in homogeneity, is $1/(1+(i-j)^2)$. The equation is

$$\text{Homogeneity} = \sum_{i,j=0}^{N-1} \frac{P_{ij}}{1+(i-j)^2}$$

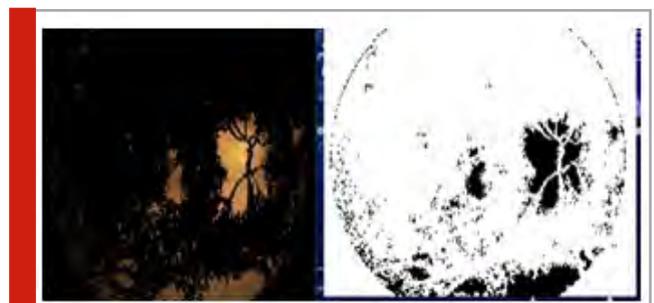
3. Contrast Enhancement and Segmentation: Contrast Enhancement uses two techniques of which one is already in existing and the other is used in proposed work.

Histogram Equalization: This usually increases the global contrast of many images, especially when the usable data of the image is represented by close contrast values. Through this adjustment, the intensities can be better

distributed on the histogram. This allows for areas of lower local contrast to gain a higher contrast. Histogram equalization accomplishes this by effectively spreading out the most frequent intensity values.



Adaptive histogram equalization: Adaptive histogram equalization (AHE) is a computer image processing technique used to improve contrast in images. It differs from ordinary histogram equalization in the respect that the adaptive method computes several histograms, each corresponding to a distinct section of the image, and uses them to redistribute the lightness values of the image. It is therefore suitable for improving the local contrast and enhancing the definitions of edges in each region of an image.



Segmentation: Segmentation is performed using an algorithm known as Skin Locus. In computer vision, image segmentation is the process of partitioning a digital image into multiple segments (sets of pixels, also known as super-pixels). The goal of segmentation is to simplify and/or change the representation of an image into something that is more meaningful and easier to analyze.

RESULTS

The final result of our proposed system will show whether the person is suffering with the disease or he/she has a normal eye. If the person has the disease, depends on his eye condition we categorize it as soft exudates or hard exudates. If he is disease free then it is shown as normal eye.

CONCLUSION

In this DR image detection, using various module analysis the retinal image has been categorized and underwent various segmentation process and the outcome is produced using different stages.

Future Scope

1. There is a scope to extend this work by connecting with an hardware (Mobile or Laptop) using which we can receive email or SMS notification.
2. Another way of extending this is to create a device for the detection of Diabetic Retinopathy in easy way

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Prognosis of Sepsis using Machine Learning Algorithms

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ABSTRACT

This paper aims at predicting the risk of sepsis in patients by analyzing machine learning algorithms. This will enable prompt and improved therapy. In-order to analyze high frequency data continuously, a machine learning approach is developed. Early detection of patients affected by the risk of sepsis can performed by this technique. It can be identified using physiological data available with the patients. These high frequency physiological data is available from bedside monitors gathered minute by minute. Our analysis and prediction in identifying the development of sepsis from available data resulted in improved output than the previous method of identifying the disease sepsis-a life threatening disease. The original model using SIRS could not accurately predict the patients affected by sepsis. The next multi-layer model was successful in predicting more patients than the prediction done by SIRS model. If this is implemented in ICU, it will help to reduce morbidity and mortality.

KEY WORDS: MACHINE LEARNING, PREDICTION METHODS, SEPSIS, MEDICAL DIAGNOSIS.

INTRODUCTION

Artificial Intelligence (AI) is a branch of Science that usually performs tasks which requires human intelligence and find solutions to complex problems with the help of various machines. This involves converting the intelligence characteristics of human into algorithms understandable by the computer. Artificial intelligence can be defined in various ways. In simpler terms, it makes the machines "intelligent" by making them work like

how people would expect. This working methodology requires distinguishing the human responses and the computer responses known as the Turing test. AI is widely used in business since it comprises of a set of tools and algorithms to easily solve business problems. It includes the study of visual perception, symbolic programming, speech recognition, problem solving, translation and even search. Its focus on symbols are more rather numeric processing. Artificial Intelligence can also be called as an electronic machine since it stores and process huge amount of data at a rapid speed.

The computer is artificially intelligent if the human finds difficulty in predicting whether it is a human or a machine at the other side. Hence artificial engineering is the engineering of making machines intelligent, mainly intelligent computer algorithms Y Wang, and J. Patrick (2009). For instance Bernel, Giraldo and

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Barbosa developed techniques that tackle the parameter configuration issues and build features to predict the disease Salcedo-Bernal et al., (2016). In another study, a combined data mining approach is introduced to provide caution on the premature decline of health for patients admitted in Intensive Care Units Mao et al., (2018). In addition, cascading of various models and a voting strategy is presented to predict the recognized entities and sort out them for better accuracy Y Wang, and J. Patrick., (2009). Further a thesis proposed by Rivas indicated the rising use of smartphones and employed a technique that uses ECG signals of patients to detect premature allergies which was accurate and also reduced complexity R. Gutiérrez-Rivas et al., (2016). Further a warning score called was calculated for the detection of septic shock in the patients who are likely to develop and it is predicted before its actual outbreak Henry et al., (2015).

In this study, sepsis is being predicted in three stages using different parameters to find out the stage of the disease in patients before its onset. Sepsis is a possibly dangerous condition brought about by the body's reaction to a disease. The body regularly discharges synthetic concoctions into the circulation system to battle a disease. Sepsis happens when the body reaction to these synthetic concoctions is out of equalization, activating changes that can harm numerous organ frameworks. Distinguishing Sepsis takes additional time before identifying the disease it leads the Patients to next stage. In existing there are numerous models work for prediction but the forecast precision of the models are not effective and not satisfactory. we build up an AI way to deal with break down consistent, high-recurrence information Chen et al., (2006). We show the abilities of this methodology for early recognizable proof of patients in danger of sepsis, a conceivably dangerous inconvenience of a contamination, using high-frequency physiological information. We made the different models for sepsis and its stages and the dataset comprises of in excess of 25000 information with the goal that exactness and expectation is progressively precise. The Algorithms, for example, Random Forest, Neural systems, SVM and Naive Bayes are utilized for Training the model. Stages like Sepsis, Severe Sepsis and Septic shock can be anticipated utilizing the Separate AI calculation.

In earlier study, the clinical data of the affected patients are collected continuously with respect to time. A time window is used for this purpose which slides and discards the prior readings as new observations are provided. This procedure helps in getting the accurate observations of the patients' condition at a specific time. Features are extracted from the data collected by each of these time windows. These features are used in real-time as an input to the model in Layer 1 to continuously predict the probable occurrence of the disease sepsis in patients.

After this a value is set on the model to estimate the probabilities of the patients who are in the verge of getting sepsis.

Characteristic attributes are taken from the probable date collected from the next level windows. These attributes are taken as real time input in the Layer 2 model to predict the stage of patients who are in the outset of developing sepsis. This is the new model which is different from the existing one in the field of attribute extraction. At this level 2, a tight bound is set (say 0.5) to decide the stage of patients affected by sepsis. Random decision forest comes under the class of classification algorithms that uses bagging and randomness features for building each individual tree thereby creating a forest of trees which are uncorrelated thereby making the prediction more accurately than made by any of its individual tree. Here a comparison is done on the outcome of a group of patients in the original and new model. We prove our perspective by evaluating the data collected from distinct facility with similar environment. Therefore, we envisage that the new multilayer model can be done in applications where real-time monitoring is necessary.

Methodology: In this section, we discuss about the details of data and its features, multilayer model execution and barometer to assess the performance of the new model. This approach can be divided to three major steps namely data collection and pre-processing, creating sepsis and severe sepsis model and creating septic shock model with an UI. Initial step involves collecting data. Every possible detail about the sepsis like symptoms and the rate of possible counts (heart rate, respiratory rate, bilirubin count etc.) are collected. After collecting the data, the data set is prepared according to the symptoms. This involves preparing three different datasets for three differentiating three stages of sepsis. Because preparing the three possibilities at the same time is not a good dataset we have to prepare the dataset separately for everything. This will increase the accuracy rate as well as results in developing perfect model. Further, pre-processing of data is done to make it understandable by machine. Then the features are selected to train the model.

After the pre-processing, the training phase is carried out in which the dataset is split into two as features and label. Sklearn package is used for calling the algorithm. Different algorithms like random forest, SVM, naive bayes etc are called. These algorithms are used to train the data and the algorithm with greater accuracy is selected. In the same way three different models are built for the three stages of sepsis. Once the data set is prepared it is split into train and test in the ratio of 70:30. The 70% data is applied for training and the rest for prediction. Hence after the prediction the accuracy for every algorithm is calculated and the perfect model

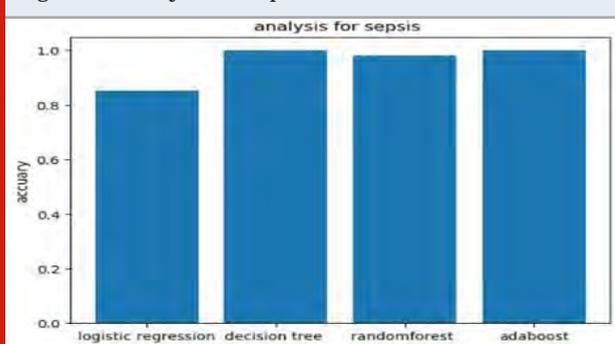
is finalized. But the web application is required to see the prediction results. However, the machine learning and Web development are different domains. Hence a pipeline is created for interacting machine learning and machine learning model using the pickle package. The pickle package stores the machine learning model in the stage of prediction. After that user can give input and can get the output results.

3. Prediction: The user gives the necessary inputs like location, respiratory rate, consciousness, heart beat rate, WBC count, temperature of the body, CRP range in order to predict whether the person/ patient having sepsis or not. Hence the sepsis is predicted according to these available data. Further if the result is obtained to be true, the second stage of sepsis is predicted by getting the additional parameters like urine output and SPO2 which indicates the traces of severe sepsis. The third stage i.e the septic shock can be predicted with additional inputs like systolic/diastolic pressure, glucose, creatine , bilirubin, INR, platelets. The above predictions can show the patient/person has been affected by the disease of sepsis according to its severity. Further the suggestion for hospitals is provided.

Figure 1: List Of Parameters involved in prediction of sepsis

Sl.No	PARAMETERS	RANGE/UNIT
1	Respiratory rate	>20 breaths per minute
2	Heart rate	>90 beats per minute
3	WBC	<4500 or >11000/dL
4	Temperature	<36 °C or > 38 °C
5	Urine output	< 0.5 ml/kg/hr
6	Spo2	less than 93%
7	Systolic/Diastolic pressure	<70 mmHg or >110mmHg / <40mmHg or >70m mHg
8	Glucose	<40 mg/dL
9	Creatine	>1.3 mg/dL
10	Bilirubin	>2 mg/dL
11	Inr	>1.5
12	Platelets	<1.5x10 ⁵ or >5x10 ⁵ /dL

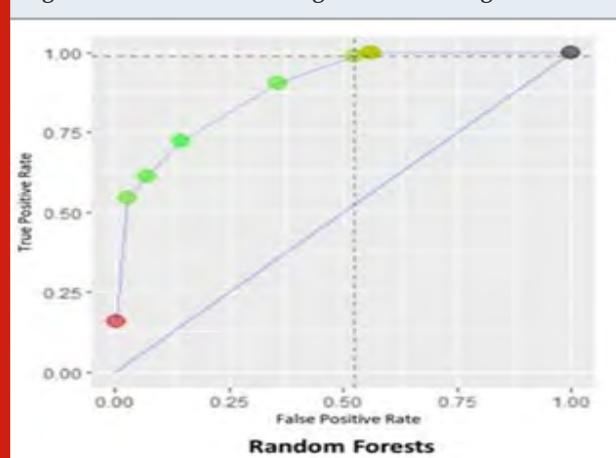
Figure 2: Analysis of Sepsis



4. Model and Features: Random decision forests is a supervised learning algorithm which is used primely in classification and also in regression problems. This algorithm operates by constructing a significant number of decision trees on the data samples collected then it obtains the prediction from each of the decision tree and then finally the accurate result is attained by voting. This method is better than single decision tree because it is an ensemble methodology as the over-fitting is reduced and the accuracy is prevailed.

The history of the random forests algorithm started when Tin Kam Ho created the primary algorithm using the random subspace method, which paves the way to solve the problem proposed by Eugene Kleinberg by rendering a "stochastic discrimination" approach. In 2019 "Random Forests" was registered as a trademark by Minitab, Inc.. Further to get accurate results, Amit and Geman independently introduced a bagging idea of combining several individual outputs in order to build a group pf decision trees with minimum variance.

Figure 3: Random Forest Algorithm Working



A neural network is a connection of neurons, the artificial neural network is composed of artificial neurons or in other words are elementary units in an artificial neural network. This imitates the actual behaviour of neurons in the human brain. The connections between the biological neuron are modeled as weights. This helps us in solving a artificial intelligence(AI) problem. A positive weight signifies an excitatory connection whereas the negative value mean inhibitory connection. All the inputs are modified by a weight and added. This operation is called as linear combination. Lastly, the activation function is computed as it controls the amplitude of the output. For example, an acceptable range of output is usually between 0 and 1, or it could be -1 and 1. Unlike von Neumann model, computations, artificial neural networks do not distinct memory and operate via the flow of signals through the net connections, somewhat akin to biological networks.

4.1. Confusion Matrix: Firstly, a receiver operating characteristic curve or ROC curve is seen that exemplify the ability of binary classifier system and the accuracy of it is determined by checking at Area Under the Curve (AUC) and other important variables which are also referred as Confusion Metrics. A confusion matrix is a

machine learning method that explains the performance of a model by measuring Precision, Recall, Accuracy etc. on a data collection for which the true values are already predicted. All the measures except AUC can be calculated by using left most four parameters. So, let's talk about those four parameters first.

Table 1			
		Predicated Class	
		Class=yes	Class=no
Actual Class	Class=yes	True positive	False Negative
	Class=no	False positive	True negative

True positive and true negatives observations are indicated in green color as they are faultless. But the false positives and false negative values are needed to be curtailed so they are indicated in red color. These terms are a bit confusing. So let's take each term one by one and understand it fully.

True Positives (TP): These are the error-free scrupulous positive values that are predicted which indicates that both the actual and the predicted class tells the similar thing. E.g. if actual class value says that there has been a murder occurred then the predicted class will tell you the same thing.

True Negatives (TN): These are the error-free scrupulous negative values that are predicted which indicates that both the actual and the predicted class tells the similar thing. E.g. if actual class value says that this is not a accident then the predicted class will also tell you the same thing. The false positives and false negatives occur only when the actual class contradicts with the predicted class.

False Positives (FP): When actual class indicates false but predicted class indicates true.

False Negatives (FN): When actual class indicates true but predicted class indicates false. Once you understand these four parameters then we can calculate Accuracy, Precision, Recall and F1 score.

Accuracy: Accuracy is the measure of knowing how well the developed machine learning model can predict a correct class for the specific observation. This accuracy

measure plays an important role in taking business decisions and also to detect the model outcomes.

Precision: Precision measure denotes the percentage of the results that are desirable and relevant from the total obtained results.

Recall (Sensitivity): Recall measure denotes the fraction of relevant results that are retrieved out of the entire relevant data available.

F1 score: Also called the F Measure is a standard which is used to indicate the balance of precision and recall. The mean of precision and recall is calculated and presented.

CONCLUSION

In this investigation, the Sepsis definition was utilized to manufacture three prescient models of sepsis in grown-up patients. Eventually, the achievement of the models is controlled by their utility in a clinical setting, wherein imperatives on operational amounts, such as model size and execution, must be fulfilled and right distinguishing proof of sepsis before beginning is stressed.

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Smart Agriculture Using IoT and Machine Learning

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ABSTRACT

Agriculture and agriculture plays an important role in our country from old ages. Since people started to migrate from rural region to urban region, they need the agriculture to be smart. This project of Smart Agriculture system includes GPS-based remote control monitoring, humidity, temperature sensing, intrusion protection, one-touch irrigation, safety, crop suggestion. In this project, we aim to reduce the work load on the farmers and will make the agriculture system more efficient. It helps to deal with problems such as wastage of water by the sprinkler system, to avoid fire to spread in the farm, stopping animals and birds to enter in the field and helping the farmer by suggesting the suitable crop for the field. All field updates will be sent to the farmer using the GSM module. This agenda is an excellent work of absolutely smart agriculture. The project focuses on IoT to make the agricultural system modern.

KEY WORDS: INTRUSION PROTECTION, GSM MODULE, GPS.

INTRODUCTION

Agriculture is one of the most important industries in the world. Over 70 % of the world depends on agriculture, which is responsible for the economic growth of the countries. A. Anusha, et al., (2019). The advancement in science and technology has contributed in progress of agriculture industry. Internet of Things (IOT) plays one of the biggest roles in bringing advancement in the fields. Nurzaman Ahmed et al., (2018). The traditional techniques of the farming require a lot of manpower, time and increase workload. IOT and Machine Learning have simplified the traditional agricultural practices and introduced smart farming techniques. Wenju Zhao et al., (2017). It has been estimated that the IOT can increase the food production by 72% by the year 2050. Therefore IoT

based agriculture is in demand with the promise to predict the soil and crop health, suggest the crop type for

fields, storage conditions, fertilizers requirements, amount of energy consumption and protection of crops. Unfortunately, due to lack of awareness among Indian farmers about smart farming, they still stick to the traditional farming and also IoT based technology requires high capital which is not accepted by the local community who follows traditional methods. M.K. Gayatri, et al., (2015). Thus a need for a cost effective, simplistic and advancement of technology like IOT is needed to agriculture system.

The main objective is to attain a completely automated system to reduce the load on the farmers so that they can utilize it for some other useful purpose and have higher food production. Joaquín Gutiérrez et al., (2019). An IOT based system would use different types of sensors which send the data to a server that stores the data and further send it to an application which can act on the data. This project focuses on IoT to modernize the agriculture system.

Proposed System: Smart agriculture is evolving trends in day to day life. Farmers are facing many difficulties

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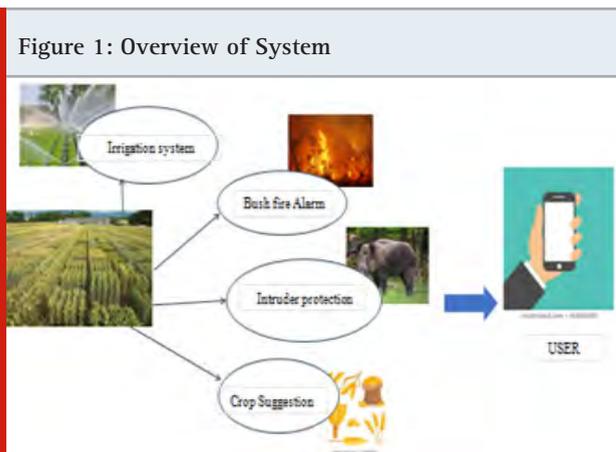


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in farming and agriculture fields. The advancement in technology such as IoT and Machine learning have progressed the growth of science and technology in field of agriculture. This system of smart agriculture consisting of such technology has been a benefit for the farmers. In the proposed system, different types of sensors are used in the field like temperature sensor, pH sensors, humidity sensors, soil moisture sensor, Passive IR sensors, Active IR sensors and photoelectric smoke detector. The information gathered from these sensors is sent to the microcontroller. The temperature sensor and soil moisture sensor detects the feasible temperature and moisture for the soil.

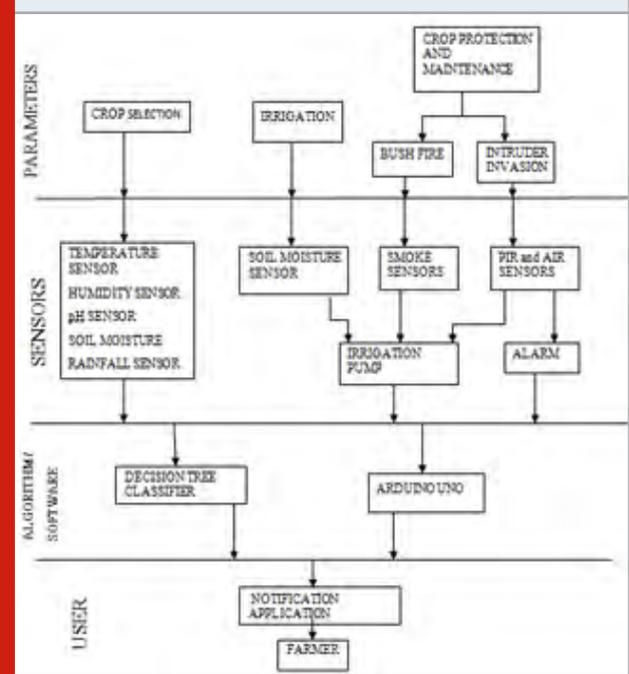
The user gets the notification of data collected by the sensor and then pumps the irrigation motor. After the requirements of the soil are fulfilled the irrigation system will go off. Passive IR and Active IR sensor are used in field to restrict the intruders entering the fields. When any animal or human enter the field, the sensor is triggered and sends notification to the user, sprinklers are turned on and alarm gets on. Photoelectric sensor is used because of the capability of sensing small fire and smoke both at the same time, if there is bushfire in the field, the sensor will switch on the irrigation motors. The nearby fire station will be notified for the same with the location. The system is also involving the crop suggestion method using machine learning. The temperature, soil and climate database are taken by the Ministry of Agriculture. The user will know which crop to be grown in the field as per the soil and weather conditions based in their region.

System Architecture: The system architecture consists of 3 modules which includes crop selection, smart irrigation system and the maintenance and protection of crops. These modules are most important process for the agriculture system. The process starts with the selection of crop depending on the soil quality and the other environmental factors using machine learning algorithm. After the growth of crops, irrigation becomes the important factor. The system consists of smart irrigation which measures the soil moisture and the other environmental conditions such as temperature and humidity.



There is a need to maintain and protect the crop from the fire and intruders for the better growth of the crop. This system has the PIR sensors to afraid the animals entering into the field because due the asymmetric sound animal gets scared and run away from the field. The bush fire alarm is used to detect the fire in the field and extinguish the fire with the help of irrigation pump. This smart agriculture system makes the life of farmers easy and better.

