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Recent Trends in Computing and Communication Technology

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From the Desk of Guest Editors

As the world is moving in the direction of digital era, IT and communication technologies are most emerging areas, which extends in boundaries day to day. Our main aim to bring out the good research ideas from the Research Scholars, Academicians and Industry persons on the Emerging problem in the area of Computer and Communication Technology.

This Special Issue Bioscience Biotechnology Communication Vol.12 No(6) November 2019 on " Recent Trends in Computing and Communication Technology" aims to provide a collection of original research articles from advances in big data analysis techniques and applications; mobile networks; applications and usability; reliable communication systems; advances in computer vision, artificial intelligence and soft computing; reliable health informatics and cloud computing environments, e-learning acceptance models, recent trends in knowledge management and software engineering; This special issue contain 21 articles on topics of recent trends in Computing and Communication Technology.

All submissions are reviewed carefully to ensure the technical quality of the article. The article available in this issue will be bible for the researchers working in new emerging technology based areas of Computer and Communication.

Happy Reading

Dr.T.Jayasankar

Dr.N.Krishnaraj

Dr.K.Vinoth Kumar

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Framework for the Merging of Thermal and Visible Images in Real Time Recognition Applications

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ABSTRACT

In this paper, we proposed the framework for the merging of thermal and visible images in our real day situations. The approach consists of training and testing. The optimal weights are obtained using the Artificial Neural Networks to escalate the rate of recognition which has been obtained from the various combinations of local descriptors method using the thermal database by the process of training. Here we use the database. The next stage involves the merging of visible and thermal images using the weights concluded from the previous step. The comparison between the conventional Algorithm and the Artificial Neural Networks shows a recognition rates surpassing all the previous results by providing upto 99% of accuracy. The approach used here remains unaffected to the changes in illumination and the various conditions.

KEY WORDS: THERMAL IMAGES, NEURAL NETWORKS, FCM CLUSTERING, REGRESSION.

INTRODUCTION

So far. face recognition technology has been known for many years. But today, some researches focus on object recognition, computer vision, robotics and biometric applications. There are many disadvantages in diminished recognition ability of algorithms in the thermal images. There are some lighting problems so the images are captured in the infrared spectrum, since the images (Unar et.al.,2014) captured in the infrared camera are variable. . Thermal cameras are used to capture the radiation of the object. Thermography

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(Hermosila et.al.,2015) is the process of recording true thermal images of object under study. The information will be recorded. The amount of radiation reflected by an object increases with temperature, it allows to see variations in atmospheric disturbances, when viewed through a thermal imaging sensor. For every person of the thermal face, the distribution of the temperature is different to every person. The energy captured by the camera (Hermosila et.al., 2014) solely does not depend on the body emission, this is the disadvantage of infrared sensor. It not only depends on temperature but also the various elements. In order to avoid the limitations of above said, we have proposed a framework for novel face recognition (Socolinsky et.al., 2004) approach that merges thermal and visible images based on matching methods. The face recognition system was based on Genetic Algorithm was used to merge the visible and thermal images. The proposed artificial Neural (Hermosila.et.al.,2014) networks are used to perform merging of visible and thermal descriptors. It has become a trend for improving the performance in image and video retrieval tasks. The fusion methodology is very robust, as it totals thermal and visible information by using genetic algorithms (FLIR et.al.2014), thus allowing it to choose optimal areas where one dispersion is more representative than the other. Face recognition is a field of research using low-cost cameras. Many scenarios are available, as steady growth due to its security application (Ghiass et.al.2013)] so, as well as other types of applications. One of the main problems is that variation intensity, recognition algorithms results in variations in the intensity of the image.

Priyanka Dharani and Dr. A S Vibhute proposed a face recognition system with intelligent human computer interaction systems for biometric applications. To distinguish one person from one another, it is an biometric approach.For face recognition system, the approach like Lavenberg is used. Here the recognition rate will be very low. The sensitivity will be very low. There is some false detection probability is available. Here computation speed is very low. The databases taken are minimum. So, some of the results are validated and trained. This method is used for any biometric applications such as ingerprint-biometric-applications. The face recognition accuracy can be increased using a combination of Wavelet, and Neural Networks. Some of the image processing operations such as Preprocessing using filters, feature extraction and classification are used Intrusive methods it has spread from the milk conduit or lobule to different tissues in the breast. Non-intrusive methods it has not yet

Figure 1. Proposed block diagram

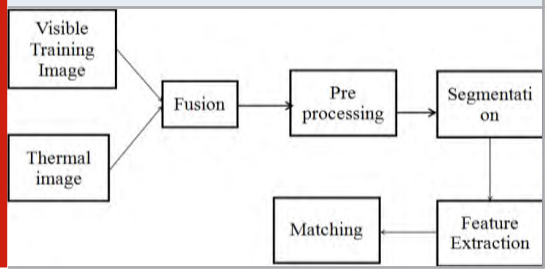


Figure 2. Original face

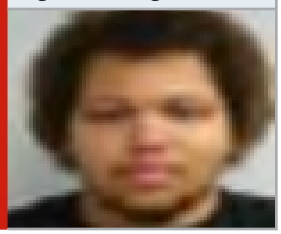


Figure 3. Thermal face

Figure 4. ROI image

attacked another breast tissue. Non-obtrusive breast cancer is called "in situ."By using this programming model large set of data sets can be processed. Transpose-Minify has the two main functions Transpose and Minify.