Figure 2: System Architecture



Arduino board. If the soil is dry, the output of the program shows the moisture content value in negative and the water pump is on, and it starts to irrigate the field until the soil has enough moisture. Once the moisture content values change to positive, the water pump is off as the soil has enough moisture. The system consists of Active IR sensors which has an emitter and receiver end to detect the object in between it. With AIR sensors, Passive IR sensors have pyroelectric sensors which detect the heat energy of the animal and human body. These sensors are connected to the microcontroller and as soon as sensors respond, an alarm is encountered with spray of sprinkling water from sprinkler for few seconds and also light is flashed in different directions to scare away the animals. The bush fire module is implemented using fire alarm activated at the boundary of the farm as there are more chances of occurrence of fire due to human activities or natural disaster at the extreme end of the farm. When the fire and smoke is detected by the smoke sensors, there is an alarm and notification is sent to the farmer regarding the same. It also activates the irrigation pump nearest to the smoke alarm to extinguish the fire.

The connection of the sensors to the Arduino board is as follows: The pins VCC, ground (GND) , A0 of the moisture sensor is connected to VCC, ground(GND) , A0

(analog pin) of the microcontroller (Arduino board) . The moisture sensor is placed inside the soil. Dc motor is placed under the water. DC motor in water pump has 2 pins VCC (red wire) and ground (GND) (white wire) is connected to the Arduino pins. The IR sensors used for intruder detection has an emitter and a receiver. The Vcc , GND, and digital pin are connected to the Vcc, GND, D02(digital pin) of the Arduino board. The DHT sensor also known as digital humidity and temperature sensor used for measuring the environmental humidity and temperature is connected to D03 digital pin. The IR flame sensor is used to detect the fire in the farm field and aware the farmer. It also takes the digital data and is connected to the D04 pin of the microcontroller.

Figure 3: Sensors and Arduino Board

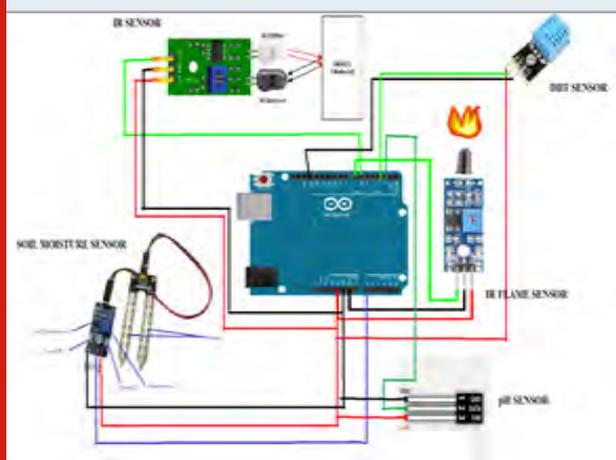
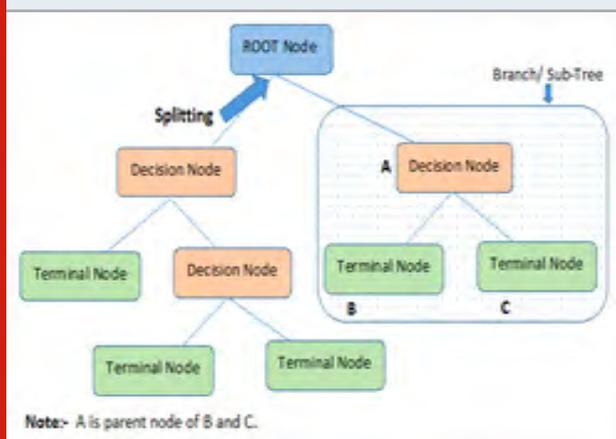


Figure 4: Decision Tree Classifier



Due the lack information to yield the crop in the suitable areas, farmers face a lot of difficulty during farming a crop. Therefore, it is needed to do crop selection which is done using machine learning algorithm called decision tree classifier and user is suggested with the type of crop that suits the weather and soil conditions. The conditions include the outside temperature and humidity, pH level of soil and the amount of rainfall in the area. They data for several crops is stored for the prediction of the crops example: 'wheat', 'mungbean', 'Tea', 'millet', 'maize', 'lentil', 'jute', 'coffee', 'cotton',

'ground nut', 'peas', 'rubber', 'sugarcane', 'tobacco' etc. The decision tree classifier consists of nodes, edges and leaf nodes to classify the objects. The nodes test for the value of the attributes such as temperature, pH, rainfall and humidity. The results of the corresponding nodes are stored in the edges or the mid nodes. The terminal node predicts the outcome i.e. the type of crop that can be grown in the field.

Table 1. Data for Crops

SNO	CROP NAME	TEMPERATURE	HUMIDITY	pH	RAINFALL
1	RICE	20-28	80-85	5.5-7.5	180-270
2	WHEAT	21-33	50-60	6.0-6.9	76-163
3	MUNG BEAN	27-29.5	80-90	6.2-7.2	36-60
4	TEA	21-25	55-65	4.5-4.9	151-250
5	MILLETS	40-50	10-15	5.6-8.0	35-50
6	MAIZE	17-25	55-75	5.5-7.0	60-130
7	LENTILS	18-25	60-70	5.9-7.8	35-55
8	JUTE	23-27	70-90	6.0-7.5	150-200
9	WATERMELON	24-27	80-90	6.0-7.0	40-60
10	PEAS	15-18	13-14	4.5-7.5	45-55
11	SUGARCANE	25-30	75-85	5.0-8.4	100-175
12	TOBACCO	21-26	60-70	5.8-6.2	75-85
13	KIDNEY BEANS	16-22	18-24	5.5-5.9	60-150
14	CHICKPEA	16-20	14-20	5.9-8.8	65-95
15	COTTON	20-30	75-85	5.8-8.0	60-100

CONCLUSION

The communication technology of IoT (Internet of Things) plays a very important and crucial role in the smart agriculture system. The paper proposes a IOT based smart agriculture system which has features like GPS-based device observation, humidity, temperature sensing, moisture, intrusion protection, one-touch irrigation, safety, crop suggestion, bush fire alarm to cut back the work load on the farmers and may produce the agriculture system extra economical. For future developments we can develop this smart agriculture system for large acres of land. All observations and experimental tests prove that this project is a solution to most of the agricultural activities and irrigation problems. The implementation of such a system helps the farmers to spice up the yield of the crops and overall production by crop suggestions.

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A Unified Approach for Image Classification Using Transfer Learning

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ABSTRACT

In recent year, deep learning has been utilized in picture order, object following, present estimation, content identification and acknowledgment, visual saliency location, activity acknowledgment and scene naming. Auto Encoder, inadequate coding, Restricted Boltzmann Machine, Deep Belief Networks and Convolutional neural systems is ordinarily utilized models in profound learning. Among various sort of models, Convolutional neural systems has been exhibited elite on picture order. In this paper we build a straightforward Convolutional neural system on picture arrangement. This straightforward Convolutional neural system finished the picture arrangement. Our investigations depend on benchmarking datasets. Based on the exchange learning, we likewise investigated various strategies for learning rate set and distinctive improvement calculation of fathoming the ideal parameters of the impact on picture arrangement.

KEY WORDS: CONVOLUTIONAL NEURAL NETWORK , TRANSFER LEARNING.

INTRODUCTION

In multi-otherworldly red, green, blue, close infrared (RGB-NIR) pictures, the noticeable (RGB) and close infrared (NIR) unearthly groups are caught at the same time by a 4-sensor line examine camera. The RGB ghostly groups are in the obvious range (400-700 nm), though the NIR ghostly band is past the obvious range (700-1100 nm). Thus, a scene top with RGB-NIR picture displays a

wide scope of attributes. Significant levels of between passerby impediments cause following disappointment. Impediments change an individual's appearance and make it hard to recognize one individual from others. Numerous approaches have been proposed to take care of these issues. One methodology is to follow by identification. This follows two steps. The initial step is individual identification and the second is information affiliation. In the identification stage, an individual locator discovers individuals' areas in each casing of a video. In the information affiliation stage, the up-and-comers of areas at outline $t - 1$ are related with those of casing t .

Be that as it may, it is hard to recognize an individual who is profoundly blocked by other individuals. In identification results are related by utilizing the score of a

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help vector machine (SVM), applicant data (facilitate, size and shading) and an imperative of the individual's speed vector. The finder is prepared by utilizing the histogram of the situated slope (HOG). The specialists in don't manage the disappointment of location brought about by impediments; notwithstanding, a limitation limits the areas where the objective individual exists. In , a twofold individual finder is prepared to identify two blocked individuals on the double. It expands on the deformable part model (DPM) approach and is vigorous to serious impediments. By the way, the twofold individual finder expands the pace of bogus location since it is influenced by neighborhood highlights. Following by location isn't reasonable for continuous preparation in view of the computation cost for recognition. A technique utilizing the stride including and neighborhood appearance was proposed in. The stride included is valuable for separating individuals yet can't characterize an individual's region. Moreover, various bunches emerge in one individual because of the distinction of recurrence attributes between the person's hand and the body.

2. Literature Survey: As of late, numerous analysts have researched multi-ghastly picture acknowledgment and classification from various angles. In Haroon Idrees, et al., (2015) Mubarak Shah, investigated the setting for human recognition in thick groups as locally-predictable scale earlier which catches the closeness in scale in nearby neighborhoods and its smooth variety over the picture. Utilizing the scale and certainty of identifications acquired from a fundamental human locator, we construe scale and certainty priors utilizing Markov Random Field. Mohammed Abul Hassan, Indratno Pardiansyah presented a coordinated strategy utilizing Histogram of Oriented Gradient (HOG) and Completed Local Binary Pattern (CLBP) is proposed to distinguish a head-shoulder area of individuals inside picture or video arrangement. . Head-shoulder district is utilized as highlights to distinguish individuals against the bogus positive and bogus negative issue. Hoard and CLBP are utilized to extricate the edge shape and surface highlights of the head-shoulder locale, separately.

The two highlights are melded to produce a consolidated component vector. Expanding overall populace is prompting thick group gathering at open spots. Because of mass assembling everywhere scale, swarm related catastrophes have much of the time happened. So as to forestall swarm disasters, computerized swarm scene examination has been a subject of extraordinary intrigue. In Sonu Lamba, Neeta Nain, (2017) proposed a novel procedure for enormous scope swarm thickness grouping controlled by powerful surface investigation. This methodology comprises of an intrigue focuses identification followed by spatio-fleeting component extraction. A turn invariant spatio-transient nearby double (RIST-LBP) design is proposed to extricate dynamic surface of the moving group.

In Markus Kuchhold, et al., (2018), proposed a scale-versatile group location and tallying approach for ramble pictures. In view of neighborhood include focuses and

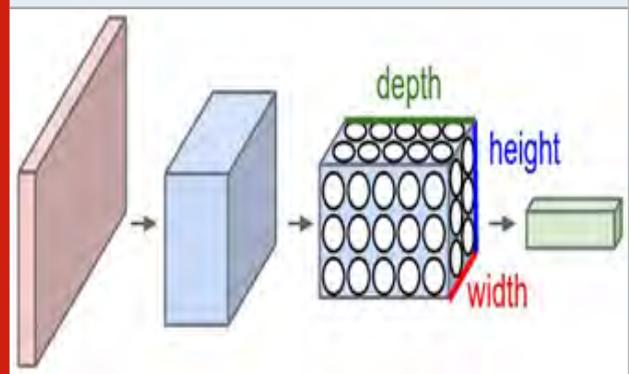
thickness estimation considering the picture scale, we identify thick groups over numerous separations and present a very quick tallying methodology with high precision for our recognized group locales. The interest for individuals following in thick groups is expanding, however it is a difficult issue in the PC vision field. "Group following" is amazingly troublesome as a result of hard impediments, different movements and stance changes. In Shota Takayama,et al., (2018) talks about strong group following dependent on a mix of supervoxels and optical stream following in their paper. The SLIC based supervoxel calculation adaptively gauges the limit between an individual.

3. Designing The Project

The Proposed Approach: We proposed a direct Convolutional neural framework on picture request. In view of the Convolutional neural framework, we in like manner analyzed different methods for learning rate set and unmistakable improvement count of lighting up the perfect parameters of the impact on picture request. We furthermore study the bit of the particular Convolutional neural framework on the outcome of picture request. Transfer learning layer includes of a handful of part maps. every nerve cell of a comparative phase map is employed to get rid of neighborhood characteristics of various circumstances within the past layer, nevertheless for single neurons, its extraction is obtainable characteristics of same circumstances in past specific part map.

so as to induce another part, the information feature maps ar initial convolved with AN hep half and a brief time later the results ar passed into a nonlinear incitation work. we are going to get clear half maps by applying completely different bits. The regular sanctionative work ar sigmoid, tanh and Relu. Pooling Layer testing method is appreciate napped detachment. The pooling layer has the result of the discretionary half extraction, it will decrease the parts of the part maps and increment the ability of feature extraction. it's usually set between 2 trade learning layers. the dimensions of feature maps within the pooling layer is settled by the moving development of elements.

Figure 1: Left: an everyday 3-layer Neural Network.



pictures contain more data than highly contrasting pictures, they can include pointless unpredictability and occupy more room in memory (Remember how shading pictures are spoken to in three channels, which implies that changing over it to grayscale decreases the quantity of pixels that should be prepared).



One significant requirement that exists in some AI calculations, for example, CNN, is the need to resize the pictures in your data-set to a bound together measurement. This infers our pictures must be preprocessed and scaled to have indistinguishable widths and statures before encouraged to the learning algorithm. Another normal pre-handling system includes increasing the current dataset with bothered variants of the current pictures. Scaling, turns and other relative changes are run of the mill. This is done to develop your dataset and uncover the neural system to a wide assortment of varieties of your pictures. This makes it almost certain that your model perceives objects when they show up in any structure and shape.

Module 2: Feature Extraction: Highlights extraction plays out some change of unique highlights to produce different highlights that are increasingly noteworthy. Highlights extraction can be utilized right now decrease intricacy and give a straightforward portrayal of information speaking to every factor in include space as a direct mix of unique info variable. The most well known and generally utilized element extraction approach is Principle Component Analysis Information Gain (IG) quantifies the expansion in entropy when the element

is given versus missing. This is the use of increasingly broad procedures, the estimation of instructive entropy, to the issue of choosing how significant an element is inside component space.

Relationship based on Feature choice appearance through element set as indicated by the amount of excess among the highlights. The assessment procedure expects to find subsets of highlights that area unit individually deeply related to the category but have low connections. Significance of gathering of highlights develops with the link among highlights and sophistication, and diminishes with developing between affiliation. CFS is used to come to a decision the most effective component set and is usually joined with search procedures, as an example, forward determination, in reverse disposal, bi-directional pursuit, best 1st inquiry and hereditary search. Filters technique utilizes totally different marking functionalities and choose top-N computationally faster than wrapper techniques. The constraint is that the component conditions don't seem to be thought of.

CONCLUSION

In this paper we proposed a straightforward exchange learning neural system on picture arrangement. This basic convolutional neural system forces less computational expense. Based on the exchange learning neural system, we additionally broke down various strategies for learning rate set and diverse advancement calculation of fathoming the ideal parameters of the impact on picture characterization. We additionally confirm that the shallow system likewise has a moderately decent acknowledgment impact. As opposed to customary strategies that utilization hand-created highlights, our calculation gains various leveled includes straightforwardly from standardized picture pixels. We utilize ReLU and dropout to upgrade the preparation of our CNN. Analyses on open datasets show that our calculation accomplished best in class execution. Also This project can be implement in image data analytics field.

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IoT Based Sensor for Water Purifier

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ABSTRACT

Quality of water is one of the components that we can't afford to compromise in our living. Polluted water leads us to diseases like diarrhoea, hepatitis, typhoid and cholera, or illness due to impurities like arsenic leads to death in some cases. Survey says that over 10,000 people were suffered due to the sickness of drinking unhealthy water in the year 2013 to 2017. To display water purity level and to filter impurities, smart sensor-based technologies and purification is used, which will help in decreasing the cost of purification. To use this filtration method a wireless sensor is used which is TDS meter which is implemented by wireless connectivity using IoT. TDS sensor is used for measuring the purity and pH value of water. Wireless sensor community used to measure water first-rate through sensing the change of pH, after filtration total, dissolved salts will be measured using this sensor. After purification, the water which was coming will be continuously monitored by TDS meter. If the output water contains more dissolved salts than predefined value immediately the sensor will detect and sends a message to the user and the user can decide to purify.

KEY WORDS: TDS METER, IOT, TDS SENSORS.

INTRODUCTION

In this world, there are a great deal of shimmering water resources but these assets are getting sullied with human desires. Expanding increment in populace, improved movements, venture extension and a lot of additional variables are liable for defilement of the water resources. To develop the establishment in agriculture countless amount of herbicides, bug sprays chemical or non bio manures, fungicides are utilized. Thus utilization of these fake mixes is corrupting the nature of clean water sources, floor water unfavorably Sundresh, H.D. and Priya, D., 2020. Water purging is the way toward disposing of

undesirable concoction mixes, natural contaminants, suspended solids and gases from water. On the off chance that somebody used to drink the faucet water or tainted water without purging, at that point he/she may moreover experience the ill effects of various wellbeing inconveniences comprising of looseness of the bowels, regurgitating, queasiness, typhoid fever and the sky is the limit from there.

The most not unordinary feature impact of polluting influences in water is Diarrhea which hurts a stomach related framework antagonistically. Besides, Arsenicosis infection is because of the arsenic and fluorides that are present in the water which can lead to the development diabetes, skincancer or malignant growth in the skin, kidney, veins, lungs and bladder conceptive difficulties. Subsequently we require water chemical for unadulterated the tainted water resources. In creating countries, it's miles imagined that over eighty% of the confusion is brought about by defiled expending water and hence, over 30% of work efficiency is lost.

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This paper is based on IOT devices that are used for purifying the water resources for both drinking and agriculture purpose and not to kill the good bacteria that is present in the system by itself. As smart water purifier doesn't need any electricity to run, there is no loss of energy in this process and further more we can always know the exact quality of our water as we are going to use a TDS meter. This whole process allows the user for better management of the water and water treatment as it can be very beneficial by proper handling of the water. Smart water purifier can be used many households in the villages as the water quality in villages is pretty low and smart water purifier can be very beneficial of the population in villages.

Literature Survey: Jer Hayes et al., (2007) expressed that We characterize an utility of a wi-fi sensor network for observing a not surprising water treatment method. The people group depends on the Teco craftsmanship remote stage and uses a flowcell. The water cure strategy remembers the oxidization of contaminants for water and can be observed utilizing spectrophotometric strategies. The response circumstances like temperature, gentle stage, contaminant focus, consideration of reagent and impetus would all be able to be checked the use of exact sensors. The remote sensor network changed into designed during a simple star arrangement with the base-station showing up because of the reality the foremost center point. The data gets accumulated, put away and afterward examined. The equipment incorporates a siphon, a fluidic chamber and a portion of the other sensor hubs to watch the shade exchange the fluid. The shade trade inside the channel lodging chamber and the mass answer got observed individually. Sensor hubs are likewise wont to uncover the surrounding conditions like light stage and temperature. A test becomes controlled which exhibits the adequacy of the use of remote detecting for the following of water decontamination medicines.

Lauren F, et al., (2018) Greenlee recommended that Reverse osmosis membrane technology has developed during the most recent forty years to a forty-four % part in worldwide distilling creation volume, and a eighty percent inside general assortment of desalination blossoms mounted World Wide. Utilization of layer distilling was extended as a substance has better and an expense has diminished. Nowadays, reverse osmosis membranes were primary period aimed at logo hitting latest distilling establishments, that they are registered to the dispersion saltwater sources the use of customized pretreatment and membrane format. Pretreatment options are comparable for the two sorts of reverse osmosis and turn on fitting added substances of water flexibly.

Saline and Sea water reverse osmosis do in any case be utilized around the world; new age in vitality rebuilding and inexhaustible quality, additionally as present day plant configuration, will permit additional utilization of distilling for interior, country gatherings which give less expensive water for gigantic beach front

towns. Huge type of exploration and basic data on RO distilling is to be had; in any case, a prompt correlation of Sea Water and Saline Water RO structures was essential to concentrate on similitudes, varieties based on technique improvement. This article exposes key boundaries of a RO method and framework changes on account of taking care of water attributes.

ThamaraiSelvi D et al., (2015) expressed that water is imperative in order to support creation, and a good (compensatory, sheltered, open) flexibly should be accessible to all or any. Improving access to unadulterated drinking-water may bring about unmistakable advantages to wellbeing. Each exertion ought to be done to understand a using-Water need as sheltered as realistic. Point of the task in order to style a continuous framework for checking drink grade amount at client locales. Likewise, the programmed charging framework is finished utilizing a GSM Modem. This system contains a couple of sensors that can constantly screen the water quality reliant on limits like water pH, Total Suspended Solid(TSS), Total Dissolved Solids(TDS), the shade of water, Dissolved oxygen.

The customer use water is assessed using a stream sensor. The limits regards are appeared in customer goals using LCD. On the off chance that it surpasses the limit esteem, the alert will be shown. By then month to month water use can be sent to metropolitan endeavor office i.e base station inside a limited quantity of seconds as text using GSM Modem. The decided bill is predicated on the measure of water ate up by the customer then the charging aggregate will be sent to the customer site through SMS. Right now message contains charge aggregate with a due date. On the off chance that the client installment process is finished prior to the due date, at that point water flexibly will be associated in any case water gracefully association will be separated.

YehiaManawi, et al., (2016) suggested that due to their unimaginable mechanical, conductive and antibacterial houses carbon-on a very basic level based nanomaterials (CNMs) have been broadly used in endeavors to make novel movies for water fix and desalination with unmatched traits. It reviews the stylish state of the utility of CNMs, which joins carbon nanotubes, graphene, graphene oxide, carbon nanofibers, MXene, carbide induced carbon and fullerene for movie heading. A succinct delineation of various CNMs and their living plans has been equipped as for layer essentials.

From that point the ongoing investigations at the layer manufacture/revision with CNMs notwithstanding the homes of the developed films were altogether summed up. It became demonstrated that, in a couple of cases, the utilization of CNMs brings about novel layers with exorbitant motion, extreme dismissal, low-fouling, and progressively favorable conductive, electrical, mechanical homes. Regardless, similar assessments thorough of comprehending the choicest CNM sum and characteristics, feed-accurate layer execution and long stretch operability ought to be coordinated to all

the more promptly evaluate the chance of CNM-based movies in water fix and desalination. This review paper is clearly crucial for masters stressed inside the film creation using CNMs.

Chen, X. and Deng, H., (2013) suggested that Ultraviolet (UV) channels speak to a fresh out of the box new polish of micropollutants in water. The alteration of polyvinylidene fluoride (PVDF) film, the results of the electrical control on the filtration by and large execution, alongside obstruction and maintenance, and feasible intermediates created for the term of EUF framework had been concentrated quite well. The film had a more unpleasant floor and the pore length quickened due to the adjustments of PVDF layer accelerated through the electrical control. The decline in contact point of view affirmed the improvement of hydrophilicity inside the PVDF film floor after the EUF treatment. The outcomes recommend that the mix of the electrical zone with ultrafiltration should development four-MBC dismissal and lessen filtration opposition. The C5 iota inside the 4-MBC structure was demonstrated to be the most receptive site, which turns out to be consistent with the middle of the road results distinguished through fuel chromatography-mass spectrometry (GC-MS) investigation.

Existing System: We could find number of water purifiers with different types of filtration. These filters generally run on electricity and are need to supply power every day which often causes wastage of electricity. Most of the water purifiers are very high in cost which a lot of people cannot afford. many water purifier manufactures always thinks about profit rather than providing a service to all the people. even after the purchase of these water purifiers they take a lot of money to maintain as they have very sophisticated hardware and needs to change the filter at a particular time. Most of the times the water which people receive from the government is pretty good quality at these time no water purification is required as excess water purification often leads into loss of minerals in the water. The water which we receive from the government has to travel in pipes which are not clean.

Proposed System: Smart water purification based on Arduino Using IoT. Using the TDS meter and PH meter to detect the quality of water. People can decide whether they want purified water or not based on the purpose of the purpose. Using natural processes for purification of water.

Tds Meter: A TDS meter might be a little hand-held device wont to imply the whole Dissolved Solids during an answer, typically water. Since broke up ionized solids, including salts and minerals, blast the conductivity of an answer, a TDS meter gauges the conductivity of the appropriate response and assessments the TDS from that breaking down. In the first place, it's imperative to perceive what TDS really is: Total Dissolved Solids. After cascades to the base as downpour, it breaks up the minerals blessing inside the stones and soil it ignores or

through. since it disintegrates those minerals, they remain inside the water at different phases of consideration. this is regularly an extremely normal strategy and it permits make flavor "right" with the assistance of scarcely lifting the pH of the water. the principal ordinary minerals saw in water are Calcium, Magnesium, and Sodium. Realizing your TDS level is basic while considering a Salt-free Water Conditioner for your home. Salt-detached Water Conditioners can secure funnels and plumbing, lower spots and stains on dishes and wash entryways, blast the ways of life of more splendid dress, and that's only the tip of the iceberg, without squandering salt or water. limit considerations a water sift through isn't a water conditioner. the final word goal of a channel out isn't to dispose of all solids inside the water.

Figure 1: TDS Meter

Levels of TDS (milligram per litre/ppm)	Rating
Less than 300	Excellent
300-600	Good
600-900	Fair
900-1,200	Poor
Above 1,200	Unacceptable

*Source WHO report

Figure 2: Arduino Board

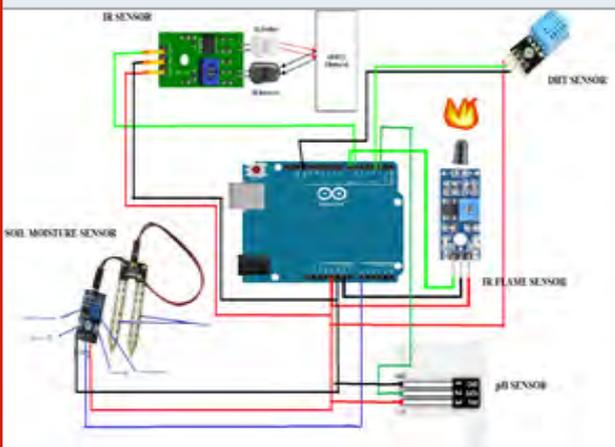


Arduino Uno R3: The Arduino Uno R3 is a microcontroller board with bolstered removable and double inline-bundle (DIP) A Tmega 328 AVR microcontroller. It also has 20 electronic input/output pins (of which 6 are regularly employed as PWM yields with six frequently employed as modest sources of info. Ventures are repeatedly stacked on ,there to from the meek to- employ Arduino PC virus . It also has a top to bottom help network, which makes it extremely modest gratitude in commencement working with installed hardware. R3 is third and utmost recent, modification of the Arduino Uno. The wifi module is an integrated material in Arduino which is used as

internet connectivity with an embedded system which has UDP\TCP protocol communication with the client. Generally, ESP8266 is used in this because it is very cost-efficient and also it is a wireless transfer which is for IoT purposes.

Working: An excellent Water Purifier is especially dependent on TDS, temperature meter and ph meters. The pH cost of a water resource can be a proportion to the acidity, temperature and alkalinity. The degree of pH value can be the size of the ease movement of the particle in light for the fact that hydrogen intrigue can be a fantastic portrayal of corrosiveness or alkalinity of the water. The pH, as demonstrated as the levels from 0 to 14, with 7.0 being unbiased. Water with a russet pH is affirmed to be acidic, and water with a elevated pH is essential or basic. Unadulterated water could have a pH of 7.0, in any case, water assets and precipitation tend to be somewhat acidic, approach to contaminants which can be in the water. The Guidelines for Drinking Water Quality embrace that the pH of ingesting water must be among 7.0 and 8.5. The recommend pH value of drinking water be somewhere in the range of 6.5 and 9.0.

Figure 3: Sensors and Arduino Board



As indicated by the EPA, the impressive impacts of a pH this is significantly less than 6.5 comprises of an unpleasant, steel taste and consumption. The significant impacts of a pH above 8.5 comprise of a tricky inclination, soft drink like taste and stores. TDS represents commonly broken down to solids which speaks to the whole consideration of disintegrated materials in water. The TDS is framed from inorganic salts, additionally as a little amount of natural recalls. Typical inorganic salts while in transit to be resolved in water comprise of calcium, potassium, magnesium and sodium, which can be all cations, and carbonates, bicarbonates, nitrates, sulfates and chlorides, which are or could be all anions.

Cations and anions are charged particles. WHO guiding principle for TDS is also three hundred elements in keeping with million. First, the water acquired by the humans from government is tested with the aid of those

PH & TDS meters and the we an Arduino to report the values from those meters an then from Arduino by the usage of a wifi module a message is sent to individual's personal computer or to phone in which he can get entry to this data and may select whether to purify the water or no longer. If the man or woman chooses purification the water could be treated through 4 important strategies of purification and people are filtration, coagulation, disinfection, sedimentation and after those techniques water is saved in a tank.

Figure 4: ESP8266



CONCLUSION AND FUTUREWORK

This smart water purifier will helps in monitoring the water quality without any human hand usage. This is very cost efficient when compared to other water purification methods which are present In market. Our method of purification is based on measuring the total dissolved salts and PH valve of the water and this can be controlled by wirelessly by using internet. The TDS and PH valve will be maintained according to the government standards. This method IS very efficient and economical. This method is very easy to install and it can work in any paces where water purification is need. Smart water purifier has a lot future scope as many of its parts can be upgraded to make it much better in future and used in the fields for agriculture purpose and while the data is stored in Cloud can be useful with the indulgence of IOT to reas the ph value and acidic nature with respect to crops and soil in the particular area.

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Design of Partitioned VLSI systems for Reliable Processing

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ABSTRACT

Partitioning plays an increasingly important role in the design process of VLSI circuits and systems. It is a technique to divide a circuit or system into a collection of smaller parts. The main reason that partitioning has become a central and sometimes critical design task today is the enormous increase of system complexity and further advances of microelectronic system design and fabrication. For minimizing the testing time and to reduce test vectors for pseudo-exhaustive testing I-PIFAN algorithm is used. Finally the reliability of partitioned circuit is found using Probabilistic gate models. For error tolerance effective reliability for the circuit is calculated. It is found that if effective reliability is used there is a greater improvement in large benchmarks.

KEY WORDS: I-PIFAN ALGORITHM, PARTITIONING, RELIABILITY, EFFECTIVE RELIABILITY.

INTRODUCTION

In CMOS technology there is an increase in device failure rates due to shrinking device dimensions, lower design tolerances and has less impact on reliability S.Borkar, (2005). Electro migration can cause faults and it affects interconnect reliability C. DP.Siewiorek and RS.Swarz (1998). Characterizing the reliability of fault-tolerant architectures was proposed by Von Neumann D.SK. Shukla and RI.Bahar Nano(2004). Various approaches based on probabilistic analysis have been proposed for the evaluation of circuit reliability. Recent researches have focused on the use of Markov random fields D.Bhaduri

and S.Shukla (2004), probabilistic model checking (PMC) S.Krishnaswamy et al., (2008), Bayesian networks, analytical and scalable approaches I.A.Abdollahi (2007), circuit transformations J. S.J.Seyyed Mahdavi and K.Mohammadi (2009).

Probabilistic gate models (PGMs) are used for calculating reliability. A simple algorithm, directly applicable on the interconnections of gates as specified in a circuit's net list, provides highly accurate results when the circuit has no or few reconvergent fan-out, as well as when the fan outs originate from the primary inputs and the primary inputs are highly reliable. An accurate algorithm is able to determine the exact reliability of a circuit. Then the effective reliability of the circuit has been computed.

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the algorithm uses in order to partition the circuit. The first variable (F) is a constant value, greater than one, to which the FO value of each node is compared. Partition is done if fanout value of a node is greater than or equal to F. The second variable (N) is a constant value, greater than or equal to the largest node fan-in of the circuit, to which the PI cone of each node is compared. If the PI value of a node is greater than N, the node's inputs are processed for partitioning in order to reduce the PI cone of the node. The maximum value of N should be small enough to allow for pseudo-exhaustive testing.

Phase 1

The steps of phase one is shown below.

1. Starting point will be at the beginning of the node.
2. Next node is processed if the Fanout value of the current node is less than F.
3. For inverter or buffer node, back trace until partition is able.
4. If the node has a Primary input value equal to one, go to step 7.
5. Output node is partitioned by adding primary input and a primary output.
6. Primary input and Fan out values are updated for all nodes.
7. Move to the next node. If not at the end of the list, return to step 2.

Phase 2

1. Starting point at the beginning of the node.
2. Move to next node if the Primary input value of the current node is less than or equal to N.
3. Node with the greatest Primary input value is found out. If the Primary input values of its inputs are equal, select the first input.
4. If the input node is not partition able backtracking should e one.
5. By adding primary input and a primary output, output of the node is partitioned.
6. Primary input and Fan out values are updated for all nodes.
7. Move to the next node. If not at the end of the list, return to step 2.

The I-PIFAN algorithm has two input variables, N and F, which control the partitioning process. Determining the optimal values for N and F relies on factors such as the hardware overhead, critical path, and testing time. Depending on the application, the I-PIFAN partitioning algorithm can be optimized to reduce hardware overhead, delay in critical path, testing time, or a combination of the three. The steps of phase one of the I-PIFAN partitioning algorithm are outlined here.

Reliability Evaluation: The probabilistic gate model is applied to each partition to find out reliability. The probabilistic model can be obtained by simple PGM algorithm. It is given by Where X_i is the output probability, P_i is probability of getting ones or zeros at the output of a gate, ϵ is gate error rate. For different values of FO and N different reliability values are

obtained. For example consider a two input NAND gate with two inputs X1 and X2 the output probability for getting one at the output of the gate is given according to Von-Neumann model as

Figure 1: Flow chart for reliability evaluation

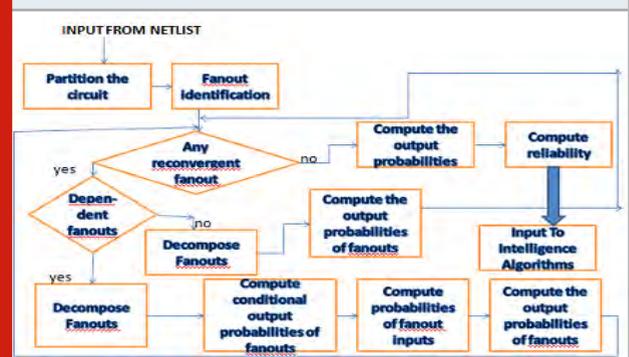


Figure 1 shows the diagrammatic explanation of reliability algorithm. From the input netlist file the partitioned circuit can be obtained using I-Pifan algorithm. From the partitioned circuit the fanouts can be identified and if there is no reconvergent fanout the output probabilities can be directly computed. In case of reconvergent fanouts the fanouts can be decomposed and output probabilities can be obtained after decomposition. The reliability can be evaluated using obtained output probabilities. The obtained reliability values can be optimized using intelligence algorithms. The effective reliability was also found out and can be optimized using intelligence algorithms.

Figure 2: Circuit with reconvergent fan outs

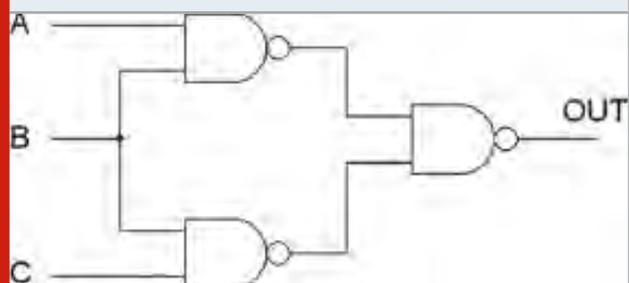
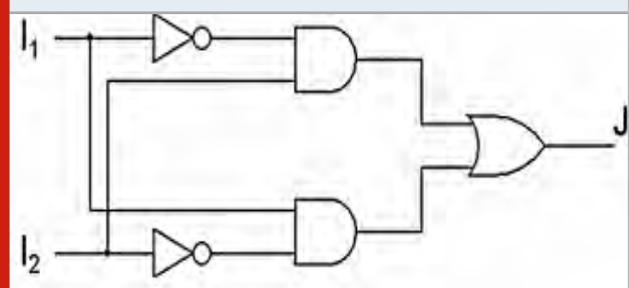


Figure 3: Circuit with multiple reconvergent fan outs



Disjoint Reconvergent Fan Outs: The statistical dependence among signals comes from several sources. In a circuit without feedbacks, reconvergent fan outs

are the only topological structure that induces signal dependence, provided that the inputs are independently distributed. Take the circuit in Fig. 1. This circuit contains a fan out that originates from input B and reconverges at the output of gate G3. Because of the possible correlations caused by the fan out, the inputs of the gate G3 may not be statistically independent. This is due to the removal of the probabilistic characteristics of the fan out. In effect, the circuit becomes one that does not contain the reconvergent fan out, as shown in Fig. 1. The following lemma states when the signal dependence can be removed in a circuit containing reconvergent fan outs. Given the input probability P_i of a reconvergent fan out F_i , the output probability of the circuit is given by Where $Z_i 1$ and $Z_i 0$ are the output probabilities when the input of the fan-out F_i is set to "1" and "0," respectively.

The single reconvergent fan-out in Figure 2, for example, is handled by calculating the output probabilities of the two auxiliary networks one with the input of the fan-out set to "0" (Z_0) and the other with the input set to "1" (Z_1) using the simple PGM algorithm. If the input of B has an actual probability P being a logical "1," the output probability is then given by Multiple reconvergent fan outs can be handled in a similar way by considering each fan-out individually, if the reconvergent fan outs are disjoint and independent of each other.

Dependent Fanouts: The dependence among fan outs can be through the interwoven branches of inputs, as the one shown in Figure 3. A general rule to handle multiple fan outs is to sequentially pick one fan-out at a time and to treat them individually. For dependent fan outs positioned in parallel, this selection can, in principle, be in an arbitrary order. For the circuit in Figure 3, for instance, we first take fan-out I1. The output probability is then given by Where J_{11} and J_{10} are the output probabilities when I1 is set to "1" and "0," respectively. Due to the presence of fan-out I2; J_{11} and J_{10} cannot be directly computed. However, further application of algorithm to the fan-out I2, gives us

Where J_{21} and J_{20} denotes the output probability when $I_1 = 1$ and $I_2 = 1$; $J_{1,2 1,0}$ denotes the probability when $I_1 = 1$ and $I_2 = 0$; $J_{1,2 0,1}$ denotes the probability when $I_1 = 0$ and $I_2 = 1$ and $J_{1,2 0,0}$ denotes the probability when $I_1 = 0$ and $I_2 = 0$. Since I_2 is the last fan-out in this circuit, all the elements in the above equations can be directly computed.

Evaluation Of Effective Reliability: For a significant number of applications, consequences of some errors can be more critical than others. Instead of nominal reliability, we propose to use the concept of effective reliability given in Eq. (8) that allows to classify errors into two categories: critical and noncritical errors. Noncritical errors are defined as errors that do not compromise the circuit performance, i.e., errors that can be acceptable/bearable by the system. We notice that the first term stands for the nominal reliability concept and the second one stands for the probability of the faulty output be considered noncritical.

RESULTS

The important parameters involved in optimisation of partitioned circuit were identified as test time, CPD and hardware overhead. In order to find the optimum partitioned circuit, these circuit parameters are analyzed. Simulations of the entire partitioning strategy are carried out in C++ environment on various ISCAS' 85 combinational benchmark circuits, and are compared with results of previous approaches published so far. The reliability and effective reliability values are calculated for the bench mark circuits c432 and c499 taking into account the number of partitions.

Figure 4: Comparison of partitions and Effective reliability for c499

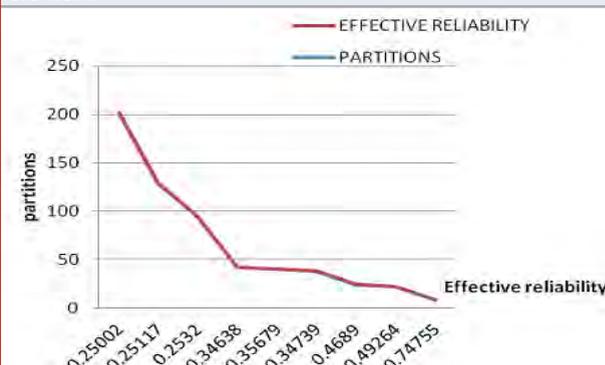
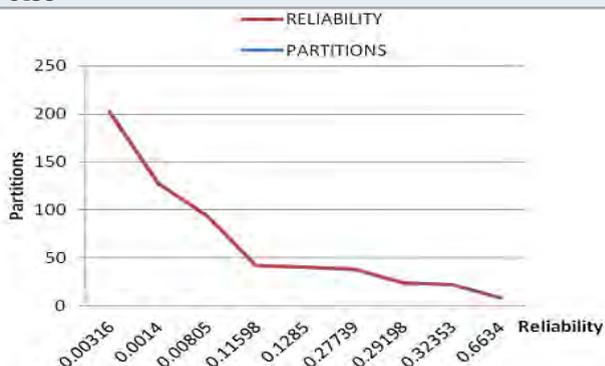


Figure 5: Comparison of partitions and reliability for c499



From the figure 4, 5 it is found that in case of C499 when the number of partitions is less there is a significant improvement in the effective reliability of the circuit to previous approach.

From the figure 6, 7 it is found that in case of C432 when the number of partitions is less there is a significant improvement in the effective reliability of the circuit to previous approach.

From table 1 in case of ISCAS' 85 benchmark circuit C499, IPIFAN results in % increase in CPD of only 2.87. For C1355, IPIFAN determined the optimal values of 16 partitions, 6.55×10^4 test vectors and % increase in CPD of only 2.070. Similarly, C1355 benchmark circuit

shows large improvement in number of test vectors and % improvement in CPD. These improvements are traded off for a small increase in number of partitions. It is noted that, for C432 and C1355 there is large reduction in CPD and number of partitions.

Figure 6: Comparison of partitions and Effective reliability for c432

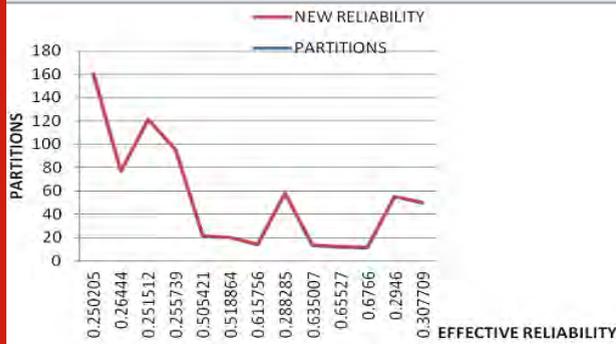


Figure 7: Comparison of partitions and reliability for c432



Table 1. Results for Iscas'85 combinational circuits

Circuit	C432	C499	C1355
No of nodes	160	202	546
No of primary inputs	36	41	41
No of primary outputs	7	32	32
N	20	13	12
F	10	5	5
No of partitions	11	22	16
% OF CPD	5.66	5.71	2.070
No of test vectors	8.4x10 ⁵	3.13x10 ⁴	6.55x10 ⁴
Reliability	0.5	0.2257	0.7737
Effective Reliability	0.8738	0.2972	0.7929

CONCLUSION

This paper presents a methodology using IPIFAN that assists digital circuit designers in the design and optimization of VLSI circuits. The use of IPIFAN algorithm to optimize the partitioning process, with multiple

performance characteristics is studied and reported in this paper. Several experimental results based on well-known benchmark circuits and comparisons with previously reported results are provided. It is found that solutions obtained by IPIFAN are competitive to the best results obtained so far. The following conclusions are made: The results of IPIFAN method shows 72.02% improvement in CPD, with more or less the same reduction in partitions and test-vectors and there is a 60% improvement in overall effective reliability of the circuit.

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Even Vertex Square Difference Labeling Graphs

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ABSTRACT

A function f is termed even vertex square difference labeling of a graph $G = (V, E)$ with $p = |V|$ and $q = |E|$ if it's possible to label the vertices $x \in V(G)$ with distinct labels from $0, 2, \dots, 2q$ in such a way that the induced edge $e = uv$ is labeled with $f^*(e = uv) = |f(u)^2 - f(v)^2|$

In this case, a graph that admits an even vertex square difference labeling of G and G is named even vertex square difference graph. In this paper, we introduced the concept of an even vertex square difference behavior of some standard graphs.

KEY WORDS: EVEN VERTEX SQUARE DIFFERENCE GRAPH, PATH P_n , CYCLE C_n , STAR GRAPH $K_{1,n}$, SLANTING LADDER SL_n , TRIANGULAR SNAKE TS_n . 2010 MATHEMATICS SUBJECT CLASSIFICATION 05C78.

INTRODUCTION

Graph labeling is one among the foremost popular problems in graph theory. A graph labeling is an assignment of integers to the edges or vertices, or both, subject to certain condition. The idea of graph labeling was introduced by Rosa 1967. The bulk of graph labeling are based on graceful labeling and are presenters in dynamic survey of graph labeling Gallian, Joseph A (2018). For all other standard terminology and symbolizations, we follow Harary M.Kannan et al., (2017). The concept of square difference labeling was introduced in Ajitha, V et al., (2012). Some standard results of Even vertex odd mean labeling of graphs was discussed in A. Rosa, (1967). The interesting idea of edge even graceful labeling of some graphs was established in

Zeen El Deen et al., (2019). It motivates us to develop the concept of even vertex square difference labeling graphs. In this paper, we showed that the path P_n , Cycle C_n ($n \geq 3$), Star graph $K_{1,n}$ ($n \geq 2$), Slanting ladder SL_n ($n \geq 3$), Triangular snake TS_n ($n \geq 3$) are even vertex square difference graphs. Graph labeling give us useful models for a large range of applications like coding theory, X-ray, astronomy, radar, and communication network addressing.