There are some limitation in the unimodal systems suffer Cherifi Dalila, afnaoui Imane used multi biometric systems and very low interest in the research community. Intrusive methods it has spread from the milk conduit or lobule to different tissues in the breast. Non-intrusive methods it has not yet attacked another breast tissue. Non-obtrusive breast cancer is called "in situ."By using this programming model large set of data sets can be processed. Transpose-Minify has the two main functions Transpose and Minify. Unimodal biometric systems have several in problems such as intra-class variation, noisy-sensor data, spoofing attacks and non-universality. To overcome this disadvantage, The NN models can be arranged by different criteria, for example, their learning techniques, design, usage, activity, etc. The extent of the undertaking is to show issues with want input yield informational indexes, so the subsequent system must have customizable parameters that are refreshed by regulated learning rule. Under the category of supervised learning, perception is one kind of classifiers performing the classification in the two-dimensional space. There is need of an algorithm which is capable of classify the candidates.

MATERIAL AND METHOD

Proposed Methodology

The proposed merging methodology will be validated using the databases. In our current scenario, merging weights are calculated using Neural networks. It consists of different blocks such as preprocessing, segmentation, matching, fusion etc. The images are trained and tested using neural networks. Both, the visible training and thermal images are merged and perform preprocessing, segmentation etc. The histogram intersection is used to combine the information of the image sets to obtain a fusion descriptor. To find the weights fusion descriptor is used to recognize the face. For high recognition rate we have used PSO process. This face recognition system has a training stage and a validation stage.

Preprocessing

Pre-processing step is used to remove the noise in the images. To remove the disturbances in the images, the filters are used. It resize the images between the pixels size of [0 255]. The input are images. The camera images, are affected by artifacts and noisy distortions. In-order to remove the noisy portions and to enhance the image, pre-processing is needed. Here, we are using histogram equalization for enhancing the image. Since, histogram equalization is well known for smoothening and sharpening image, we used this technique. The output image is the processed image. For enhancing the image, this process is used. For preprocessing, we can use median filter and histogram equalization for enhancement of the image.

Segmentation

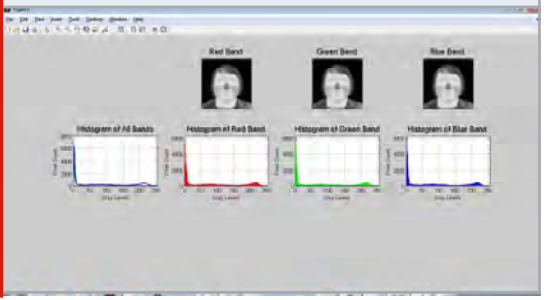
Image segmentation is the process of dividing image into various segments. There are various methods of image segmentation such as growing, splitting and merging. Other than this image segmentation, we can represent the images in terms of boundary descriptions or some statistical features.

By using image segmentation, face will be extracted and from that features are taken and trained . The whole process is compared with large data value. If it is matched, training process will be continued.

Feature Extraction

In computer vision, features are initialized with new datas. It is used for learning process.If the

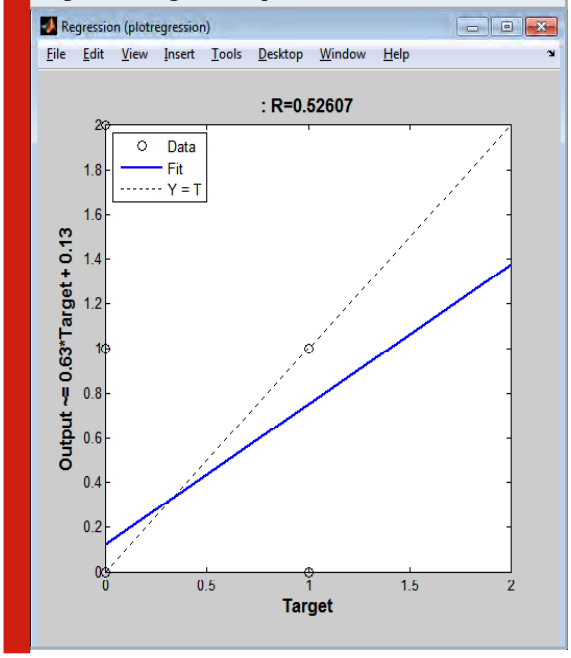
Figure 5. Masking output



features are large, accuracy will be high. Data is to be redundant and informative.

GLCM (The Grey Level Co-occurrence Matrix)
Features such as energy, entropy, contrast and correlation are finally calculated using MATLAB.. These features are extracted and feed to neural

Figure 6. Regression plot



network. It is a technique of extracting statistical texture features. This method describes texture intensity values location and orientation of similar valued pixel.

$$Energy = \sum_{i,j=0}^{N-1} (P_{ij})^2$$

$$Entropy = \sum_{i,j=0}^{N-1} -\ln(P_{ij}) P_{ij}$$

$$Contrast = \sum_{i,j=0}^{N-1} P_{ij} (i-j)^2$$

$$Correlation = \sum_{i,j=0}^{N-1} P_{ij} \frac{(i-\mu_i)(j-\mu_j)}{\sigma^2}$$

RESULTS AND DISCUSSION

CONCLUSION

In this paper, an algorithm of merging images using neural networks are proposed. The merging method was trained and validated with known database. The optimal weights are calculated using neural networks and validated using the database. Here features are extracted and tested. It is therefore finally concluded that the merging process can be used to obtain high rates for thermal images. This system is robust and so many disturbances such as atmospheric variations using this method. Accuracy will be high and the recognition rate will be more and efficiency will be high.

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Optimization Using Modified Grey Wolf Algorithm for Twitter Sentiment Analysis on Demonetization

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ABSTRACT

Social medias such as face-book, Google +, Instagram, Myspace, and Twitter are the collective of online communications channels dedicated to community-based input, interaction, content-sharing and collaboration, which helps people to share the public opinions about the products, political analysis and movie reviews, etc. In this paper, public opinion is created to make an attempt on DeMonetization (DeMon) policy in India. Initially, the DeMon twitter data were collected from November 9 to December 3, which was considered for experimental analysis. Usually, the commotions, for example, URLs, positive and negative emoticon, prevent words were diminished from crude tweets in the pre-preparing stage. The twitter estimation investigation (TSA) was finished by Modified Mean Gray Wolf Optimization calculation (MGWO) way to deal with pre-prepared twitter information.The optimal clustering heads from the sentimental contents were found out by the proposed clustering method for acquired twitter data. The MGWO obtained the three types of results such as positive, negative and neutral to validate the TSA on DeMon. The experimental results showed that MGWO approach improved the accuracy in TSA upto 3-20% when compared with existing methods namely Bernoulli naive Bayes, multinomial naive Bayes, Support Vector Machine (SVM), decision tree and Linear Discriminant Analysis (LDA).

KEY WORDS: DEMONETIZATION,MACHINE LEARNING, MODIFIED MEAN GREY WOLF OPTIMIZATION ALGORITHM, TWITTER SENTIMENT ANALYSIS.

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INTRODUCTION

Twitter is the crucial stage utilized for correspondence and imparting data to companions (Luis Terán, and José Mancera 2019). Twitter marks the data simple to feast and peruse since it enables the client to distribute just 140 charms in a solitary tweet (Shirdastian et.al 2017). A few applications, for example, races, surveys, assessment investigation (SA) and promoting utilized Twitter as a blogging stage, since it gives

a huge measure of information (HimjaKhurana, and Sanjib Kumar Sahu 2018; Daniel et.al 2017). By and large, individuals tweets about different points, for example, surveys on films, items, brands, governmental issues, and so forth via web-based networking media to impart their insights (Ruan et.al 2018). This exploration work is, for the most part, used to recognize the general conclusion on DeMon approach in India. The DeMon is one of the greatest political choices in India, which influenced every single resident in India (Arun et.al 2017). The DeMon is a stage towards the fantasy of advanced India, to handle the worry of dark cash and to make India as a cashless economy (Singh et.al 2017). Late strategies in TSA separates the twitter content from accessible websites, for characterizing the content as encouraging or destructive (LaBrie et.al 2017; Komorowski et.al 2018). Difficulties looked by the analysts in TSA are: nonpartisan tweets are more typical than positive and negative ones, which is extremely hard to group. Tweets are short and frequently show constrained assumption prompts (Vyas et.al 2018). Numerous scientists concentrated on the utilization of conventional classifiers, as innocent Bayes, most extreme entropy, and SVM to take care of these issues (Singh et.al 2016; Birjali et.al 2016). To improve the arrangement precision, another grouping characterization approach was executed. In this exploratory research, TSA was performed on the reproduced DeMon twitter information. The proposed strategy comprises of two stages, for example, pre-handling and characterization. The undesirable commotion, for example, URLs, positive and negative emoticon, stop-words was decreased by preparing the twitter information which was well-thought-out as a major stage. The MGWO approach was utilized for TSA on pre-prepared twitter information. The nostalgic substance of Twitter information was utilized for finding the ideal grouping heads by utilizing the proposed system. The MGWO got the outcomes in three structures, for example, positive, negative and nonpartisan. These twitter words were put away in the lexicon with individual weight esteem, at that point the testing information was coordinated with the word refers to assess the exhibition of the proposed methodology. This paper is sorted out as pursues. Audit of different late papers on TSA is portrayed in Section II. The proposed philosophy (MGWO) is exhibited for twitter arrangement in segment III. Segment IV demonstrates the near test result for proposed and existing twitter opinion techniques. The end is made with future works in Section V.