2.Basic Definitions:

Definition 2.1: A Path P_n is a walk in which all the vertices are distinct.

Definition 2.2: A cycle or simple circuit is a circuit in which the only repeated vertices are the first and last vertices. That is a closed path.

Definition 2.3: A Triangular snake TS_n is obtained from a path u_1, u_2, \dots, u_n by joining u_i and u_{i+1} to a new vertex v_i for $1 \leq i \leq n$ that is every edge of a path is replaced by a triangle C_3 .

Definition 2.4: A Star graph is that the complete bipartite graph $K_{1,n}$ and it has n vertices and n edges. The star graph on n vertices is denoted by S_n .

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Definition 2.5: A Triangular snake T_n is obtained from a path $u_1, u_2, u_3, \dots, u_n$ by joining u_i and $u_{(i+1)}$ to a new vertex v_i for $1 \leq i \leq n-1$.

Definition 2.6: A Slanting ladder SL_n is that the graph obtained from two paths u_1, u_2, \dots, u_n and $v_1, v_2, v_3, \dots, v_n$ by joining each u_i with v_{i+1} , $1 \leq i \leq n-1$.

3.Main Result:

Theorem:3.1

Every Path P_n is an even vertex square difference labeling graph.

Proof:

Let $\{v_i, 1 \leq i \leq n\}$ be the vertices and $\{e_i, 1 \leq i \leq n-1\}$ be the edges .

First we label the vertices as follows:
 Define $f : V \rightarrow \{0, 2, 4, \dots, 2q\}$ by
 For $1 \leq i \leq n$, $f(v_i) = 2i - 2$.

The resultant edge labels are :
 For $1 \leq i \leq n-1$, $f^*(e_i) = 8i - 4$.

From the above labeling pattern , we obtained distinct edge labels .Hence every path P_n is an even vertex square difference labeling graph.

For $1 \leq i \leq n$, $f^*(e_i) = 8i - 4$ and $f^*(e_n) = (2n - 2)^2$

From the above concept, we observed that all the edge labeling are distinct. so every cycle C_n ($n \geq 3$) is an even vertex square difference labeling graph.

Figure 3: Ordinary labeling of C_n

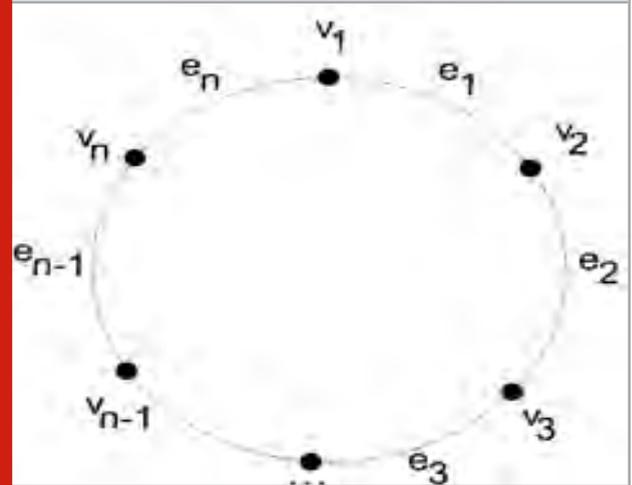


Illustration: 2

In Figure .4 and Figure.5, we show that even vertex square difference labeling of C_6 and C_5 respectively.

Figure 1: Even vertex square difference labeling of P_n .

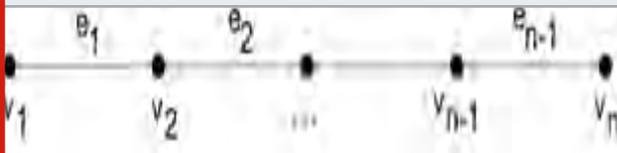
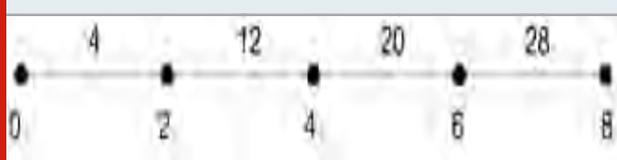


Illustration:1

Even vertex square difference labeling of P_5 is shown in figure.2.

Figure 2: Even vertex square difference labeling of P_5 .



Theorem:3.2

Every Cycle C_n ($n \geq 3$) is an even vertex square difference labeling graph.

Proof:

Let $\{v_i, 1 \leq i \leq n\}$ be the vertices and $\{e_i, 1 \leq i \leq n\}$ be the edges.

First we label the vertices as follows:

Define $f : V \rightarrow \{0, 2, 4, \dots, 2q\}$ by

For $1 \leq i \leq n$, $f(v_i) = 2i - 2$.

The resultant edge labels are :

Figure 4: Even vertex square difference labeling of C_6 .

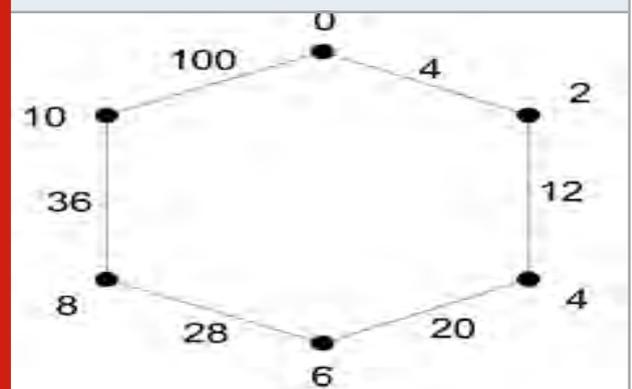
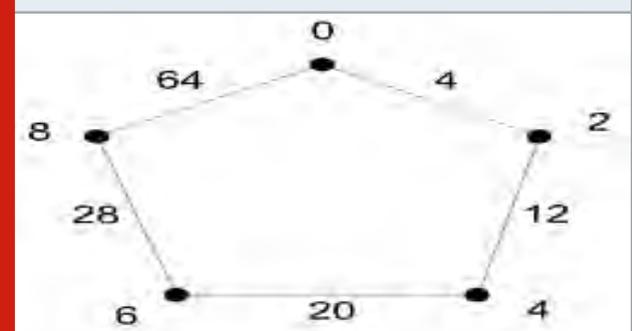


Figure 5: Even vertex square difference labeling of C_5 .



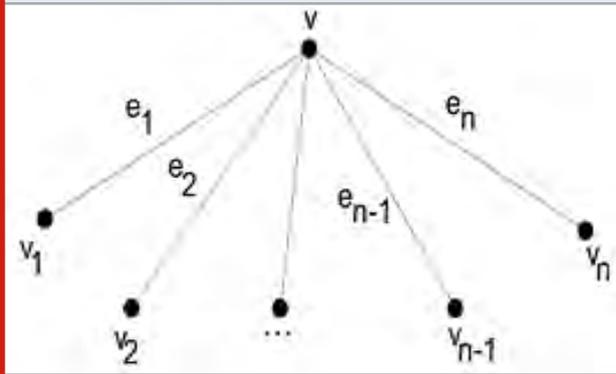
Theorem:3.3

The Star graph $K_{1,n}$ ($n \geq 2$) is an even vertex square difference labeling graph.

Proof:

Let $\{u, v_i, 1 \leq i \leq n\}$ be the vertices and $\{e_i, 1 \leq i \leq n\}$ be the edges which are denoted in the following figure.6.

Figure 6: Ordinary labeling of $K_{1,n}$



Define $f: V \rightarrow \{0, 2, 4, \dots, 2n\}$ as follows Let $f(v)=0$.

For $1 \leq i \leq n$, $f(v_i) = 2i$
Hence the induced edge label is obtained by

For $1 \leq i \leq n$, $f^*(e_i) = (2i)^2$

So f is an even vertex square difference labeling of $K_{1,n}$ for $n \geq 2$ then $K_{1,n}$ ($n \geq 2$) is an even vertex square difference labeling graph.

Illustration:3

Even vertex square difference labeling of $K_{1,3}$ and $K_{1,4}$ are illustrated in Figure.7 and Figure.8 respectively

Figure 7: Even vertex square difference labeling of $K_{1,3}$.

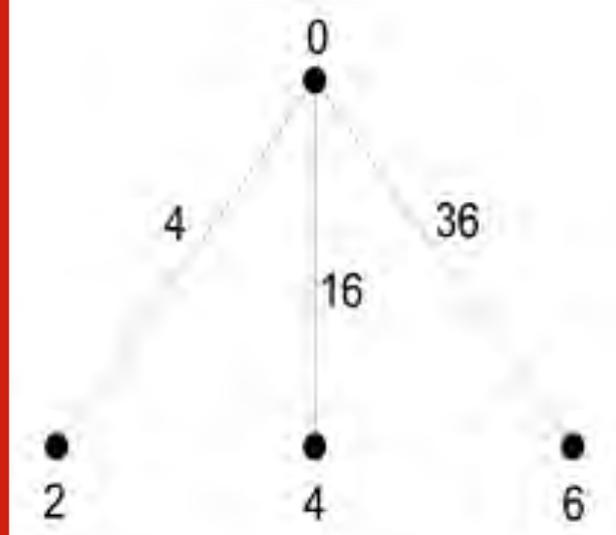
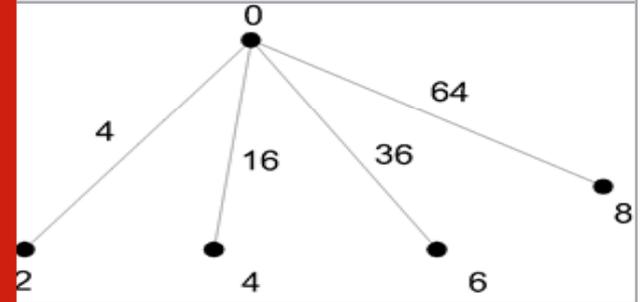


Figure 8: Even vertex square difference labeling of $K_{1,4}$.



Theorem:3.4

The Triangular Snake TS_n $n \geq 2$ is an even vertex square difference labeling graph .

Proof:

Let $\{v_i, 1 \leq i \leq n, u_i, 1 \leq i \leq n-1\}$ be the vertices and $\{e_i, 1 \leq i \leq n-1, a_i, b_i, 1 \leq i \leq n\}$ be the edges.

First we label the vertices as follows:

Define $f: v \rightarrow \{0, 2, 4, \dots, 2n\}$ by

For $1 \leq i \leq n$, $f^*(a_i) = 16i - 12$.

For $1 \leq i \leq n$, $f^*(b_i) = 16i - 4$

For $1 \leq i \leq n-1$, $f^*(e_i) = 16(2i - 1)$

Figure 9: Ordinary labeling of TS_n

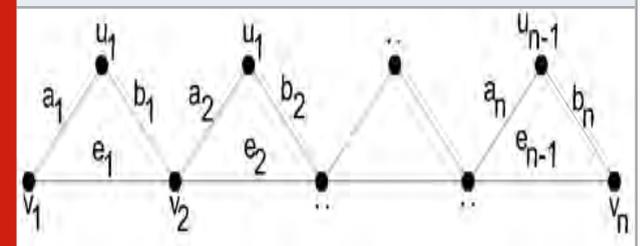
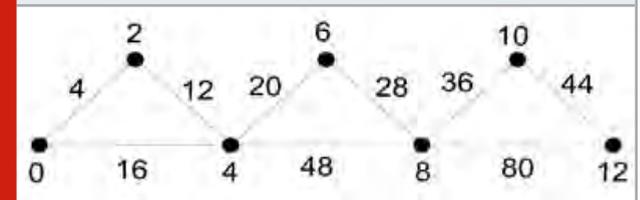


Figure 10: Even vertex square difference labeling of TS_4



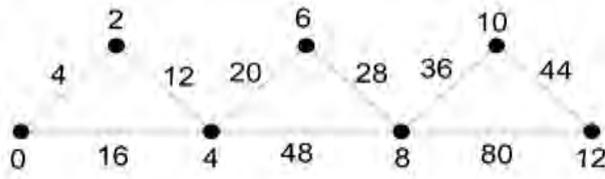
Thus, f is an even vertex square difference labeling of TS_n . Therefore, TS_n is an even vertex square difference graph.

Illustration: 4

In Figure :10 and Figure:11 shows that even vertex square

difference labeling of TS_4 and TS_3 respectively.

Figure 11: Even vertex square difference labeling of TS_3



Theorem:3.5

The Slanting ladder SL_n ($n \geq 3$) is an even vertex square difference graph.

Proof:

Let $\{u_i, v_i, 1 \leq i\}$ be the vertices and $\{a_i, b_i, c_i, 1 \leq i \leq n-1\}$

First we label the vertices as follows:

Define $f:V \rightarrow \{0,2,4,\dots,2q\}$ by

For $1 \leq i \leq n, f(u_i) = 4i - 4$

For $1 \leq i \leq n, f(v_i) = 4i - 2$

We obtained the resultant edge labels are

For $1 \leq i \leq n-1, f^*(a_i) = 16(2i - 1)$.

For $1 \leq i \leq n-1, f^*(b_i) = 12(4i - 1)$.

For $1 \leq i \leq n-1, f^*(c_i) = 32i$.

Clearly f is an even vertex square difference labeling of SL_n ($n \geq 3$).

Hence SL_n ($n \geq 3$) is even vertex square difference labeling graph.

Figure 12: Ordinary labeling of SL_n

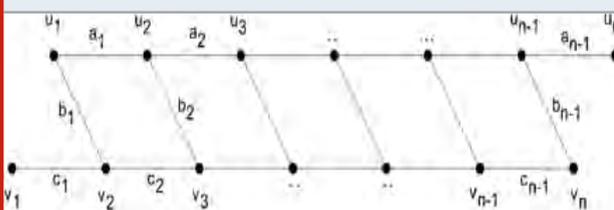


Illustration: 5

In Figure :13 and Figure:14 shows that even vertex square difference labeling of SL_3 and SL_4 respectively.

Figure 13: Ordinary labeling of SL_3

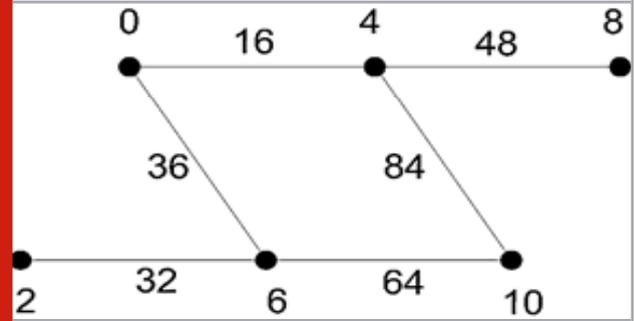
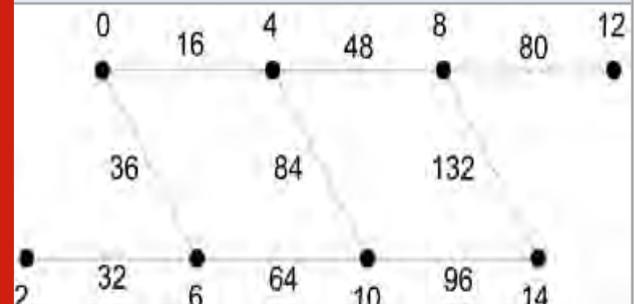


Figure 14: Ordinary labeling of SL_4



CONCLUSION

It is very interesting to investigate graphs which admit even vertex square difference labeling.. In this paper, we proved that Path, Cycle C_n ($n \geq 3$), Star graph $K_{1,n}$ ($n \geq 2$), Slanting ladder SL_n ($n \geq 3$), Triangular snake TS_n ($n \geq 3$) are even vertex square difference graphs. The derived results are demonstrated by means of sufficient illustrations which provide better understanding. It is possible to study the analogous results for several other graphs.

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Layout Based Control of Electrical Appliances using Internet of Things

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ABSTRACT

Home automation system help us to automate our home for a smarter living experience. We can control and monitor our home through our smartphone and access it from anywhere. In this paper, the main objective is to control the electrical appliances with the help of layout of a room based on IOT using Wi-Fi based microcontroller in the android application. This feature gives the user the ability to be able to control the electrical appliances by clicking the particular image of the electrical appliances. Internet Of Things (IoT) is a trending technological field that converts any electronic device into a smarter one. The relay which is controlled using NodeMCU (ESP8266) which is chargeable for the operation of the home appliances. NodeMCU is a low cost open source IoT platform which has an inbuilt Wi-Fi module and an Arduino IDE is used for programming the NodeMCU. This system is implemented using android things and firebase by google, the latest technology in the field of IoT (Internet of Things). Home automation develops the lifestyle by automating the appliances.

KEY WORDS: ARDUINO IDE, KODULAR, NODEMCU (ESP8266), RELAY, WI-FI, FIREBASE.

INTRODUCTION

In recent times, home automation is one of the major growing industry and it is a network of hardware, communication, and electronic interfaces that work to integrate everyday devices with one via the Internet. Smart home settings can help reduce costs and protect your privacy. The appliances which are mainly interact with the help of application in the home automation. Mostly all existing methods shows only icons and buttons for controlling electrical appliances. To overcome this, we have introduced the application by just clicking

the particular image of the electrical appliances in the application, so we can able to ON and OFF the household appliances. Most of the existing system uses short range module (ie., Bluetooth), so it is works only in the limited range compare to Wi-Fi module.

ESP8266 (Wi-Fi based) microcontroller along with relays is used to control electrical switches remotely from the server. User can control switches using a Web Application after authenticating (Harsh Kumar Singh 2019) and firebase is used to connect the application and the controller (Sourabh Sarkar et al., 2018). Various devices such as Sense Pod (hand held wireless device) that will help consumers communicate with their smart homes using simple physical gestures like tapping or rolling (Khan et al., 2018) and hands-free sensory headwear-based HMI device useful for tetraplegic people to drive autonomously home automation devices Giuseppe Piscitelli et al., (2019) are studies in literature. Most of the controller which is connected to the Bluetooth module, so

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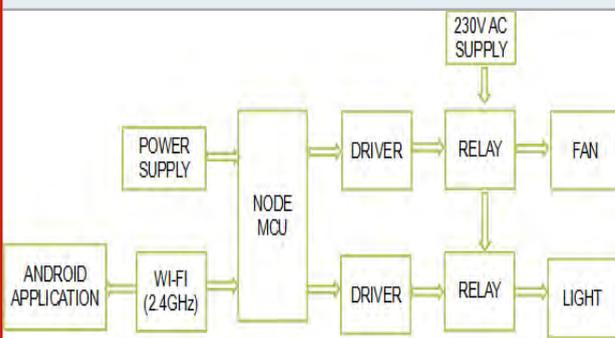
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it works only in the limited range Asadullah et al., (2018) and Muthukumaran et al., (2019). A Wi-Fi based Wireless Sensor Network (WSN) is designed for the purpose of monitoring and controlling environmental, safety and electrical parameters of a smart interconnected home. The user can exercise seamless control over the devices in a smart home via the android application (Singh et al., (2019); Tseng et al., (2018); Vikram et al., (2017).

MATERIAL AND METHODS

Proposed System: The aim of the project is to control the household electrical appliances by clicking the particular image of the appliances in the room. The entire layout of the room which is presented in the application. Here, Firebase is used and it is a real time database which connects the controller and the android application. The appliances which are mainly controlled with the help of application created by the kodular and it transmits the signal to the NodeMCU which is used for turning ON and turning OFF the home appliances through the relay.

Figure 1: Proposed system block diagram



Implementation: The main components are NodeMCU and relay and the application which is developed by Kodular. The app in Kodular can be built with the help of components and blocks. The android application uses Firebase for storing and transfer data. As Firebase is free of cost and also the high speed of data transfer makes it ideal for the real time database system. The app have to respond when a Button is clicked, what data is to be communicated to the database using FirebaseDB component etc. are all configured using the Blocks.

Figure 2: Software implementation

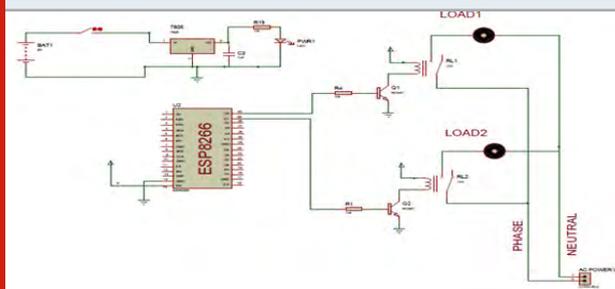
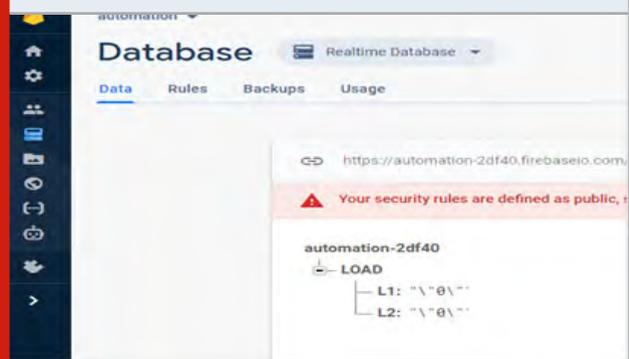


Figure 2 shows, the D0 pin connected to load 1 and D1 pin connected to load 2 through relay. The relay which acts as a switch that is used to turning ON and turning OFF the appliances. Here the 7805 IC regulator is used that restricts the output voltage to 5v output for various ranges of input voltage. The android application and the NodeMCU which can be connected with the help of Wi-Fi module. The android application which contains the entire layout of the room, from which we can touch the particular image of the appliances whatever we want. By clicking the image of the particular appliances, we can ON and OFF the appliances.

Figure 3: Blocks used in kodular for creating android application

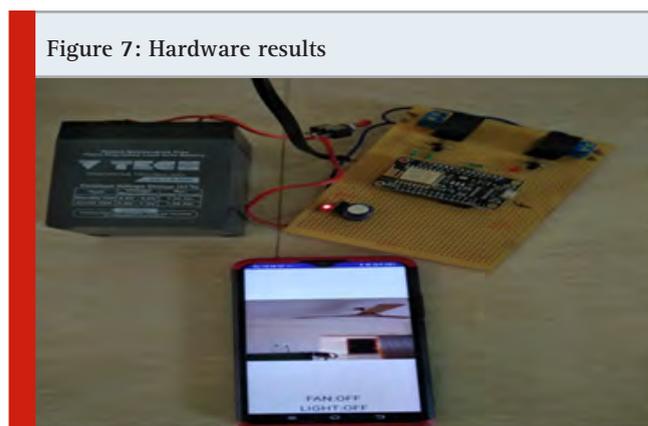
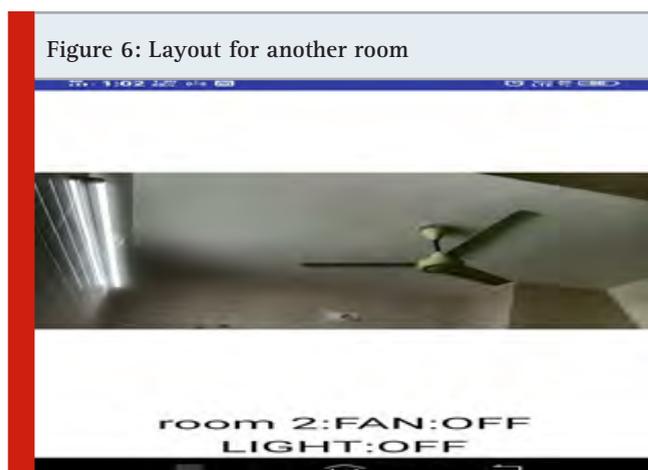
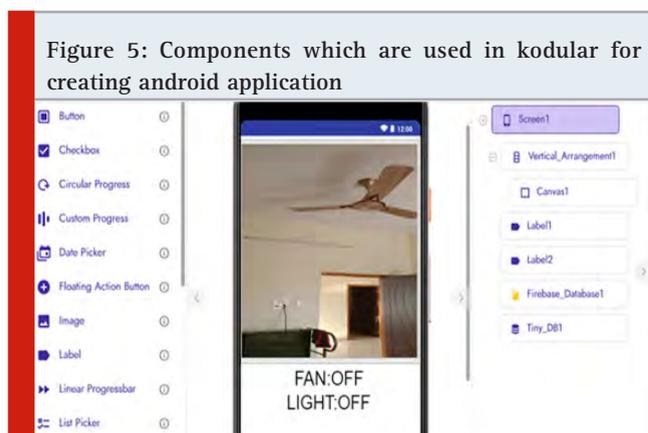


Figure 4: Values are uploaded in the firebase



Role of Firebase: Firebase is a google cloud platform and here the values will be uploaded to the firebase. The application uses firebase for transferring and storing the data. It provides a real time database and back end as a service. In this paper, the concept of home automation and security using the Internet of Things is realized using low cost microcontroller-based NodeMcu (Esp8266), an Android device and Firebase services. NodeMcu is usually used for prototyping purposes. It connects to the Internet through WIFI hotspot. The NodeMcu can be easily configured to connect to the internet and can be programmed easily.. NodeMcu(Esp8266) has an inbuilt WiFi module thus it enables us to connect to the online database, Firebase without using any other additional devices. Once the sensors and electrical are connected to the NodeMcu, they can be used to send or receive

data to or from the Firebase Database. On the other side, there is an Android Application that is connected to the Firebase which enables us to control electrical appliance remotely and much more. The above figure shows, the values which are uploaded in the firebase and it connects the controller and the application.



RESULT AND DISCUSSION

In this paper, the proposed system of using NodeMCU for controlling various electrical appliances by clicking the image of the particular appliances using an android smart phone has been successfully developed. Here the

android application developed by kodular with Firebase, built with the help of components and blocks. Internet of Things is a type of technology that is going to have an impact not only today but also in the coming future.

The above figure shows, the application which is provided with the layout of the room and some of the components which are shown.

CONCLUSION

This paper highlights the various aspects of security, management and maintenance found in the IoT-based home network automation. For the users comfortness, to contact electrical appliances by clicking the image of the particular appliances in the room via their smartphones. Here, I have developed the layout only for homes. In future, we can extend this project for large scale industries.

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Sentiment Analysis in Social Media and their Recent Trends

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ABSTRACT

Sentiment analysis has attracted the interest of many researchers in recent years, since subjective texts are useful for many applications. In specifically, analyst predicts that sentiment analysis on online reviews has become a hot research field. Studies of sentiment analysis on Twitter Corpus mainly focuses on Tweet Collection and pre-processing of tweets and its framework and lexicon construction, feature extraction, and polarity determination. This paper presents a literature review on the recent developments in sentiment analysis, and makes an in-depth introduction of its research and application in twitter and business field. The methods used in current research are especially given importance and the existing problems of those studies are discussed. Finally, some possible future developments on sentiment analysis of research are pointed out.

KEY WORDS: SENTIMENT ANALYSIS, CLASSIFICATION TECHNIQUES, FEATURE EXTRACTION, POLARITY RESULT.

INTRODUCTION

“The Pen is Mightier than the Sword”. The Power of a pen is Mightier than the Sword. The power that the written word carries is far more powerful and damaging than a sword and it is also hard for anyone to analyse and predict the exact meaning of those words. This paper describes effective and easiest way to process sentiment analysis on twitter corpus and also about its business applications, most of the reviews in social media and twitter datasets are way difficult to analyse and extracts the emotion

behind the text, indeed it is hard to predict the emotion of the writer. But, luckily, many researchers introduced numerous methods to analyse sentiment.

This paper presents the methods used in those researches are empathized and the existing problems of those studies are discussed Sentiment analysis, or opinion mining, aims at user’s attitude and opinions by investigating, analyzing and extracting subjective texts involving users’ opinions, preferences and sentiment. Since Bo Pang et al., (2004) put forth this concept in 2002, the academics have undertaken a diverse range of related research, due to its practicality in opinion monitoring and business competitive intelligence. Sentiment analysis on online reviews has become increasingly popular. A multidisciplinary research field in nature, sentiment analysis includes multiple fields such as natural language processing (NLP), computational linguistics, information retrieval, machine learning and artificial intelligence etc. As an astronomical quantity of sentimental subjective

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texts appear on Internet, researchers put more emphasis on complex sentimental sentences and texts instead of on words only. In light of text granularity, sentiment analysis is conducted on distinct research levels word, phrase, sentence, text and multi-text YAO Tian-fang et al., (20018).

Twitter is a micro-blogging site used by people to express their opinions on various topics. Sentiment Analysis is the process of extracting meaningful customer insight from the text in terms of sentiment score. Twitter Sentiment analysis is an application of sentiment analysis, on the twitter data (tweets). But today it as become difficult to analyze tweets because of the changed and challenging formats of the tweets. The increase in the use of various slangs, emoticons, abbreviations, and puns in tweets, has made it difficult to analyze tweets in the same ways as before HOU Feng, et aaaaaal., (2009). Twitter has emerged as a major micro-blogging website, has over 100 million users generating over 500 million tweets every day. With such large opinion-based audience, Twitter has become an informative source for many organizations, institutions, and companies for information regarding their product or services which customer use WANG Hui, et al., (2009).

With millions of tweets coming up every day, companies are able to model in customer insight in terms of graphs and tables based on the sentiment reflected in their tweets. On Twitter, users share their opinions in the form of tweets, using only 140 characters. This leads to people compacting their statements by using slang, abbreviations, emoticons etc. Ren Hongjuan et al., (2010). Along with this, people also use sarcastic and polysemy language in their tweets. Hence it is well understood that Twitter language is unstructured. In order to extract meaningful information from tweets, sentiment analysis is used which gives result in terms of percentage sentiment on a particular scale. The results from this can be used in many areas like analyzing and monitoring changes of sentiment with an event, sentiments regarding a particular brand or release of a particular product, analyzing public view of government policies and business applications WEI Wei, et al., (2011). This paper presents an overview and the prospects of the several major research fields in sentiment analysis.

II.About Sentiment Analysis:Sentiment analysis is a process of calculating sentiment of a particular statement or sentence. It's a classification technique which derives opinion from the tweets and formulates a sentiment score which reflects the sentiment-based opinion of the text. Chauhan Vipul Kumar,et al., (2010), Sentiments are subjective to the topic of interest. We are required to formulate that what kind of features we decide to extract from the text. For example, we can have two-class tweet sentiment classification (positive and negative) or three class tweet sentiment classification (positive, negative and neutral). The dimension of the sentiment class is a crucial factor in deciding the efficiency of the model. As what we want to calculate has to be programmed in terms of a class in the sentiment calculator. The greater

the efficiency of the program the better and refined are the results.

Sentiment analysis approaches can be broadly categorized into two classes – lexicon based and machine learning based ZHAO Yan-Yan (2010). Lexicon based approach is unsupervised as it proposes to perform analysis using lexicons and a scoring method to evaluate opinions. Whereas machine learning approach involves the use of feature extraction and training the model using feature set and some dataset. The basic steps for performing sentiment analysis includes data collection, pre-processing of data, feature Extraction, selecting baseline features, sentiment detection and performing classification either using simple computation or else machine learning approaches.

There have been many works on using online users' sentiments to predict box-office revenues for movies and the works on sentiment analysis by Asur and Tumasjan (2008) have suggested that online users' opinions or sentiments are closely correlated with our real-world activities. All of these results hinge on accurate estimation of people's sentiments according to their online generated content. Currently all of these works only rely on sentiment analysis from textual content. However, multimedia content, including images and videos, has become prevalent over all online social networks. Indeed, online social network providers are competing with each other by providing easier access to their increasingly powerful and diverse services.

III. Survey on Related Works Naïve Bayes proposed by M. Tirupthi, Suresh Pabboju and G. Narasimha (2017) suggested that the tremendous use to the people and industries which are based on sentiment analysis. For example, Sales Marketing, Product Marketing etc. The key features of this system are the training module which is done with the help Hadoop and MapReduce, Classification based on 919 918 Naïve Bayes, Time Variant Analytics and the Continuous learning System. The fact that the analysis is done real time is the major highlight of this paper. Several existing systems store old tweets and perform sentiment analysis on them which gives results on old data and uses up a lot of space. But in this system, the tweets are not stored which is cost effective as no storage space is needed. Also, all the analysis is done on tweets real-time. So, the user is assured that, getting new and relevant results. However, the proposed system has some limitations.

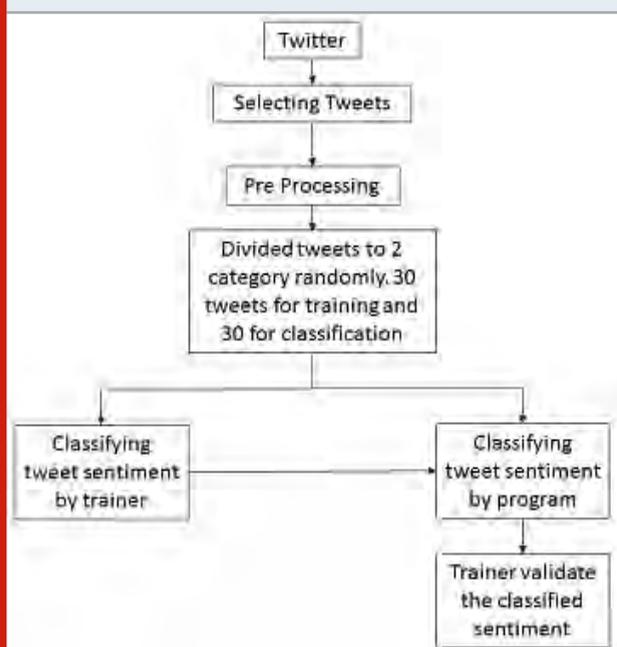
First limitation is being Uni-gram Naïve. training of the data was done based on word probabilities and used the same for classification. Future enhancement to this work might be to use n-gram classification rather than limiting to uni-gram which will require pattern filtering on Hadoop. When classifying the sentence, words are taken individually rather the sentence in total. The semantic meaning is neglected that might be present between the words. Second Limitation this is only used for English Language. It might be possible to build a system which can perform sentiment analysis in all

languages. The third limitation that the system may not provide actual intended meaning of the user. There might be some sort of sarcasm present in the sentences which the system ignores.

McDiarmid Tree proposed by Zahra Rezaei, and Mehrdad (2017) states that the data generated by users in Twitter provides a great opportunity and precious source for text data mining and sentiment analysis. The Hoeffding tree is the most common algorithm which has been used in many previous works of data stream mining. Since data in Twitter follows data stream model, Hoeffding tree algorithm is an appropriate approach to deal with it. The process time of the Hoeffding tree is rather high. To overcome this problem, we employed McDiarmid tree algorithm in this paper for the task of sentiment analysis on Twitter. Before applying classifying algorithms on tweets, we used some common pre-processing tasks appropriate for twitter language.

We also used both filtering and wrapper techniques for feature selection to enhance the performance. McDiarmid tree algorithm is similar to Hoeffding tree algorithm with this difference that the McDiarmid's bound is used instead of the Hoeffding's bound. Our experiments have shown that the McDiarmid tree has a considerable improved performance in processing time while the obtained accuracy from that is near to accuracy of the Hoeffding tree. Because of large amounts of Twitter data, processing time is highly important for sentiment analysis. For this reason, McDiarmid Tree for sentiment analysis of Twitter data performs better than Hoeffding tree algorithm.

Figure 1: Proposed Sentiment classification



Incorporating SVM and Naïve Bayes Mohd Naim Mohd Ibrahim and Mohd Zaliman Mohd Yusoff (2015) can be done by training and verifying the sentiment

classification by the same person, we could archive a high degree of accuracy using Naïve Bayes technique. This method is suitable to train and classify sentiment from twitter and other social network data. This method also is a good candidate to assist human / operator to classify a large number of tweets. We also learn that this technique is suitable to political or business sentiment classification. From our results also could negate some perception that Naïve Bayes is weak compare to SVM.

Table 1. Accuracy of Classifier without stopword

Algorithm	Accuracy
Naive baysin Baysnet RandomForest	73.6148%
Naive Bayesian BayesNet KNN	73.8515%
RandomForest BayesNet KNN	91.0418%
Naive Bayesian BayesNet RandomForest KNN	87.0895%

The proposed sentiment classification based on trainer perception as shown in Figure 1 KNN Anurag P. Jain and Vijay D. Katkar (2013) shows that it can be observed from the experimental results that data mining classifiers is a good choice for sentiments prediction using tweeter data. In a experimentation, knearest neighbour (IBK) outperforms over all three classifier namely Random Forest, bays Net, Naive Bayesian. Random Forest also gives good prediction accuracy There is a no need to use of ensemble of classifier for sentiments predictions of tweets as single classifier (i.e. knearest neighbour) gives a better accuracy over all combinations of ensemble of classifier

Support vector machine Rui Huaxia and Liu Yizao. (2012) is a supervised learning model which is used for classification. Its main aim to determine best linear separators for classification. It is a non-probabilistic classifier. For a given set of training data, each is labelled for belonging to one of the classes, SVM training algorithm create a model which assign new data into one or two classes. SVM classification shown in Figure 2. Hyperplane is used to separate two classes. In the

diagram below, for example, to classify triangle and circle shapes we compute three hyperplanes A, B and C. C is best separator as items on both sides are at maximum distance from Hyperplane and B is worst separator.

Deep Learning on Sentiment Analysis Rui Huaxia and Liu Yizao (2015) has become very important for the business owners. Because, with sentiment analyzers, it is now possible to understand the user activities and choices. Many works have been done for English. In contrast of that, work done in Bengali is very little. This research is a little step forward to fill the void. Despite being one of the most used languages in the world, Bengali lacks in both benchmark datasets and a well-furnished model for sentiment analysis. Moreover, researchers usually do not publish their dataset. The dataset that was made for this research is clearly step ahead since it will be enriched and published for research purposes. Moreover, the dataset was not stemmed for our purpose. In future, we can stem the dataset and our result might improve. It is clear that deep learning models are the future here. Using the recurrent deep learning models, it is now possible to achieve state of the art performance in Bengali sentiment classification. In future it will be interesting to see the business applications or sentiment analyzers for Bengali text using deep recurrent models. Also, hybrid deep learning models can be applied to the task of sentiment classification.

SWESA Li, Zhichao et al., (2011) is a simple optimization-based framework, that jointly learns word embeddings and a classifier for the task of sentiment analysis. Through extensive experimentation we show that SWESA outperforms both non-neural network algorithms (naive Bayes, LSA) as well as state-of-the-art neural network algorithms based on CNNs and RNNs. As a by-product of our optimization formulation we show that the word embeddings learned by SWESA are polarity aware and perform very well on antonym tasks, even without being explicitly trained for such tasks. Particularly, strongly polarized word embeddings are easily distinguished. These results indicate that when using finer grained sentiment labels, word polarized along other scales such as dimension, etc can be determined. Our contributions strongly emphasize the point that on domains where data is limited, i.e. few thousands of points, but sentiment rich, data size is not a handicap and simple algorithms can do a better task than more involved neural network-based algorithm. In the future, we shall investigate modifications of our framework for tasks other than sentiment analysis.

The experimental study of Collaborative Field Jihie Kim, et al., (2010) in Figure 3 and results showed that collaborative filtering techniques can be a useful and powerful tool for generating profiles of user sentiments. We expect that similar approaches can be used in other conversational data such as online message boards that discuss political issues. As retweet often indicates endorsement of the message, we plan to incorporate it into the collaborative filtering framework and generate a stronger model.

IV. Application

A) Support in decision making: Decision making is a very important field of our life. Opinions extracted from reviews helps us in making various decisions like “which books to buy”, “which hotel to go”, “which movie to watch” etc.

B) Business application: In today’s world of competition, every company wants to satisfy its customer’s requirements by creating new innovative products. Assessments of individuals are an essential angle today with the goal that organizations can get an input from clients and can roll out sought improvements in their item. Google Product Search is one’s illustration.

C) Predictions and trend analysis: sentiment analysis enables one to predict market trends by tracking views of public. It is also helpful in elections where candidates want to know the expectations of people from them. The proposed module has the advantage of transfer learning. This learning approach prompts notion embeddings that catch signals from various areas.

In the primary condition that is including with fine tuning, the sentiment embedding lattice is pre-initialized utilizing the information from our exchange learning methodology, yet the model is then ready to alter these subjectively by means of back propagation. In the subsequent condition that is excluding fine tuning, we basically utilize our conclusion insert ding grid with no guarantees, and don’t refresh it. Rather, the model can refresh its different other parameters, especially its different weight networks and inclination vectors.

Additional Embedding Models: Specifically, as a more straightforward methods for accomplishing increases over standard CNNs, we propose to utilize CNNs with word vectors enlarged with feeling signals. Given that standard word embeddings have all the earmarks of being helpful for catching semantics, one may guess that expanding these word vectors with extra measurements to catch notion data can prompt improved outcomes.

Table 2. CNN Outcomes

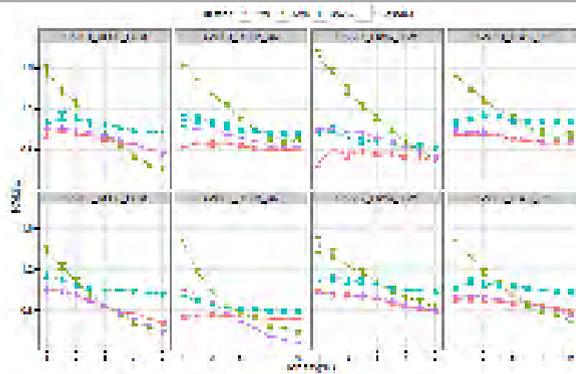
Model	20%	50%	100%
CNN (Kim,2014)	83.14	84.29	85.72
CNN-Rule-q (Hu et al.,2016)	83.75	85.45	86.49
Gumbel Tree-LSTM (Choi et al.,2017)	84.04	84.83	86.80
DC-MCNN (2019)	85.06	86.16	86.99

Sentiment Classification using BERT: BERT is utilized to explain the fine-grained sentiment classification task. Investigations show that our model outflanks other mainstream models for this errand without complex engineering. We likewise exhibit the viability of move learning in regular language handling all the while. There are five sentiment labels in SST: 0 (very negative), 1

(negative), 2 (neutral), 3 (positive), and 4 (very positive). If we only consider positivity and negativity, we get the

binary SST-2 dataset. If we consider all five labels, we get SST-5.

Figure 2 : Collaborative Filtering Result Analysis



A. BERT: (Bidirectional Encoder Representations from Transformers) is an embedding layer designed to train deep bi directional representations from unlabeled texts by jointly conditioning on both left and right context in all layers. The objectives are listed below:

- **Masked word prediction:** Here 15% of the words which is given as are masked out, and the whole sequence is fed to a deep bidirectional Transformer [5] encoder, and then the model learns to predict the masked words.
- **Next sentence prediction:** It specifies the relationship between two sentences.

B.Preprocessing: The following preprocessing steps on the review text are to be done before the data are feed into model.

Table 3. CNN compared with the proposed method

Approach	d		en	es Rest.	ru Hotels
	Movies	Food			
CNN					
– Random Init.	300	80.78	86.63	81.50	90.18
– Word Vec. Init.	300	85.72	87.97	85.13	92.82
	Our Approach				
– With fine-tuning	300/26	86.99	90.08	85.02	93.40
– No fine-tuning	300/26	86.38	88.81	85.70	94.87
	CNN with Concatenated Sentiment Embeddings				
– VADER	301	85.89	88.39	84.90	92.31
– SocialSent	550	84.90	88.48	82.63	92.23
– Our Embeddings	326	86.05	89.07	84.56	92.72
	Our Model with Alternative Sentiment Embeddings				
– Random	300/26	86.16	87.97	85.24	93.99
– VADER	300/1	86.33	88.39	84.45	94.18
– SocialSent	300/250	86.38	87.89	83.09	93.40

1. **Canonicalization:** The process of removing digits, punctuations and symbols. Convert the content in to lower case.
2. **Tokenization:** The texts are broken down to their prefix, root, and suffix to handle unseen words better.
3. **Special token addition:** At last the tokens are added at the appropriate positions.

C. Proposed Architecture: The overall architecture of our model is showed in Fig 4. There are four main stages. The first is the pre-processing step as described above. Then we compute the sequence embedding of 0.1 to regularize and prevent over fitting. The results of our model and compare with it some of the popular models that solve the same problem, i.e., sentiment classification on the SST dataset.

D. Comparison Models with the proposed

- **Word embeddings:** In this strategy, the word vectors pre-prepared on huge content corpus, for example, Wikipedia dump are arrived at the midpoint of to get the report vector, which is then taken care of to the assessment classifier to figure the sentiment score.
- **Recursive networks:** Various types of recursive neural networks (RNN) have been applied on SST. The results are compared with the standard RNN and the more sophisticated RNTN. Both of them were trained on SST from scratch, without pre-training.
- **Recurrent networks:** Sophisticated recurrent networks such as left-to-right and bi-directional LSTM networks are applied on SST.
- **Convolutional networks:** In this the input sequences are passed through a 1-dimensional convolutional neural network as feature extractors.