Literature Review

Investigators have recommended numerous methods for the TSA established on DeMon. In this scenario, a brief evaluation of some important contributions to the existing literatures are presented. (E. Kušen, and M. Strembeck 2016), evaluated asentimental analysis at 2016 Austrian presidential election. In this literature, 343645 messages were extracted and analysed a data-set related to 2016 Austrian presidential elections. The developed methodology combined the methods like network science and SA and the clear polarization was found in terms of sentiments spread by twitter followers about the two presidential candidates. The approach was not able to recover the seven days old tweet because of application programming interface restriction. Hence, the approach lost the data permanently. (Jianqiang, et.al 2018) developed a word embeddings method based on large twitter data with the help of unsupervised learning by combining co-occurrence statistical characteristic and latent contextual semantic relationships between words in tweets. The sentiment features of tweets were formed by combining the word sentiment polarity score and n-gram features in word embeddings. The sentiment classification labels were predicted by feature set which was integrated into deep convolution neural network (DCNN). The efficiency of word embedding method was validated by conducting experiments on five datasets when compared with existing techniques. The pre-trained word vectors used in DCNN had good performance in the task of TSA. While clustering the sentimental contents in large dataset, the computational time becomes a bit high. (Asghar et.al 2018) proposed a cross breed grouping structure to conquer the issues of erroneous characterization. The exhibition of twitter-based SA frameworks were improved by utilizing four classifiers, for example, a slang classifier, a moticon classifier, the SentiWordNet (SWN) classifier, and an improved domain-specific

classifier. The information content was gone through the initial two classifiers, for example, emoji and slag, in the wake of applying the preprocessing stage. In the last stage, SWN-based and domain-specific classifiers were applied to arrange the content precisely. A constraint of the methodology was the absence of programmed scoring of domain-specific words without playing out a query activity in SWN, which may build the arrangement exactness.

(Kannanet.al 2018) actualized a SA approach which broke down online networking posts and separated client's sentiment progressively. As indicated by a chose set of hashtags identified with a given subject, an extremity of a powerful lexicon (DD) of words was built. The tweets were grouped under a few classes by new includes which emphatically calibrate the extremity level of a post that was presented by the DD strategy. The methodologies were approved by grouping the tweets which were identified with US2016 Election. The exploratory outcomes demonstrated that the identification of positive and negative classes with their sub-classes gave a decent exactness of the DD technique. In any case, the created methodology had a constraint that the programmed development of DD utilizing little examples. (El Alaoui et.al 2018), proposed a Predictive Analysis on DeMon information utilizing SVM (PAD-SVM). The framework PAD-SVM included three phases pre-handling, graphic examination and prescriptive investigation. The pre-preparing stage incorporates cleaning the got information, performing and parting the important information from the tweets. Though, the engaging stage performed to locate the most powerful individuals and deciding logical functionalities. Also, the prescriptive examination was performed to see the present mentality of the individuals and the general public responded to an issue in the present time. The model accomplished more precision, which was utilized to supersede the current information to discover the anticipated information. The technique was monotonous to continue, on the grounds that the created strategy requires consistent forecast for figuring the extremity scores. (Dhanya.N.M, and U.C. Harish 2018),implemented various Machine Learning Algorithms (MLA) for classifying the Twitter data which gave an opinion about DeMonpolicy in India. The twitter data were collected from November 9th to December 3rd used for analysis. These collected data were pre-processed to remove the unwanted noises and missing values and gave input to MLA includes Navie Bayes, SVM, decision trees. The experimental results were carried out for analysing the performance of these approches and the obtained results stated that SVM showed better performance than other classifiers. The limitation of the MLA approach was reduction of accuracy rate, because the tweets in Hindi and Tamil language were not considered for classification (i.e. considered as neutral). To overcome the above-mentioned issues and enhance the performance of TSA based on DeMon, a proposed (MGWO) methodology is implemented in Section 3.

Proposed Methodology

TSA is the strategy of separating the data from the immense measure of tweet information and after that arranges the information into unique classes named as opinions.The important features from people opinions are mined by opinion mining known as SA. Previously, several MLA and statistical approaches are employed for TSA to extract the twitter data features. In this experimental analysis, a clustering based classification approach: MGWO is employed for analysing the people sentiments against DeMon. The proposed approach has two phases: training and testing phase, which is detailed below.

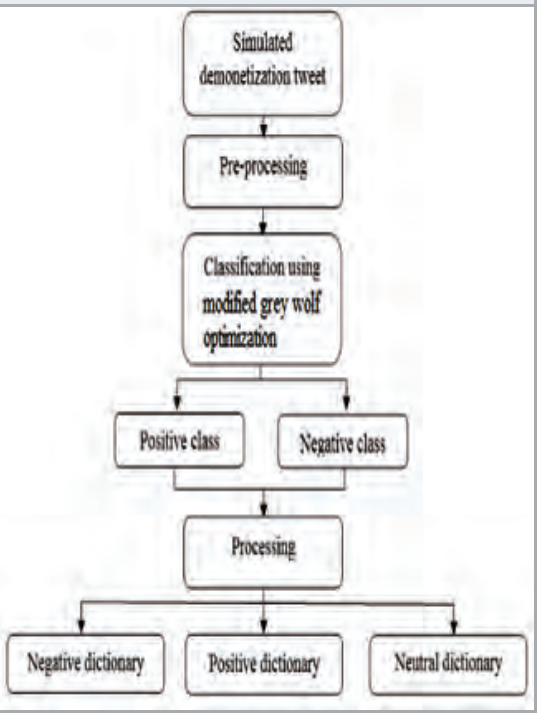
Training Phase

In proposed methodology, the training phase contains four steps: data acquisition, pre-processing, classification and constructing dictionary. The working procedure of proposed methodology in training phase is given in figure 1.