Table 4. Evaluation of Dataset

Dataset	Type	Labels	# of docs	Eval.
BBC	News	5	2,225	10-cross
20News	News	6	18,846	Train-test
Reuters	News	8	9,178	10-cross
Ohsumed	Medical	23	23,166	Train-test
RTC	Snippets	2	438,000	Train-test
IMDB	Reviews	2	50,000	Train-test
PL05	Snippets	2	10,662	10-cross
PL04	Reviews	2	2,000	10-cross
Stanford	Phrases	2	119,783	10-cross

Text Categorization and Sentiment Analysis: Text preprocessing is often the first step in the pipeline of a Natural Language Processing (NLP) system. The main focus is on pre-processing and how it affects the performance of standard neural text classification models based on Convolution Neural Networks.

Cross pre-processing: In this experiment we observe a different trend, with multiword enhanced vectors exhibiting a better performance both on the single CNN model (best overall performance in seven of the nine datasets) and on the CNN+LSTM model (best performance in four datasets). For this situation a similar arrangement of words is found out however single tokens inside multiword articulations are not prepared. Rather, these single tokens are considered in disengagement just, without the additional noise when considered inside the multiword articulation too.

V. Feature Extraction

TOPIC Extraction

FAN Na, (2009) noted a method of extracting Chinese sentiment topic sentences. Then, FAN Na proposed a method based on mixture model for analyzing subject and sentiment in texts. Firstly, texts in corpus were labeled as positive or negative and their subjects were labeled too. The method is general and can be applied to any text collections.

Object Extraction: One of the fundamental tasks of sentiment analysis is to extract the object from review sentences, in order to identify all the features of the events in a certain text. Zhang and Liu et al., (2011) employed a learning-based method called Bayesian Sets to extract opinions expressed on entities and their attributes. To improve the performance of opinion targets extraction, XU Bing et al., (2011) proposed to integrate shallow parsing features and heuristic position information for modeling of the training process without introducing domain lexicon. HUANG Yi-Hua et al., (2011) constructed a phrase tree structure to present the appraisal expression pattern, as well as a method based on approximate convolution tree kernels to calculate the similarity between these structures.

Relation Extraction: ZHANG Jian-Feng et al., (2008) presented a novel method to extract the pairs of opinion-bearing terms and opinion targets as the candidate set, and then employed the maximum entropy model to combine lexical, part of speech, semantic and positional features derived from text. The method incorporated relation extraction into opinion mining and solves the problem of coreference and omitting of opinion targets to some extent. Qiao et al., (2007) noted that keywords are parallel to each other. "Tensor Field Model" (TFM) was proposed, and its perspectives are field theory in physics and multilinear algebra in mathematics. The tensor representations of documents and queries in TFM were constructed, presenting some key concepts such as term field, tensor product of term array and term field constant.

VI. Classification Techniques: Sentiment Classification techniques can be categorized into machine learning approaches, lexicon-based approaches and hybrid approaches.

I. Machine learning approach: The Main focus on Machine Learning analysis is on mechanically learn to supervise advanced patterns and to create intelligent choices to support its rule-based information. The basic premise of machine learning is to create algorithms that can receive input and predict output on counter basis. The Machine Learning Approach (ML) applies the algorithms and use of linguistic options/choices.

II. Lexicon based approach: The Lexicon-based approach depends on a sentiment lexicon, a set of well-known and precompiled sentiment terms. It is classified into dictionary-based approach and corpus-based approach that use applied mathematics or linguistics ways to find out sentiment polarity.

III. Hybrid approach: The hybrid approach combines many approaches and it is common with sentiment lexicons taking part in a key role within the majority of ways. The assorted approaches and also the hottest algorithms of sentiment classification illustrated in Fig.4. The text classification ways in machine learning approach is divided into supervised and unsupervised learning.

VII. Sentiment Polarity Analysis: Sentiment polarity analysis prefers to the analysis and judgment of the sentiment expressed in a subjective text, which is capable of distinguishing positive, negative, or even more subtle sentiment, such as happiness, anger, grief or joy. It largely involves two tasks: the dichotomy of subjective/objective information, and the sentiment classification of subjective information, including the commonplace positive/negative dichotomy as well as more exquisite n-multiple taxonomy. There are some focuses of research on Chinese: (1) in the granularity of words, Du Weifu et al., (2008) proposed a novel scalable word semantic orientation computing framework, in which the word semantic orientation computing is transformed into the function optimization. As an instance of the proposed

framework, the authors built an undirected graph in the use of word similarity computing technology first, and then partition the word-to-word graph by the idea of minimum-cut, thereby function optimization was adopted in this word semantic orientation computing framework and resolved by using simulated annealing algorithm. A method of collocation orientation identification based

on hybrid language information was proposed by WANG Suge et al., (2009) and YANG Anna et al., (2009).

Firstly, according to the characteristics of six kinds of collocation patterns, the probability latent semantic models were determined for them. Then the obtained semantic models were used to identify the sentiment orientations of collocations. Lastly, for some collocations containing a sentiment word, their previous tags were modified by using some constructed rules. The experiment result in the corpus of car reviews indicated that the proposed method is superior to the method based only on probability latent semantic model or rule for collocation orientation identification. The technology of the Chinese word sentiment polarity judgment was discussed and analyzed by ZHANG Jing and JIN Hao (2007). The polarity was described by using the sentiment characteristics set. The model of the sentiment polarity mutual information characteristics was created based on the bi-gram dependency of POS tagging. The classifier was available by machine learning to automatically judge, compare and optimize the word sentiment polarity.

All of these helped to improve the properties, the highest accuracy of SVM reaches 95.47%, and the F value is up

Figure 3: Simple Classification Technique

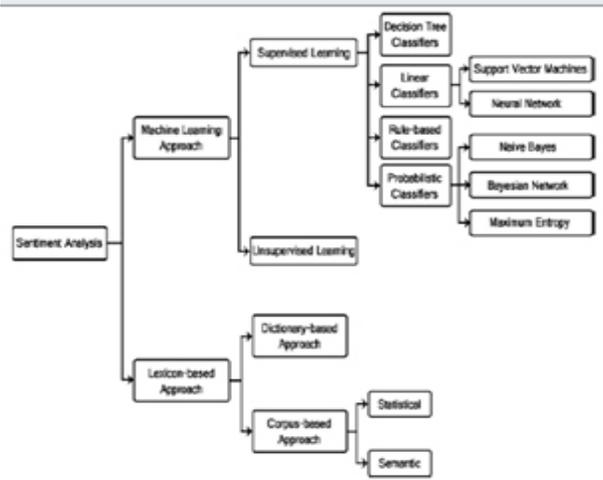


Table 5. Analysis of Recent work in Sentimental Analysis

Approaches	Algorithm/ Mechanism	Author	Result in Terms of Accuracy	Limitations
Machine Learning Approach	SVM	Prathusha K Sarma and William A Sethares	83%	Limited Range of annotated areas and those units are not typically grammatical.
	Supervised (Naïve Bayes, SVM, N-gram Model)	Qjang, Ziqiong Rob Law	83.54%	Limited numbers of Training Sets are available
	BERT	Manish Munikar	84.2%	It has complicated architecture
	Text categorization	Jose Camacho-Collados	85 %	It purely handles with text
	Unsupervised (Data Mining)	Anurag P. Jain And Vijay D. Katkar	67%	Sensible and it requires multiple parameters to extract its work
Lexicon Based Approach	Sentiwordnet	Cataldo	71%	Limited Range
	Sentinet	Musto	74%	of coverage
	Wordnet affect		62%	in Lexicon
Hybrid Approach	KNN + SVM	Anurag P. Jain and Vijay D. Katkar	76.17%	A Symbolic Approach is quite efficient

to 93.90%. In the granularity of sentences, WANG Gen, and ZHAO Jun, (2010) proposed a new method called Multiredundant-labeled CRFs and applies it on sentence sentiment analysis. This method can not only solve ordinal regression problems effectively, but also obtain global optimal result over multiple cascaded subtasks by merging subjective/objective classification, polarity classification and sentimental strength rating into an integrated model, with each subtask maintaining its own feature types. De-cheng et al., (2009) presented how to identify the topics as well as the relations between the topics and the sentimental descriptive terms in a Chinese sentence, and how to compute the sentiment polarity of the topics. They extracted the topics and their attributes from a sentence with the help of a domain ontology, then identify the relations between the topics and sentimental descriptive terms based on arising results, and finally determine the polarity of each topic in the sentence.

CONCLUSION AND FUTURE SCOPE

This paper presents a survey of sentiment analysis and classification algorithms. This survey concludes that sentiment classification is still an open field for research. There is a lot of scope for algorithms in it. SVM and Naïve Bayes are most popular algorithms for sentiment classification. Sentiment analysis of tweets is very popular. Datasets from sites like Amazon, IMDB, flipkart are widely used for sentiment analysis. Deeper analysis is required in case of social networking sites. In many cases, context consideration is very important. Therefore, more research is required in this field.

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Feasibility Analysis for Targeted Nodes Using Signal Strength

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ABSTRACT

The proposed system is used to check the connection status of users with maximum strength of signal and interference, to achieve this kind of situation need to get latitude and longitude co-ordinates from certain user either manually or retrieved from GPS (Global Positioning System) this value can be compared with nearby signal transmitting points and plotted in the map with GUI concepts. The comparison can be in the form of shortest path that is which is very closer to the subscribing area and interference if the target node is an highest building and transmitter is also need to be highest if not interference will occur, last one signal strength the transmitting node to have good signal strength. Then only it can able to give good signal to the target node. Thus feasibility checking for signal interruption and good signal strength can be achieved.

INTRODUCTION

Now a day the electronic network communicating devices are getting increasing both in city sides and also at rural areas. In city side there is no problem for subscribing wired network connection but in rural areas the thing is become complex for the peoples Tian, R. and Zhang, Y., (2018). In the growing world the peoples are working from home and due to some different situation the people at rural areas also in need of network from complex areas because the transmitters become few nos only and man power need to visit the particular places regularly to monitor the feasibility for particular new connection Instead of this the proposed approach become very useful to achieve this.

In situation one technical people or field person need to directly visit the subscribers location Chunping, W et al., (2013). After visiting the destination area need to

fetch the latitude and longitude of the particular area. Now the feasibility can be check in two ways, one way is using the laptop the field person can open the nearby transmitting radio and ping it for good signal strength Sun, P.G et al., (2009). Another way is the field person can input the coordinate value in to the map and monitor the nearby transmitter for resulting good signal strength. If there is more than one transmitter field person need to visit that transmitting area and calculate the distance after calculating the field person goahead with the nearest one. So In existing system those all things can be done manually to check feasibility with good signal strength for the subscribers.

Related work: The Dhilipan, et al., (2016) analysis and evaluation of the target node is explained with the help of correlation between the node is possible. Then the target node has been achieved by searching mechanism in the complex network. Also the importance and reliability of the target node were simulated. Thus the result of the efficient node as target node in complex network taken. The Ramesh, G.P., Rajan, A. (2017) evaluates the functions of all the nodes has been updated and the special tasks of the target node has also been discussed over here. The scheme of reprogramming is to convert the transmit code image into target nodes and implementation of the routing algorithm also been done.

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The approach has been compared with deluge also makes possible. Both life time and energy consumption has also been achieved. Teymoori, P et al., (2015) a new evaluation approach is therefore proposed with mean of RSSI and LQI as the measure for evaluating the link to avoid the inaccurate result they have taken micaz node as experiment to verify the communication links in wireless sensor network and lots of samples are verifying statistically linked to Gauss link. This also deals with Upper layer protocol of network. Duan, L., et al., (2017) overcomes of the other approach like k link node. Without k link node they select the leader node. Particular selected node ie. leader node will have the characteristic of particular network

Proposed System: In our proposed system subscribers just need to login to the home page and just click the check feasibility link. Subscriber will get the confirmation with in certain time. According to dealers view while subscriber clicking that link the system will capture particular area coordinate value using Global Positioning system (GPS) which can be plot it on the Graphical User Interface (GUI) with red color for identifying as new subscriber. it consists of Map belongs to the particular area, after plotting the particular coordinate value the subscribers red markers check with nearby green markers represents the already link available coordinates in that particular area. if there is more than one link which deploy the shortest path algorithm now the nearest node will be captured. if there is more than one node with same nearest distance need to ping them with all using ping methodology, fetch the source node with good signal strength . Now the target node is fixed with good signal strength has been achieved.

strength using ping methodology Now the target node is fixed and dealer proceed it with the feasible node

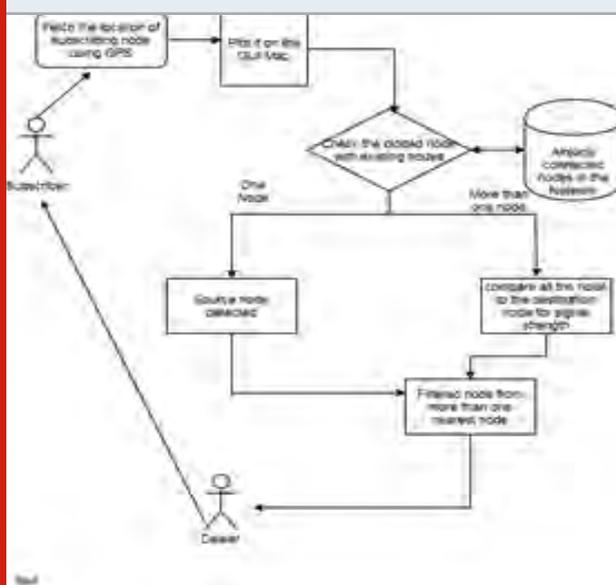
Subscriber Login: With the help of subscriber login the subscriber can submit their query for new connection at their area. While submitting the request particular users location can be captured by GPS(Global Positioning System).

Dealers Login: The Dealer Login will fetch the data from the database that has been already submitted by Subscriber ie., GPS coordinates and check that Particular coordinate with nearest connected network coordinates using shortest path algorithm. If more than one node with same distance means they goes for pinging session. Ping process will go through for the nearest nodes, thus the feasible node with good signal strength has been achieved.

Database: The database consists of the subscribers name, phone no, mailed, coordinate value of the customers are stored with customer id as an primary key to fetch the details.

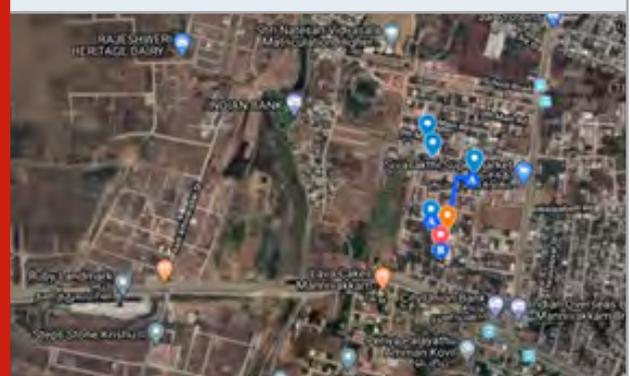
Transmitters Details: The Radio devices information like Radio ID, Radio devices IP and the Radio device type, Radio Device Location ie., Coordinate values with latitude and longitudes.

Figure 1: Architecture Diagram



In the above architecture diagram dealer is an actor one who fetch the coordinate value of subscriber and plot the value in GUI. Plotted value compared with nearest existing nodes If there is more than one node at same distance select the feasible node with maximum signal

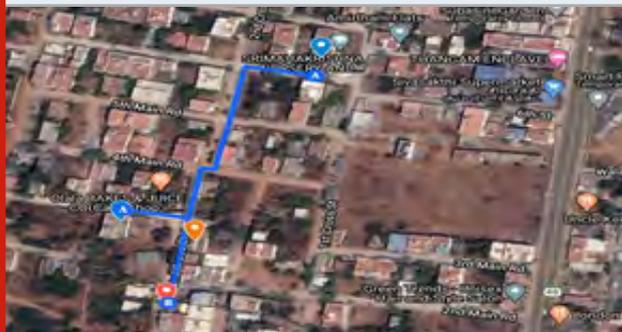
Figure 2: Analyzing Availability of nodes



Experiments and Results: Feasibility analysis for targeted nodes using signal strength this approach has been done by first subscribers need to query their requirements as they need the new connection in the existing network . This has achieved by first while they asking for new connection their latitude and longitude i.e. coordinate value received by the providers end and plot it on the Graphical User Interface Map, after that the coordinate value has been marked as red color which indicates that is new connection requirement and other existing nodes in the network which is transmitters has been marked as blue color indicator. Now the subscribing node compared with the existing nodes using shortest path algorithm. if there is only one node is an resultant node then it will be taken as target node otherwise more than one node with same distance means we need to implement ping methodology now by opening the transmitters address need to ping from the subscribers end and select the

appropriate node with good signal strength. Thus the target nodes using signal strength and algorithm is possible over here. In the above diagram which explains the feasible achieved node has been connected to the existing node through the given path.

Figure 3: Identifying the target node



CONCLUSION

Feasibility Analysis for Targeted nodes using signal strength used mainly for subscriber and Providers for Network connection in rural areas, this provides the graphical representation of the target node which is nearest one and also with good signal strength can be achieved.

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A Survey on Aspect-Based Opinion Mining Techniques

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ABSTRACT

With the rapid growth of social media, sentiment analysis has become one of the most active research areas in natural language processing. Its application is also widespread, from business services to political or social campaigns. Research results show that machine learning techniques such as SVM, Naïve Bayes, RNN, CNN, LSTM and attention based neural network have higher accuracy and can be regarded as a baseline learning methods for aspect based opinion mining. Lexicon-based methods, unsupervised learning and traditional techniques are also very effective in some cases which require few efforts for annotated documents and some are domain dependent. Benchmark initiatives like Sem-Eval provide a way to solve the problem of mining methodologies that evolve over time. The primary objective of this survey is to focus on various techniques and approaches used for aspect-based opinion mining with respect to product review and social media (Twitter). First we introduce the general concept and framework of aspect based opinion mining and then compared their performance, advantages and disadvantages for those approaches and models. Finally, we summarize the challenges and evolving trend of the reviewed methodologies and conclude the survey.

KEY WORDS: ASPECT, CLASSIFICATION, FEATURES, MODEL, OPINION MINING, SENTIMENT POLARITY, TARGET.

INTRODUCTION

Sentiment analysis or opinion mining in Natural Language Processing (NLP) refer to the identification and aggregation of attitudes or opinions expressed by social media or product review users towards a specific topic. The presence of sarcasm, word ambiguity, syntactic and semantic nature of words or sense makes the task of opinion mining even more challenging. The objective of text data mining is to design effective algorithm and models to extract opinions from natural language

text and to summarize them suitably. Aspect based opinion mining helps in downstream application such as public intention or mood prediction regarding product sales and market intelligence, political movements, social events and prediction. It provides benefits to customers by allowing taking purchase decisions, inventory management through customer satisfaction and government's organization to act or understanding public perception.

Major differences between the aspect based opinion mining and stance detection are: (i) the opinion mining problem is concerned with the sentiment with/without a particular target which is expected by the stance detection, (ii) the sentiment and stance (for a target) within the same text may not be aligned that is the polarity of the text may be positive while the stance may be against a particular target, or vice versa. Aspect-Based Opinion mining is about detecting relevant aspects on the target or entity

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and the sentiment orientation. It can be formalized as a task of extracting triple $\langle e, a, s \rangle$, where e is a target or entity, a represents aspect and s is the opinion or sentiment orientation Liu, Bing, (2015). Aspect-based opinion mining task can be categorized into 2 primary areas based on the nature of text granularity i.e. corpus level M. Hu and B. Liu, (2004) and document or sentence or phrase level Pang, Bo, and Lillian Lee. (2008).

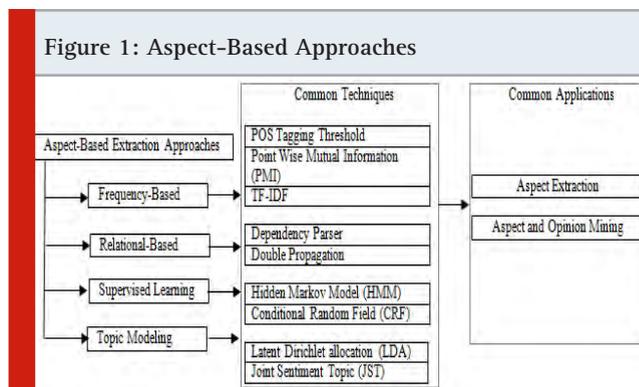
Aspect-oriented (aspect-based) opinion mining Maria Pontiki et al., (2015) and Target-dependent (target-based) opinion mining Long Jiang et al., (2009) are two sub problems of opinion mining which can be considered more close to stance detection Yingjie Li et al., (2009) than the generic opinion mining problem itself. The main differences between stance detection and target-dependent opinion mining are: (i) The stance target may not be explicitly given in the input text; (ii) The stance target may not be the target of the sentiment in the text.

(iii) The stance target may be an event while the target is usually an entity or an aspect in opinion mining. Aspect based opinion comprises of two sub tasks (i) Aspect extraction and (ii) Aspect and opinion mining and it can be at two level i.e corpus level and document or sentence or phrase level. Corpus level opinion mining is a feature-based summary of a large number of customer reviews for a product sold online. It pays attention to aspects that most reviews are interested in and the corresponding opinions. Document or sentence or phrase level mining aims to extract aspects terms and opinions or sentiment polarity in a single review.

Previous corpus-based aspect mining techniques are based on frequency patterns Hu, Ming and Bing Liu (2004) of aspect terms in reviews or blog posts however there are disadvantages of missing low frequency aspects or ignoring semantic similarity of aspects. Hence, unsupervised learning based approaches Salcedo and Dixon. (2019). are proposed to overcome the frequency base approaches as clustering base problem. Other method includes relation-based method and supervised learning method. Document level, mining process can be viewed as a sequential tagging problem Michael Collins, et al., (2019). Various standard machine learning methods such as Naïve Bayes, Maximum Entropy classification and Support Vector Machines are applied in movie reviews data and classified the document by overall sentiment Pang, (2002). The usages of unsupervised learning algorithm for classifying the reviews of different domain can be seen at Turney and Peter D. (2001).

Some previous studies Turney, (2001) attempted to perform these sub-tasks in an opinion document. In Sentence level, the sentence is classified as whether a subjective or objective sentence and then to classify the polarity of subjective sentences. Subjective sentence normally express subjective views and opinions whereas objective sentences express factual information. Early works Moghaddam, Samaneh, and Martin Ester. (2011) have addressed the problems of each sub tasks. In Phrase

level, classification is performed based on features or aspects of entities and polarity is calculated for each and every individual aspects. Aspect based opinion mining comes under phrase level opinion mining task and it is more fine-grained. Several methods for aspect based opinion mining Liu, Bing, and South Morgan Street. (2005) have been proposed to extract features or aspects from user reviews. The introduction of neural network concept in aspect based opinion mining has become one of the focus areas for many researchers. Figure 1 shows some of the common techniques of aspect based opinion mining.



Aspect-Based Opinion Mining

Literature Review: Opinion Mining is studied at four levels by researchers' i.e corpus level, document level, sentence level and aspect or phrase level depending on the text granularity. Aspect level opinion mining carries out fine-grained opinion analysis, since it works at word or phrase level. Aspects or features of entity are extracted for a target and opinion polarity (positive, negative and neutral) of each extracted aspect is calculated in aspect-based opinion mining. People express opinions either implicitly (Indirect) or explicitly (Direct). It is difficult to extract implicit aspect word as opinion words expressed are differing from people to people. Different approaches like hybrid association rule mining Wang et al., (2013), pointwise mutual information Su, Qi et al. 2006., and classification based approach Lingwei Zeng and Fang Li. (2013) are used by researchers to identify implicit aspects. Study shows that adjectives, adverbs and subjective nouns are considered to be aspect related words in most cases and gives high performance Hatzivassiloglou, V et al., (1997).

1. Corpus Level Aspect Extraction; It aims to extract $\langle \text{target, aspect} \rangle$ pairs of a corpus. For a given target entity "Climate", the target aspect extraction can be $\langle \text{Climate, temperature} \rangle$, $\langle \text{Climate, population} \rangle$. Aspect extraction can be categorized as Rule-based approach and Un-Supervised approach. Refer Table 1 techniques and performance comparison. Rule-Based approach assumes that aspects words and opinion expressions are appeared in the review corpus frequently and most of the aspects are nouns and noun phrases. In addition to these assumption rules such as POS pattern, association mining rules and syntactic dependency patterns are applied for aspect extraction.

Figure 2: Frequency-based Aspect extraction framework

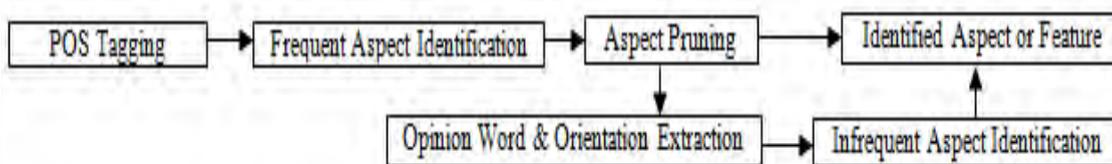


Table 1. Techniques and Performance comparison

Author	Year	Title	Approach	Performance
Rule Based Approach Hu and Bing Liu	2004	Mining and summarizing customer reviews	POS Tagging, Association miner CBA-Apriori Algorithm, pruning.	Rec: 69.3%, Pre: 64.2%, Acc: 84.2%
Martin	2013	Analyzing Political Sentiment on Twitter	POS Tagging, Noun Phrase frequency & PMI measure, pruning.	PMI Measure: 22.5%
Hajar	2018	WordNet based Implicit Aspect Sentiment Analysis for Crime Identification from Twitter	Wordnet Semantic relation, Term-Weighting Scheme	F1 Score > 60%
Konjengbam	2018	Aspect ontology based review exploration	POS Tagging, dependency tree, semantic relationship, ontology	Pre:56%, Rec:73.68%, F-Score:63.63
Unsupervised Approach				
Carlos	2019	Unsupervised Model for Aspect-Based Sentiment Analysis in Spanish	Domain ontology, semantic similarity	F1: 73.07%, Acc: 84.8%
Lu	2016	Clustering for Simultaneous Extraction of Aspects and Features from Reviews	POS Tagging, noun & adjective rule, clustering, domain specific similarities.	F-score: 66.24%
Ming	2019	Coupling Global and Local Context for Unsupervised Aspect Extraction	Bow, LSTM, word embedding, LDA, encoding, decoding	Pre: 28%, Rec:50.2%, F1: 36%, Acc:33.7%

Rule Based approach of Aspect Extraction: Rule-Based extraction approach can be further classified into frequency based methods, relation based methods and hybrid methods. As reported in Martin Ringsquandl et al., (2013), the frequency based method (Figure 2) has two stages of extraction i.e frequent aspect and infrequent aspect extraction. All frequent item set is a possible feature but not all candidate frequent features are genuine features and therefore pruning is required to remove those unlikely features. Opinion word and orientation are extracted from the resulting aspect sets which helps to extract the infrequent aspects. If no

frequent aspect are present but one or more opinion word are present in the sentence then the nearest noun and noun phrase represents infrequent aspects. Adjective appearing near to aspect term is prone to express an opinion and orientation of opinion word can be obtained using WordNet. Hajar et al., (2018), focus on implicit aspect extraction task using twitter base crime dataset. The proposed hybrid model is based on WordNet semantic relations and Term-Weighting scheme, to enhance training data for Crime Implicit Aspect Identification. Konjengbam (2018), employs POS-tags and dependency tree to mine the frequent nouns as aspect terms.

simplicity and effectiveness, however it has few disadvantages i.e. too many irrelevant aspects are produced and aspects having low frequency are missed out. Rule-based model or patterns are domain dependent. This allows us to introduce unsupervised approaches of aspect extraction from unlabeled review or social media corpus. The extracted aspects can be grouped according to their semantic similarity through clustering and it is domain independent which means that it can adapt to new domain.

In Carlos et al., (2019), the model uses ontology classes M. Lan, et al., (2018) and semantic similarity algorithm of Wu & Palmer (1994) for the detection of explicit and implicit aspects. The model of aspect extraction

comprises of 4 steps: identify candidate aspects, extract candidate aspects with ontology, extract aspects by similarity, and extract implicit aspects. For the extraction of implicit aspects, a dual propagation technique is used, which consist in a co-occurrence matrix between explicit aspects and opinion words to identify possible implicit aspects. Clustering algorithms are also employed for aspect extraction, Lu et al., (2017) employed a clustering approach that simultaneously identifies product features and groups them into aspect categories from online reviews. It extracts both explicit and implicit features, and does not require seed terms. The algorithm of this approach puts same aspect into one cluster i.e it aims to group similar candidate terms. Finally the important.

Table 2. Techniques and Performance comparison

Author	Year	Title	Approach	Performance
Frequency and Relation Based				
Amani	2016	Aspect-Based Opinion Mining Using Dependency Relations	POS Tagging, dependency relation, lemmatization, subjective lexicon.	Pre: 83%, Rec: 87%
Hu and Liu	2004	Mining opinion features in customer reviews	POS Tagging, association rule, pruning, stemming & fuzzy matching	Pre: 80%, Rec: 80%
Popescu	2007	Extracting product features and opinions from reviews	POS Tagging, PMI, syntactic dependencies, relaxation labeling	Pre:86%, Rec: 89%
Zainuddin	2016	Improving Twitter Aspect-Based Sentiment Analysis Using Hybrid Approach	POS Tagging, Association rule mining, dependency parsing	Pre: 82.32%, Rec: 77.48, Acc:80.73
Topic Model Based				
Xin	2010	Jointly Modeling Aspects and Opinions with a MaxEnt-LDA Hybrid	MaxEnt-LDA, multi-grain topic model	Pre: 87.4%, Rec: 78.7%, F1:82.8%
Aditya	2011	Topic detection and tracking using hidden Markov models	HMM, Laplace smoothing, Viterbi algorithm	Pre:95%, Rec:96%, F1:95%
Anoop	2018	Aspect-Oriented Sentiment Analysis: A Topic Modeling-Powered Approach	LDA, unigram feature, Naïve Bayes	Acc: 81%

Unsupervised approach for aspect extraction: Earlier researchers primarily used rule-based approaches of aspect extraction due to its aspects are selected from the resulting clusters, and the candidates contained in these aspects are identified as features. Similar clustering approach can be seen at [48]. Ming [44], proposed an unsupervised aspect extraction approach that explores how words appear in global context (on sentence level)

and local context (conveyed by neighboring words). A neural network based model, capable of coupling global and local representation to discover aspect words was proposed. They employ long short-term memory (LSTM) network to explore local context and LDA-fashion Bayesian graphical models for global context modeling.

2. Corpus Level Aspect and Opinion Mining: Aspect and Opinion Mining process is a two phase's process. The first phase aims to extract aspect i.e <target, aspect> pairs and the second phase as opinion extraction i.e <target, aspect, opinion> from the review corpus. Opinion for an aspect term can be emotional adjective (e.g 'hot temperature'), set of ordered labels (e.g strongly disagree, disagree, neutral, agree, strongly agree) or it can be numeric ratings say 5 star rating, low rating score indicates negative opinion. Researchers primarily adopt two approaches, a) frequency and relation based approaches b) topic model based approaches for aspect and opinion mining. Refer Table2 techniques and performance comparison.

Frequency and Relation based approach: Frequent aspect words (usually single nouns and compound nouns) in a corpus are likely to be an aspect. However not all frequent nouns are actually referring to aspects and aspects that most people do not discuss and frequently mentioned, will be missed by frequency-based methods. Relation-based approach finds the relationship between the words and sentiments to identify aspects.

Table 3. Entity categories for aspect classification, Banitaan [56]

Entity	Description with example
Components	Physical objects such as camera, LCD, view finder and battery
Functions	Capabilities provided by a camera, including movie playback, zoom and auto focus
Features	Properties of components or functions, such as color, speed, size, weight, and clarity
Opinions	Ideas expressed by reviewers on a product, its features, components or functions
Others	Other possible entities defined by the domain

To explain how the frequency and relation based approach work, we choose Amani's et al., (2016) aspect-based opinion mining using dependency relations, It undertakes Dependency Parsing, Pre-processing, Lemmatization, and POS tagging of texts in order to obtain the syntactic structure of sentences by means of a dependency relation rule. Aspects can be classified under the entity definition and categories, as illustrated in Table 3. The initial step is preprocessing and applies Stanford Lemmatization to return base form of words. The aim is to group similar words to find frequent aspects and opinions and then treating them as single item. The next step is to run the POS tagging (such as verb, noun, and adjective). Lastly, it used Stanford Dependency Relations to find the

syntactic parsers that allow mapping the dependencies between all words within the sentence in the form of relation (governor, dependent), for example <NN-noun, JJ-adjective>, <NP-noun phrase, JJ-adjective>. It is a sort of binary relations or a grammatical relation holds between a governor and a dependent. The extracted aspects are integrated with the opinion lexicon to find the corresponding opinion for each aspect.

Hu et al., (2004) employs the frequency based approach to extract the product aspects and opinions words. They use association rules miner (Based on Apriori Algorithm Agrawal, R. and Srikant, R. (1994) to extract all frequent item set and identifies its semantic orientation using a bootstrapping technique. Popescu et al., (2005) introduce OPINE, a review-mining system whose novel components include the use of relaxation labeling to find the semantic orientation of words in the context of given product features and sentences. Also the hybrid approach Zainuddin, et al., (2016) between association rule mining, dependency parsing and SentiWordNet is also applied to solve aspect-based sentiment analysis problem on tweets.

2.2. Topic Model Based approach: Topic model based approach overcomes the limitation of frequency and relation based approach. Here it captures word frequencies and co-occurrences effectively. A "topic" comprises of a cluster of words that frequently occur together. Such models have the capability of connecting words with similar meaning and distinguish between uses of words with multiple meanings. Some of the models based on supervised learning techniques are Hidden Markov Model (HMM) and Conditional Random Field (CRF). Techniques such as Probabilistic Latent Semantic Indexing (PLSI) and Latent Dirichlet Allocation (LDA) are unsupervised topic modeling techniques.

Anoop et al., (2020), experimented the usage of topic modeling algorithm (LDA) for aspect-specific sentiment analysis of product reviews. The primary step includes topic modeling from customer reviews, which are collection of uni-gram words, and then extract aspects from it. Based on the probability, topics are mapped to corresponding aspects, and then aspect-level polarity is computed, and finally using Naive Bayes classifier, sentiments are classified. MaxEnt-LDA Xin Zhao et al., (2013) is another technique used for topic based mining. Maximum entropy model combines all heterogeneous features in a probabilistic framework. This model captures both aspect words and opinion words. Aditya (2013), proposed a Hidden Markov Models (HMM) based topic detection and tracking where hidden states are topics and observations are words. The idea is to identify the topic of each of these input word streams and segment the stream of text into blocks based on the topic identified. HMM aims to find the most likely topic sequence from a given sentence sequence of the document.

3. Document or Sentence or Phrase Level Aspect and Opinion Mining: Due to complexities and randomness of syntactic rules or composition of sentences it is

insufficient for corpus level aspect mining which primarily focus on linguistic analysis or unsupervised learning. There are cases of aspect redundancy and dependencies where researchers keep focusing on improving the accuracy. Techniques and models can be broadly classified under two categories i.e. Sequential

Model and Deep Learning Based models. Refer table 3 comparison chart. Document or sentence level aspect mining can be treated as a sequential tagging problem. Sequence tagging possesses complex dependencies and interactions among the input tokens and the output tags.

Table 3. Techniques and Performance Comparison

Author	Year	Title	Approach	Performance
Sequential Model Based Lee	2000	Lexicalized Hidden Markov Models for Part-of-Speech Tagging	Lexicalize HMM, smoothing	Acc: 95.25%
Kim & Lee,	2017	Sentiment Analysis in Microblogs Using HMMs with Syntactic and Sentimental Information	HMM, SIG, GMM	Acc: 79.4%
Toh &Wang	2014	Aspect Term Extraction and Term Polarity Classification System	POS tagging, NER, CRF, dependency relation, K-means clusters	F1:84.54%
San	2015	Elixa: A modular and flexible ABSA platform	Perceptron algorithm, POS tag, SVM	Acc: 82.34%
Deep Learning Based				
Zhao	2018	Deep Convolution Neural Networks for Twitter Sentiment Analysis	CNN, GloVe, K-Max pooling, semantic relation	Acc:87.62%
Huang [65]	2018	Parameterized convolutional neural networks for aspect level sentiment classification	CNN, parameterize filter and gates, aspect based	Acc: 75%
Soujanya	2016	Aspect extraction for opinion mining with a deep convolutional neural network	POS tagging, word embedding, linguistic pattern rules, CNN	Rec:86.1%, Pre: 88.27%, FScore:87.17%
Nguyen	2015	PhraseRNN : Phrase Recursive Neural Network for Aspect-based Sentiment Analysis	Phrase dependency tree, word embedding, RecRNN	Acc:62.20%
Socher	2011	Semi-supervised recursive auto encoders for predicting sentiment distributions	Word embedding, Recursive autoencoder	Acc: 50.1%
Socher	2013	Recursive deep models for semantic compositionality over a sentiment tree bank	RecNN, word embedding, Tensor network	Acc: 80.7%
Dhanush	2016	Aspect-based Sentiment Summarization with Deep Neural Networks	Word embedding, RNN, CNN, parse tree aspect tagging	Acc: 76.1%
Zhang	2016	Gated neural networks for targeted sentiment analysis	Word embedding, Bi-GRNN, parameter optimizer, 3way gate	Acc: 72.49%, F1:70.57%
Jiang	2018	Identifying tweets of personal health experience	Word embedding, LSTM	Acc:81.5%

Continue Table

Tang	2016	through word embedding and LSTM neural network Effective LSTMs for Target-Dependent Sentiment Classification	Word embedding, TD-LSTM, TC-LSTM, sentiment lexicon	Acc:71.5%
Wang	2016	Attention-based LSTM for Aspect-level Sentiment Classification	Word embedding, AE-LSTM, ATAE-LSTM	Acc:84%
Cheng	2017	Aspect-level Sentiment Classification with HEAT (HiErarchical ATtention) Network	Word embedding, Bi-GRU, Bernoulli attention mechanism	Acc:85.5%
Dehong	2017	Interactive Attention Networks for Aspect-Level Sentiment Classification	Word embedding, LSTM, IAN	Acc:78.6%
Ruidan	2018	Effective Attention Modeling for Aspect-Level Sentiment Classification	Word embedding, AT-LSTM, semantic association	Acc:84.61%
Li	2018	Hierarchical Attention Based Position-aware Network for Aspect-level Sentiment Analysis	Word embedding, Bi-GRU, Hierarchical attention, HAPN	Acc:82.23%
Tang	2016	Aspect Level Sentiment Classification with Deep Memory Network	Memory network, content & location attention, embedding	Acc:80.95%

The task of predicting what word or letter comes next comes under sequence modeling. Unlike the Feed Forward Neural Networks (FNN) and Convolutional Neural Networks (CNN), in sequence modeling the current output is dependent on the previous input and the length of the input is not fixed. Traditional sequential models like HMMs and CRFs have been employed by researchers for document or sentence level aspect and opinion mining; however neural network techniques are also employed recently. In HMMs strong independent assumptions between the observation variables are made, this impairs the accuracy of the model. While CRFs make similar assumptions on the

dependencies among the class variables, no assumptions on the dependencies among observation variables need to be made.

Sequential Model Based approaches: In Sequential Model Based approach, techniques such as Standard HMMs consider only POS information in contexts, and so they cannot capture lexical information which is necessary for resolving some morphological ambiguity. Lee et al., (2000), proposed lexicalize HMM for POS sequence tagging. Usages of lexical information can be referred at W. Jin, et al., (2019). Sometime features such as n-grams, POS tags, or other polarity lexicons worsen the sparseness problem in micro blogs. For example phrases like “not ugly” and “not sharp”, essentially require bigrams to correctly classify a sentence containing those phrases as positive. Kim and Lee, (2000) adopt HMM to take word sequence into account. Toh and

Wang (2014), propose Conditional Random Field (CRF) technique as a sequence labeler for aspect extraction and employ a logistic regression (linear) classifier to address aspect term polarity classification. San et al., (2005), present a supervised Aspect Based Sentiment Analysis (ABSA) system where opinion target extraction task has been addressed as a sequence labeling problem and used perceptron algorithm to learn. The target polarity classification is addressed by means of a multiclass SVM. Jakob and Gurevych [80], follow a very similar approach that addresses opinion target extraction as a sequence labeling problem using CRFs.

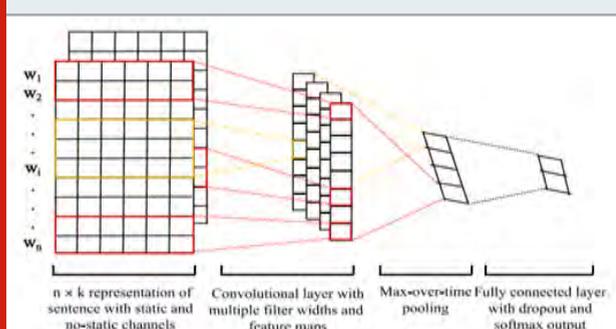
3.2. Deep Learning Based Approaches: Deep Learning is a subfield of machine learning which allows machines to learn from experience and understand the world in terms of hierarchy of concepts, with each concept defined in terms of its relation to simpler concepts. Most of the previous works in aspect term extraction have either used CRFs, HMMs or linguistic patterns. All of these approaches have their own limitations, CRF is a statistical and linear chain model, so it needs a large number of features to work well; linguistic patterns need to be crafted by hand, and they crucially depend on the grammatical accuracy of the sentences. HMM often have large number of unstructured parameters and cannot express dependencies between hidden states. Latter such limitations are overcome by using a convolution neural network (CNN) Yoon Kim et al., (2014), a non-linear supervised classifier that can more easily fit the data. Aspect based opinion mining using

Deep Learning techniques J. Zhou et al., (2019) maps the word representation from a high-dimensional sparse vector space (e.g. one-hot encoding vector space) to a lower-dimensional dense vector space. One commonly used word embedding approach is Word2Vec, which contains Continuous Bags of-Words model (CBOW), and Skip-Gram model (SG).

These word vectors tend to embed syntactical and semantic information. The usage of Global Vector (GloVe) encoding can be found at J. Pennington, et al., (2014). Convolution neural network (CNN) technique is powerful in processing unstructured data with convolution and pool operations. CNN are primarily efficient for short text such as tweets. It can be used for feature representation learning by utilizing word embedding to map the sentence into a lower-dimensional semantic representation as well as maintaining the sequences information of the words. This representation of the sentence then passes through a convolution layer with multiple filters, a max-pooling layer, and a fully-connected layer consecutively. Figure 3, presents the framework of CNN. Techniques such as Recurrent Neural Networks (RNN), Recursive Neural Network (RecNN) and Long-Short-Term Memory (LSTM) which could tackle variable length input sequence have also contributed in the document or sentence level aspect and opinion mining.

Zhao et al., (2018), propose a deep convolution neural network model (DCNN) to classifying tweet as negative or positive sentiment. Their approach concatenates the pre-trained word embeddings feature (GloVe) and n-grams features as the sentiment features vector of the tweet, and inputs the feature sets to a deep convolution neural network. Huang et al., (2018), incorporated aspect information into CNN by applying parameterized filters and parameterized gates. They introduced two neural units that took learning aspect-specific features into consideration, i.e parameterized filter (PF-CNN model) and parameterized gate (PG-CNN model). Soujanya et al., (2016), introduced specific linguistic pattern rules and combined with a deep learning approach (CNN) for the aspect extraction task.

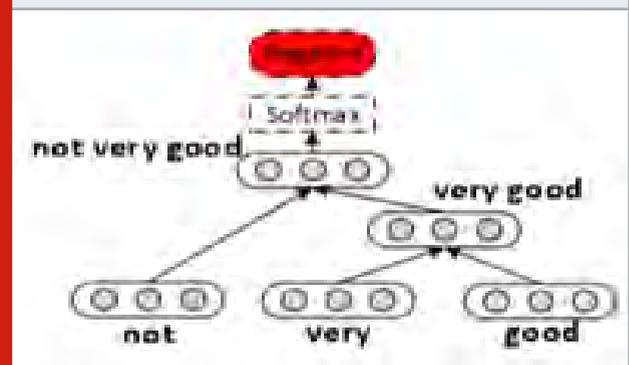
Figure 3: Framework of CNN Model



A Recursive Neural Network (RecNN) is more like a hierarchical network where there is no time aspect to the input sequence but the input has to be processed hierarchically in a tree fashion. It can learn a directed

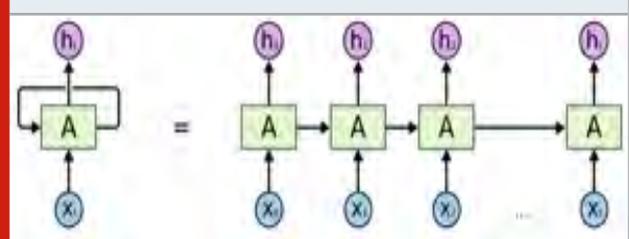
acyclic graph structured input for sentence-level sentiment analysis and paraphrase detection. As illustrated in Figure 4, we obtain the representation of “very good” by the composition of “very” and “good”, and the representation of trigram “not very good” is recursively obtained by the vectors of “not” and “very good”.