Data Collection And Pre-Processing

In the underlying phase of TSA, the Twitter information were gathered dependent on the particular hashtag (#DeMon). The animated database comprises of crude tweets, dates, tweet Ids, senders and their areas. An aggregate of 8,900 tweets were gathered in the primary stage, from November 9 to 16, 2016. Furthermore,

Figure 1. Working procedure of proposed methodology in training phase



3600 tweets were gathered in the subsequent stage, from November 17 to December 3, 2016. The example tweet gathering is given in figure 2. Afterward the acquirement of DeMontwitter statistics, significant step in the TSA is pre-processing of acquired data. Before classifying the tweets as different classes such as positive, negative and neutral, the unwanted noises includes URLs, different emoji and stop words are removed from raw tweets. Then, an effective clustering based classification approach was employed for classifying the twitter classes. The brief description of classification technique is given below.

Classification

In this paper, changed MGWO calculation is proposed which is utilized for expanding the exactness and execution of the GWO calculation. In this proposed technique where the enclosing and chasing activities have been adjusted by increasing the value of the conditions. The rest of the conditions/strategies those are like standard GWO calculation(Mirjalili et.al 2015).

Figure 2. Sample tweets regarding DeMon.

What a fantastic move against black money to ban Rs 500 and Rs 1000 notes! This will be a game changer. I welcome it wholeheartedly 👏👏👏

Filled my cars petrol tank with 500 and 1000 notes, and now i'm feeling like some kind of Saudi King.#BlackMoney

Good thing is that 500/1000 notes are valid in Hospitals cause lots of folks are going to have heart attack tonight. 😂

The primary point of this strategy is to improve the effectiveness of the movement and reasonable way of each wolf is available in the looking through zone. The MGWO calculation is packed in the accompanying divisions:

Encompassing prey

During the chase, the prey is encompassed by the dim wolves can be extemporized by utilizing the accompanying conditions:

$$\vec{D} = \left|\vec{C} \cdot \overrightarrow{X_p}(t) - \theta \cdot \left(\vec{X}(t)\right)\right| \quad (1)$$

$$\vec{X}(t+1) = \overrightarrow{X_p}(t) - \vec{A} \cdot \vec{D} \quad (2)$$

Where, θ is the mean, the prey position vector is denote as $\overrightarrow{X_p}, t$ is the current iteration, the grey wolf position vector is denote as $\vec{X}(t)$.

The vector $\vec{A}$ *and* $\vec{C}$ are denotes as:

$$\vec{A} = 2\vec{a} \cdot \vec{r_1} - \vec{a} \quad (3)$$

$$\vec{C} = 2 \cdot \vec{r_2} \quad (4)$$

Where element of $\vec{a}$ decreases from 2 to 0. $\vec{r_1}, \vec{r_2}$ take certain random values lying between [0,1].

Hunting

α β and δ bunches unpredictably take an interest and guide the chasing of prey. At first the three best and ideal arrangements of up-and-comer are portrayed by α,β, δ and the rest of the arrangements are signified by ω. Each wolfs position has been extemporized in the pursuit space locale by ascertaining the mean of the positions.

$$\overrightarrow{D_\alpha} = |\overrightarrow{C_1} \cdot \overrightarrow{X_\alpha} - \theta \cdot \vec{X}(t)| \quad (5)$$

$$\overrightarrow{D_\beta} = |\overrightarrow{C_2} \cdot \overrightarrow{X_\beta} - \theta \cdot \vec{X}(t)| \quad (6)$$

$$\overrightarrow{D_\delta} = |\overrightarrow{C_3} \cdot \overrightarrow{X_\delta} - \theta \cdot \vec{X}(t)| \quad (7)$$

$$\overrightarrow{X_1} = \overrightarrow{X_\alpha} - \overrightarrow{A_1} \cdot (\overrightarrow{D_\alpha}) \quad (8)$$

$$\overrightarrow{X_2} = \overrightarrow{X_\beta} - \overrightarrow{A_2} \cdot (\overrightarrow{D_\beta}) \quad (9)$$

$$\overrightarrow{X_3} = \overrightarrow{X_\delta} - \overrightarrow{A_3} \cdot (\overrightarrow{D_\delta}) \quad (10)$$

$$\vec{X}(t+1) = \frac{\overrightarrow{X_1}+\overrightarrow{X_2}+\overrightarrow{X_3}}{3} \quad (11)$$

Fitness Function

The primary goal of the proposed work is to plan the undertakings in cloud condition to enhance the execution time and vitality utilization. To accomplish the previously mentioned goal, the wellness capacity is determined so as to assess the nature of the arrangements. Nonetheless, for each streamlining issue, the wellness capacity is required to discover the closest ideal arrangement. The wellness work for vitality and time limitations is given in the condition (12)

$$FF(I) = \alpha \times F_1^{min} + (1-\alpha) \times F_2^{min} \quad (12)$$

Where wellness capacity is signified as FF(I). Here α is a consistent worth, the estimation of α is between1> α ≥0. F_1ˆmin Is first target to limit the errand execution time. F_2ˆmin Is second target to limit the vitality utilization.

Pseudo Code Of Modified Mgwo

Input:

Parameters of Modified MGWO Algorithm.

Task (T_y) and

Resource.

$$(R_x) \forall x \in \{1,2,\dots m\} \text{ and } y \in \{1,2,\dots\dots,n\}.$$

Output:

The tasks are scheduled to an optimal resource $\{T_y, R_x\}$.

Parameters initialization:

1. 'n' is an original population size

$\overrightarrow{X_i} = (i = 1,2,\dots,n)$, factor "a", C & A coefficient vector, Max_{it} maximum iteration.

2. Set counter preliminary value

Population initialization:

3. Set *i= 1*

4. While $(i \leq n)$ do

5. Randomly generate initial population $\overrightarrow{X_i(t)}$

6. Compute the fitness of every single grey wolf in the search area using Equation (12)

7. End While

8. The grey wolf with most fitness is denoted as Alpha $\overrightarrow{X_\alpha}$.

9. The grey wolf with the second most fitness is denoted as Beta$\overrightarrow{X_\beta}$.

10. The grey wolf with the third most fitness is denoted as Delta $\overrightarrow{X_\delta}$.

Solution Updating phase

11. While $(t < Maxitr)$

//Maximum number of iterations

12.For each search agent

13. Using equation (11) each grey wolf position is updated.

14. End for

15. The value of "a" is decrease for 2 to 0.

16. Using Equations (1) and (2) the coefficient of "A" and "C" are updated respectively.

17. Compute the fitness value of all grey wolfs using Equation (12).

18. Update the positions of Alpha, Beta and Delta using equations (8), (9) and (10).

19. set $t = t + 1$

//increasing the iteration counter

20. End while

Best Solution

21. return Alpha $\overrightarrow{X_\alpha}$as the nearest optimal solution from the search space.

Implementation Steps

Stage 1: Define the related parameter esteems in the calculation and haphazardly create the underlying populace.

Stage 2: Code the particles and introduce the populace.

Stage 3: Randomly separate the gathering into two subgroups, and embrace distinctive preparing techniques for various subgroups.

Stage 4: For every subgroup, explicit calculation is used to refresh the position and speed of the particles. From that point onward, the two subgroups are coordinated.

Stage 5: Judge whether iterative conditions can meet the stop conditions or accomplish the emphasis times.

Stage 6: If iterative conditions can't meet the stop conditions or accomplish the cycle times, if you don't mind execute stage 3. Something else, if you don't mind execute stage 7.
Stage 7: Select the top10% of people with the best wellness esteems from Step 4 and create the underlying pheromone of the dark wolf calculation.
Stage 8: Establish the TSA model of the dark wolf calculation and instate the parameters of the calculation.
Stage 9: Every dark chooses move hubs, refreshes the neighborhood pheromone and adds the hubs chose to the tabu rundown.
Stage 10: When all the dark complete a cycle, the worldwide pheromone ought to be refreshed.
Stage 11: Evaluate whether cycle conditions can meet the stop conditions or accomplish the emphasis times.

Stage 12: If the iterative conditions can't meet the conditions or accomplish the emphasis times, if it's not too much trouble execute stage 11. Something else, the worldwide best arrangement is acquired. Based on the best solution value, the DeMon tweets are classified into three classes (negative, positive and neutral class) using MGWO technique. In order to evaluate the proposed methodology performance, the testing twitter data are coordinated with the dictionary (contains trained twitter data).

RESULTS AND DISCUSSION

For trial reproduction, Hadoop programming was utilized on PC with 3.2 GHz with i5 processor. So as to appraise the proficiency of MGWO calculation, the exhibition of the proposed MGWO strategy was contrasted and Bernoulli guileless Bayes, multinomial credulous Bayes, SVM, choice tree and LDA characterization strategies (Dhanya,et.al 2018) on the mimicked DeMon twitter information. The exhibition of the proposed philosophy was analyzed by methods for exactness, accuracy, review, and f-measure.

Performance measure

The exhibition measure is characterized as the connection between the information and yield factors of a framework is comprehended by utilizing the reasonable execution measurements like exactness and review. The general recipe for figuring the exactness and review of the TSA is given in the conditions (13) and (14).

$$Precision = \frac{TP}{TP+FP} \quad (13)$$

$$Recall = \frac{TP}{TP+FN} \quad (14)$$

Precision is the proportion of measurable fluctuation and a portrayal of arbitrary mistakes. The general recipe of exactness for deciding the TSA is given in the condition (15).

$$Accuracy = \frac{TP+TN}{TP+TN+FP+FN} \times 100 \quad (15)$$

Where, speaks to as obvious positive, indicates false negative, speaks to genuine negative and is false negative. F-measure is the proportion of exactness test and it considers the both accuracy and review of the test so as to ascertain the score. The general recipe for F-measure is given in the Equation (16).

$$F.M = 2.\frac{presision.recall}{presision + recall} \times 100 \quad (16)$$

Experimental analysis on acquired DeMon twitter data

In this trial explore, reproduced DeMon twitter information is utilized for looking at the presentation assessment of existing systems and the proposed methodology. In table 1, the accuracy and review estimation of proposed and existing techniques are looked at for three classes: positive, nonpartisan and negative. The normal accuracy estimation of the proposed system: MGWO conveyed 0.92 and the current procedures: Bernoulli gullible Bayes, multinomial innocent Bayes, SVM, LDA and choice tree conveyed 0.74, 0.78, 0.87, 0.74 and 0.78 of exactness. Also, the normal review estimation of the proposed system conveyed 0.88 and the current techniques conveyed 0.67, 0.63, 0.84, 0.62, and 0.63 of review. The graphical portrayal of a normal accuracy and review is meant in the figures 3 and 4. In table 2, the approval result demonstrates that the proposed approach outflanked the current strategies regarding f-measure and exactness. The normal f-measure estimation of the proposed strategy: MGWO conveyed 0.86 and the current systems: Bernoulli guileless

Table 1. Proposed and existing methodologies comparison by means of precision and recall.