Figure 4: Composition process in tree based RecNN.



In RecNN R. Socher et al., (2011) binary dependency tree is built given a sentence containing a target aspect. Therefore it represents syntactic relations associated with the aspect. Each word (leaf node) or phrase (internal node) in the binary dependency tree is represented as d-dimensional vector. The parent node v is represented by combining left and right child vector representation. RecNN has been successfully employed to model compositionality in NLP via parse-tree-based structural representations, such as sentence-level sentiment analysis R. Socher, (2019) and paraphrase detection R. Socher et al., (2018). Similarly, AdaRecNN (Adaptive Recursive Neural Network) uses n compositional functions $G = \{g_1, \dots, g_n\}$ instead of a global function g and then selected them depending on the linguistic tags and combined vectors along with factor is the main differentiating factor between the elements of the sequence.

Figure 5: Framework of RNN



This sequence is fed to a single neuron which has a single connection to itself (Figure 5). RNN model in J. Zhou, et al., (2019), has recurrent connections which allows a form of memory. At each time step, apart from user input at that time step, it also accepts the output of the hidden layer that was computed at the previous time step. In research work of Dhanush et al., (2016), RNN has been used for aspect extraction and CNN for sentence level sentiment classification. The tokenized sentences are passed to RNN based aspect model and

tag all the aspects. Similar work on RNN technique can be seen at Pengfei et al., (2015). RNN approaches can be categorized as Standard RNN, Bi-Directional RNN (Bi-RNN) such as Bi-LSTM and Bi-GRU, Hierarchical RNN (HRNN), Attention-based RNN, Long Short Term Memory (LSTM) and Gated Recurrent Unit (GRU), Memory probabilities. Dong [89], proposed AdaRNN for target-dependent sentiment classification for Twitter. It adaptively propagates the sentiments of words to target depending on the context and syntactic relationships between them.

Unlike RecNN, Recurrent Neural Networks (RNN) basically unfolds over time and it is used for sequential inputs where the time Network etc. Standard RNN is a basic framework of RNN. The transition function of standard RNN is a linear layer followed by a non-linear layer (e.g., tanh). Bidirectional RNN (Bi-RNN) is based on idea that output at time step t should depend on previous and future contents in a sentence. Since not all the information in the sequence is important, attention mechanism are imposed in the RNN model to focus on the important parts of the text sequence and this notion has attracted a large amount of interest from neural networks researchers. Some commonly used Bi-RNN types for aspect-based opinion mining are bidirectional GRU (Bi-GRU) and bidirectional LSTM (Bi-LSTM) A. Graves, (2019).

Long Short Term Memory (LSTM) network is a special type of RNN, which is able to learn long-term dependencies. Gated Recurrent Unit (GRU) is a more recent framework, which is similar to the LSTM model but simpler with fewer parameters. GRU uses an update gate to control how much the hidden gate will be updated, and a reset gate to control how the information is updated to the hidden state and control how much the previous hidden state will influence the current hidden state. Zhang et al., (2009) proposed a gated recurrent neural network (GRNN) to model the syntax and semantics in the tweets and the interaction between the aspect and its surrounding contexts. RNN has few disadvantages such as gradient vanishing and exploding problem over long sequence and such problem are removed using LSTM.

LSTM is suitable for classifying process and predicting time series given time lags of unknown duration. It trains the model by using back-propagation. LSTM network comprises of three gates input, forget and output gates. A forget gate is responsible for removing information from the cell state which are no longer required for the LSTM to understand things or the information that is of less importance is removed. Jiang et al., (2018), proposed a method where a sequence of vectors representing each study tweet is constructed using a vector space model (VSM) and fed to a long short-term memory (LSTM) neural network that performs binary classification i.e personal experience tweet (PET) or non-personal experience tweet (non-PET). Tang et al., (2016), develop two targets dependent long short-term memory i.e. Target-Dependent LSTM (TD-LSTM) and Target-

Connection LSTM (TC-LSTM). The idea is to integrate the connection between target word and context words. The basic idea of TD-LSTM is to model the preceding and following contexts surrounding the target string, so that contexts in both directions could be used as feature representations for sentiment classification. TC-LSTM is the extension of TD-LSTM by incorporating target connection component.

It incorporates the semantic relationship between target words and its context words. Such incorporation of only target information in LSTM is insufficient and accuracy can be optimized by attending the important word considering the target using a technique called Encode-Attend-Decode or Attention mechanism technique. Through this mechanism the network can learn the association of aspects and sentiment words in aspect sentiment classification. Wang et al., (2016), has identified two architectures i.e Attention-Based LSTM (AT-LSTM) and Attention-Based LSTM with aspect embedding (ATAE-LSTM). One disadvantage of the proposed model is that different aspects are input separately i.e attention mechanism can handle one aspect at a time hence there can be mismatch between sentiment words and aspects.

Cheng et al., (2017), introduced an aspect level sentiment classification with HEAT (HiErarchical ATtention) Network (HEAT) which solve the problem of mismatching between sentiment words and aspects. HEAT has two main components Aspect Attention and Sentiment Attention. Aspect attention pays attention to the aspect information and sentiment attention aims to capture the sentiment feature of the text under the direction of the target aspect and the extracted aspect information. The limitation of this approach is that it cannot handle comparative sentiment (sentence like "Coke tastes better than Pepsi"). Dehong et al., (2017) proposed Interactive Attention Networks (IAN) technique for Aspect-Level Sentiment Classification.

In this technique, it learns attentions interactively in the contexts and targets to generate the representations for targets and contexts separately. Ruidan et al., (2018), improvised the effectiveness of attention mechanism by capturing the importance of each context word towards a target by modeling their semantic associations. Latter Li et al., (2018), introduces position embedding to learn the position-aware representations of sentences and generate the target-specific representations of contextual words. The model HAPN (Hierarchical Attention based Position-aware Network) encodes the position information into the representation of each word effectively. Conventional neural models like LSTM captured context information in an implicit way, and are incapable of explicitly exhibiting important context clues of an aspect Muthusamy Chelliah et al., (2019). Tang et al., (2016), proposed an aspect level sentiment classification with linguistic models and statistical machine learning techniques are explored for the tasks and promote the performance. Recently scholars in opinion mining area turn their orientation

to representation learning and neural based approaches to seek the breakthrough for aspect based mining tasks. Some of the challenges are listed below.

Inter Aspect Dependencies: Extracted aspects can be inter-related for example, the aspects of a specific product may follow a tree structure. For e.g. 'screen' is an aspect of 'Samsung Phone', and 'screen size', 'screen resolution' and 'screen saturation' are three sub aspects of 'screen'. Such challenges of structure aspect tree needs to review.

Domain Dependence: Developing domain-independent algorithms, methods and models for aspect based opinion mining are still important. Different domains can interpret the same sentiment word polarities differently i.e the word "unpredictable" is positive in the domain of movies, dramas etc. but the same word has negative opinion if used in the context of a vehicle's steering. Deep Memory Network where they explicitly capture the importance of each context word when inferring the sentiment polarity of an aspect.

Challenges In Opinion Mining: Earlier, researchers primarily focus on frequency, relation rules and feature-based methods however researchers endeavor to seek effective features and patterns for aspect mining. Then the computational Implicit Aspects: Handling implicit aspects is a challenging task. There may be many implicit expressions in a review, in this e.g "This picture will not fit into a frame", the phrase "fit into a frame" indicates the "size" aspect of that picture. Further research is needed to handle this kind of sentences.

Sarcastic Sentence: Sarcasm is another challenging area where researcher keeps on focusing. If someone says something positive he/she actually means negative, and vice versa. For example, I work 40 hours a week for us to be this poor.

Lack of historical knowledge: The informal and unstructured syntax of Tweets and along with the fact that machines lack proper contextual awareness and historical knowledge that humans have, makes this a challenging problem for machine learning algorithms. Deep learning method is an area where researcher find more and more necessary because of the limited amount of training data required and still yielding meaning and useful insights.

CONCLUSION

In our research survey paper, we provide a comparative study of existing techniques and models for aspect based opinion mining. Research results show that machine learning techniques such as SVM, Naïve Bayes, RNN, CNN, LSTM and attention based neural network have higher accuracy and can be regarded as a baseline learning methods. Lexicon-based methods and unsupervised learning methods are very effective in some cases which require few efforts for annotated documents and few are domain dependent. Benchmark initiatives

like Sem-Eval provide a way to solve the problem of mining methodologies that evolve over time.

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Detection of Traffic Signal Violation Using Ultrasonic Sensors

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ABSTRACT

Traffic Signal violation is a day to day occurrence in today's world. Though the traffic police are able to book a few trespassers they are not able to completely stop each and every violation. In this paper we introduce the concept of ultrasonic sensors which helps to identify the violator and at the same time do an image capture of the vehicle number plate from the ANPR CCTV cameras (automatic number plate recognition camera). This helps to identify the vehicle and give information to the traffic police even after the vehicle has fled the scene. At the same time, traffic jam and accidents can be avoided. Signal jumping drivers can also be booked and fine amount sent to the residential address of the violator. This is implemented by placing two ultrasonic sensors on each side of the traffic signal path. When vehicle jumps the signal, the ultrasonic sensor detects the object and triggers the camera. It helps to capture the vehicle number plate at the right time and identify the owner of the vehicle from the registration database available. The information of violator can be tracked immediately with the help of GUI.

KEY WORDS: ULTRASONIC SENSORS, IMAGE, CAPTURING, SIGNAL JUMPING, ANPR CAMERA, GUI.

INTRODUCTION

Traffic in the city is extreme chaos at peak hours in cities and metros. The situation becomes difficult to handle for both traffic police and public. The violators of rule especially, signal jumping leads to different abnormal situation like accident prone and problem to road crossers. In order to avoid that problem Traffic Detection system comes handy to the traffic inspector and easy to handle the situation without creating traffic jams. Accordingly,

we need to fix two ultrasonic sensors on both side of the Traffic light zebra crossing path along with ANPR CCTV camera. The ultrasonic signal triggers the ANPR camera when a vehicle crosses while traffic light is red. The ANPR camera immediately collects the registration number of the vehicle and the data will be stored in the database. The traffic police can view the data of traffic violator from user end GUI specially designed for them to identify the owner of the vehicle. The GUI can display the pictorial representation of the vehicle details by comparing the data captured using camera and Vehicle Registration details.

With the help of these details the traffic police can charge the person legally by sending the challan to the residential address of the violator along with the proof of jumping the signal. The system comes in handy for the traffic police to instill law and order and control traffic in peak hours smoothly.

ARTICLE INFORMATION

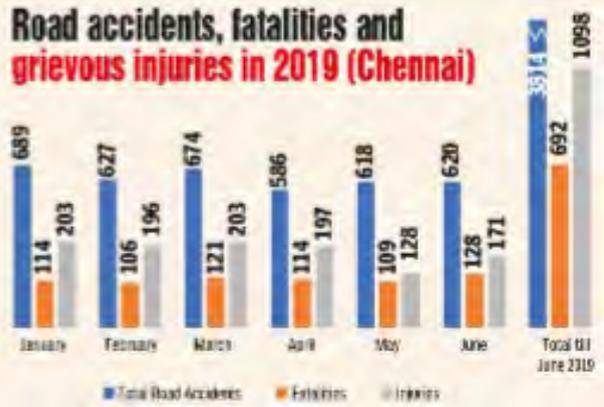
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Figure 1: Between January and June 2019, there have been 692 fatalities and 1,098 grievous injuries from 3,814 accidents recorded in Chennai alone. In 2018, there were 7,580 road accidents and 1,260 fatalities.



Literature Study: Chennai recorded highest number of accidents, nearly 689 road accidents of 5173 on January 2019 itself. This initiated the study of several Traffic violation detection methods that can be used for Indian roads especially in constraint to jumping red signal. B.Hemanth Sai Ram et al., (2017) uses RFID technology to create tag and store the data and transfer the data using a wireless interface. It sends the e-challan text message to the registered mobile number of the vehicle owner and to RTO Office. The violator pays the penalty amount through online if their account is linked to online banking.

Rohit Chandrashekhar Iyer, et al., (2017) Traffic signal jumping detection and real time traffic data analysis using RFID uses RFID and NFC for tracking vehicle jumping the signals in the day time. Here RFID tag is used to fetch information about the violating vehicle and the micro controller sends information to store the data and send information to the violators. RFID contains Name, phone no, email id and vehicle details. Samujjal Purkayastha, et al., (2019) Use of ATMEGA16 Micro controller to interface the sensor and computer which identifies the Number plate. NPR Algorithm is used to extract the Vehicle Registration Number. NPR algorithm first captures the image, then preprocessing for plate region extraction using segmentation and character recognition is done. Finally, it compares the data base to give the Registration Number of the vehicle owner. Sathe Pooja et al., (2013) a GSM Module embedded with 32-bit ARM7LPC2148 locates the Vehicle’s latitude and longitude coordinate values to both the transmitter and receiver. With this facility tracking of particular vehicle while on the move is made easier.

Proposed Work: In Fig 2. the Architecture for traffic signal violation using ultrasonic sensors the violating vehicle is shown. When the Vehicle enters into the particular range in the traffic path it checks for red signal. If red signal is on the ultrasonic sensor will trigger the camera. The APNR camera captures the number plate and extracts vehicle registration number and stores it in to

the database along with the color and type of vehicle. This in turn is compared with the Vehicle Registration database to fetch the accurate data of the violated vehicle, owner of the vehicle, address and mobile number and automatically sends message to the vehicle owner with details of information like where the vehicle over sped, the signal name and also the timestamp of the particular incident with penalty amount. The GUI is helpful for the Police department to check if it is a repeated offence by the rider.

Figure 2: Architecture for traffic signal violation using ultrasonic sensors.



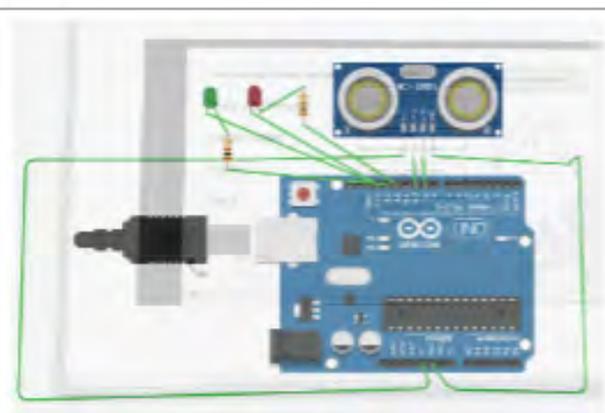
Ultrasonic Sensors:



Implementation



The Ultrasonic sensor reads the object which has jumped the signal and triggers the camera to capture the Number plate.

Figure 3: $\text{distance} = \text{duration} * 0.0344 / 2$;

CONCLUSION

Here the database of the over speed vehicles are collected and compared with previous defaulters. In case of first time the owner is warned. In two or more occurrence challan is sent with fine amount that can be paid online or in the court. If the vehicle is repeatedly found to jump signal according to the motor vehicle act the license of the owner is cancelled.

Future Enhancement: As of now we are identifying the vehicle and SMS will be send to the violator and RTO office within Tamilnadu. If another state vehicle is caught, the details have to be read from other state registration database which will be linked to the available database. In the future detection of fine amount from the violator has been proposed. Identifying the address leads to lot of complexities like change of address, phone number, different state registered vehicles all can be brought under law in case of violation. Also, theft of vehicle can be controlled.

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Analysis of Electrical Performance of a Fire Fighting Rover

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ABSTRACT

In this undertaking we have clarified about the exhibition Detecting fire and quenching is a risky activity for firemen. A robot is a mechanical plan that is equipped intended for finishing a intelligence bogging collection of behavior of course mostly programmable in a personal computer. This is constrained by a cell phone through DTMF tone for development and arriving at the fire. The framework is modified utilizing Arduino UNO board. A putting out fires machine is structured, which can stifle the fire with the assistance of fireman away from the risky region. Additionally it can arrive at basic territories like harmed and wrecked structures. This assists with killing fire in any situation without loss of human life. It likewise gives the fire fighters to effectively discover and put off the fire. It tends to be worked from a sheltered separation and it can move into harsh territories inside the structure since this plan has caterpillar foothold in the meanderer. It has a ventilating framework outfitted with water fog which is utilized to wipe out the smoke and diminish the temperature in the premises ostensibly. There is a fire ordinance which is joined to the pipeline of the fire quenching fluid, which can be raised or brought down to focus on the fire. It utilizes LED lighting to get clear visual concerning continuous activity for observing reason.

KEY WORDS: CELL PHONE, ARDUINO UNO AND DTMF.

INTRODUCTION

A force gracefully is an electrical device to requirements exciting power in the direction of an electrical load MD Azhar and Dr. K. Sudhakar Reddy, (2016). The necessary ability of a force gracefully is in the direction of alter above exciting run from a supply in the direction of the true electrical energy, run as well as repetition in the direction of organize the pile Kristi kosasih, et al., (2017).

Thus power provisions be a few of the point alluded to as exciting power converters. A few force supplies are separate self-governing bit of hardware, as others are integrated by way of the pile equipment to they authority. Instance of the previous slot in power equipment start within job.

stations and buyer hardware gadgets M.Suresh, et al., (2018). Different capacities that power may carry out integrate constraining the run involved through the pile in the direction of secure levels, final inedible the run in casing of an electrical flaw, power mold in the direction of forestall electronic shout or electrical energy overflow lying on the involvement as of arriving at the pile, power-factor amendment as well as put gone strength consequently it be able to be on controlling the pile in container of a passing smash in the supply

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power (uninterruptible power elegantly) P.Karthikeyan, et al., (2018).

Figure 1: Bridge Rectifier

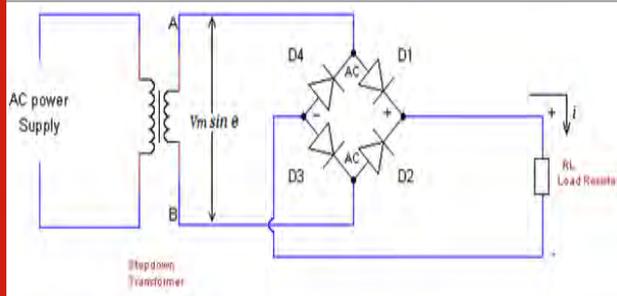
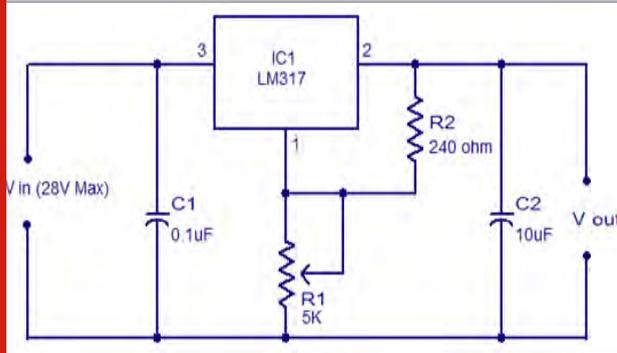


Figure 2: LM317 voltage regulator



MATERIAL AND METHODS

Characters evaluation is the mainly important progress in encoding development procedure. Ahead of structure out of bed the equipment it is significant in the direction of make a decision the point in point in time issue, financial system as well as associates excellence. While this equipment is fulfilled, at that point subsequent stages are to figure out which working framework and language can live utilize used for structure out of bed the device. While the software engineer’s start assembles the device the developers require fraction of external assist. This assist is able to be acquiring starting superior software engineers, as of manuscript or as of location. Ahead of structure the construction the on top of idea are careful for structure up the planned construction.

1. Ultra Sonic Sensor: Ultrasonic sensors occupation through burning noise effect at a repetition extremely elevated used for public in the direction of listen to. They at to tip belief that the noise determination exist reflect rear; ascertain division needy on the point in time necessary. This is similar to how radar quantify the point in time it take a broadcasting signal to go again in the wake up of beating an piece.

2. Stepper Motor: A stepper motor, otherwise called footstep train or venture train is a brushless DC exciting train that partitions an occupied rebellion keen on a variety of the same advance. The motor location would

next be bright to be tell to be in motion and grasp at single of these way by rejection place antenna for censure (an open-circle checker), as lengthy because the train is painstakingly calculated in the direction of the submission into look upon to power as well as pace. Exchange resistance engines are huge venture engines with a decrease streak tally as well as by and large are shut circle commutated. Brushed DC engines turn persistently as DC electrical energy is apply to their terminal.

Figure 3: Diagram of Ultrasonic With Arduino

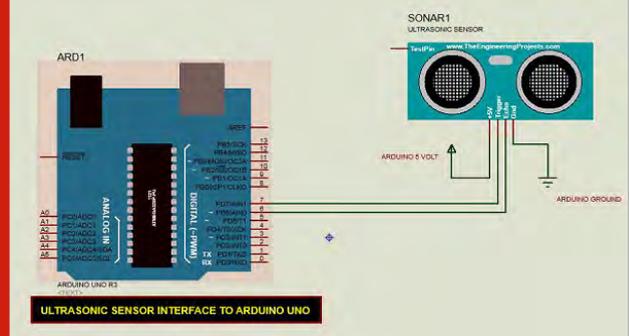
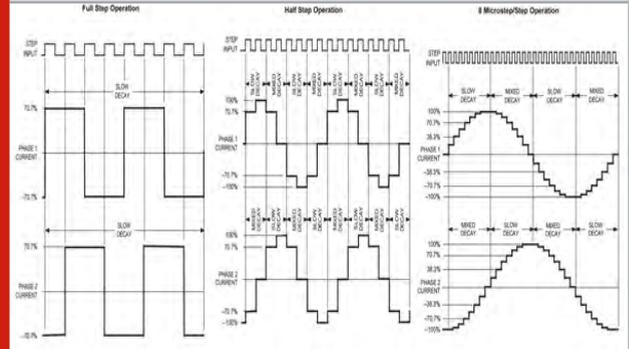


Figure 4: Micro stepping Waveform



The stepper train is recognized in its assets of altering in excess of a train of in order beat (normally cube signal beat) keen on an unequivocally characterize boost in the extremity point. Every one heart beat move the extremity from side to side a set end. Steppers engines adequately contain dissimilar "saw-like" electromagnets mastermind in the region of a central ropes mold small piece of flatten. The electromagnets are empowering by an external driver track or a miniaturized range checker. To create the engine beam revolve, early single electromagnet is specified power, which pleasingly pull in the rigging’s teeth. At the tip as the equipment teeth are used to the major electromagnet, they are slightly responding to unbiased as of the subsequent electromagnet. These imply as the subsequent electromagnet is twisted on as well as the primary is killed, the ropes pivot to some extent to grow out of bed with the subsequent single.

3. Fire Fighting Rover Using Arduino

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