Methodologies	Precision				Recall			
	Positive	Negative	Neutral	Average	Positive	Negative	Neutral	Average
Bernoulli naive Bayes [18]	0.83	0.90	0.64	0.74	0.26	0.24	0.99	0.67
Multinomial naive Bayes [18]	1	1	0.61	0.78	0.12	0.19	1	0.63
SVM [18]	0.95	1	0.79	0.87	0.84	0.59	1	0.84
LDA [18]	0.89	0.32	0.81	0.74	0.41	0.68	0.70	0.62
Decision tree [18]	1	1	0.61	0.78	0.12	0.19	1	0.63
Proposed (MGWO)	0.99	1	0.87	0.94	0.90	0.75	1	0.89

Figure 3. Graphical representation of precision comparison.

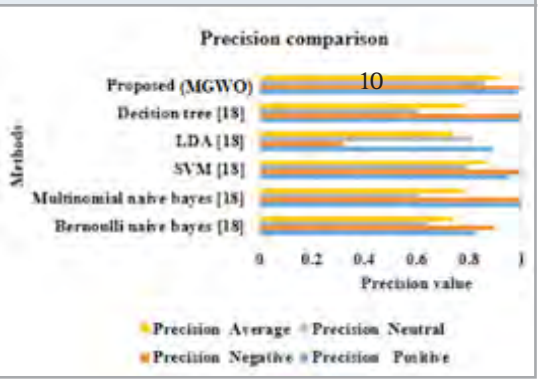


Figure 4. Graphical representation of recall comparison

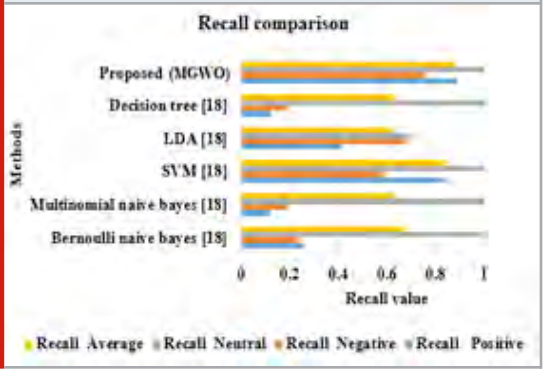


Table 2

Methodologies	F-measure			Accuracy (%)	
	Positive	Negative	Neutral	Average	
Bernoulli naive Bayes [18]	0.39	0.38	0.78	0.61	66.75%
Multinomial naive Bayes [18]	0.22	0.31	0.76	0.54	63.25%
SVM [18]	0.83	0.74	0.88	0.83	84%
LDA [18]	0.56	0.44	0.75	0.64	62.25%
Decision	0.22	0.31	0.76	0.54	63.25%
tree [18] Proposed (MGWO)	0.87	0.74	0.94	0.87	88.76%

Bayes, multinomial gullible Bayes, SVM, LDA and choice tree conveyed 0.61, 0.54, 0.83, 0.64 and 0.54 of f-measure esteem. Correspondingly, the precision of the proposed philosophy conveyed 87.76% and the current techniques conveyed 66.75%, 63.25%, 84%, 62.25% and 63.25% of exactness. The graphical portrayal of normal f-measure and exactness is spoken to in figures 5 and 6. Table 1 and 2 unmistakably demonstrates that the proposed MGWO approach improved

Figure 5. Graphical representation of f-measure comparison

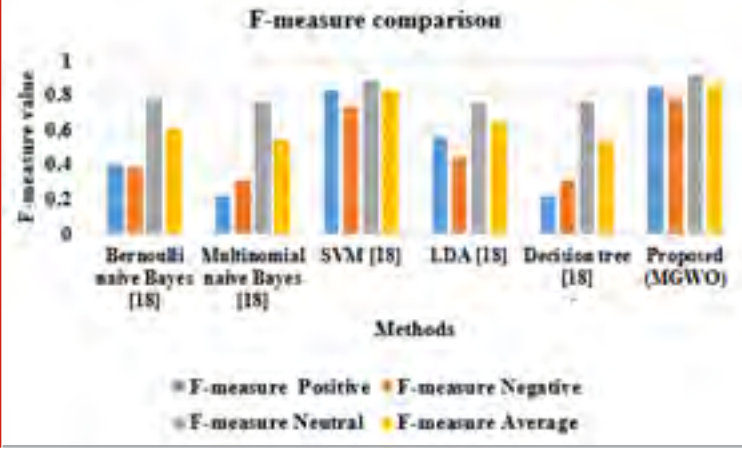
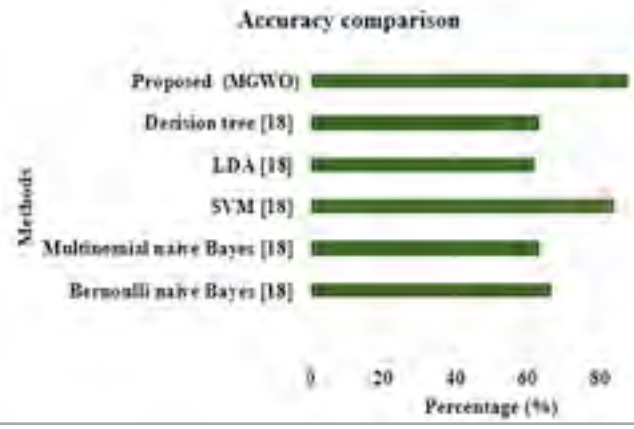


Figure 6. Graphical representation of accuracy comparison.



the characterization exactness in TSA up to 19% contrasted with the current techniques in the reenactedDeMon twitter information. In this situation, advancement based order procedure is performed to anticipate the best outcomes. The streamlining based model for twitter notion improved the assumption arrangement precision. Contrasted with the current plans, the proposed strategy works successfully as far as exactness, review, precision and f-measure.

CONCLUSION

TSA is one of the developing exploration fields for breaking down and distinguishing the conclusions and perspectives of clients. This examination work investigated the impacts of DeMon arrangement actualized by the Indian government utilizing nostalgic examination idea. In this exploratory research, the DeMon twitter information were gathered from the timeframe of November 9 to December 3, 2016. The obtained twitter information was pre-prepared by dispensing with the superfluous emoticon from the tweets, and the execution of missing worth treatment. The pre-handled information was used for TSA utilizing MGWO enhancement procedure. This advancement philosophy recognized the ideal hub heads from the opinion substance. The exploratory examination of MGWO was checked on reenacted DeMon twitter information, which demonstrated the predominance of the proposed methodology. The characterization pace of DeMon

twitter information is preferable in the proposed system over the past techniques. Contrasted with other existing methodologies in TSA, the proposed plan conveyed a powerful execution by methods for exactness. The created methodology improved the characterization exactness of around 3-19% contrasted with the past techniques. In future work, to improve the arrangement rate, another multi-target characterization approach will be created.

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Cloud Health Care Authentication Using Enhanced Merkle Hash Tree Approach With Threshold RSA

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ABSTRACT

Cloud computing is a distributed computing paradigm, which host and provide a variety of internet based services to the customers. It is widely used in the commercial applications like data storage and online application. In cloud storage services, the user can access their personal medical data at anytime and anywhere without storing the medical data at local. However, the cloud service provider does not completely trust the cloud storage due to the verification of data integrity, which happens at non-trusted cloud servers. To address this issue, an effective authentication model: multi-owner cloud healthcare authentication using Enhanced Merkle Hash Tree (EMHT) approach with threshold RSA is proposed in this study. The developed system provides a secure healthcare cloud storage system for supporting privacy preserving public auditing. Initially, the data owner uploads the medical data in cloud server and allowed to alter the stored medical data using private key. The cloud server stores and split the medical data into batches by using EMHT-RSA approach. Third Party Auditor (TPA) audits the medical data files, which are requested by the data owner. In the modification process, the multi-owner authentication mechanism is also implemented for authenticating the user. The experimental outcome shows that the proposed methodology reduced the encryption and decryption time in cloud medical data storage upto 2-167 m-sec compared to the existing methods: Advanced Encryption Standard (AES) and blow fish.

KEY WORDS: CLOUD COMPUTING, CLOUD DATA STORAGE, CLOUD SERVICE PROVIDER, MEDICAL DATA, MERKLE HASH TREE, MULTI-OWNER AUTHENTICATION AND THIRD PARTY AUDITOR.

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INTRODUCTION

In current scenario, data centric network services have developed effectively with the growth of intelligent data processing and network power computing (Wu et.al 2016). Cloud computing is the emerging technique with enormous number of data centric network applications like medical information system [Li et.al 2018; Kumar

et.al 2018; Mehmood et.al 2018), data storage (Challa et.al 2018), data sharing and big data management. Usually, cloud system depends on the architecture of service oriented computing that is proficient to provide identity-as-a-service, anything-as-a-service and database-as-a-service (Indu et.al 2017; Li.D et.al 2018; Jiang et.al 2018). Cloud computing utilize the resources or data for achieving scale of economics and coherence, similar to public utility (Lee.A et.al 2015). The users store several resources about their health or medical data into cloud, and the same resources are retrieved at any place and time through internet (Yang et.al 2015). Whereas, the cloud computing brings severe security issues, specifically for user's medical data or resources stored in the cloud. The medical data privacy becomes a major issue, which includes illegal user access, once the resource is out-sourced to a third party (Ali et.al 2014; Hu et.al 2016). The cloud-computing comprises of three basic authentication such as, biometric (Fiandrotti et.al 2017), password and smartcard based authentication (Fan et.al.2018).

The password based authentication is highly insecure and the smartcard based authentication is practically inconvenience for all applications. Numerous biometric based authentication methodologies are developed for improving the security of medical resources in cloud (Chiou et.al 2016). The fundamental task of conventional algorithms (multi-factor bio-metric fingerprint authentication algorithm (Nagaraju et.al 2015), Tan's approach (Xiaopenget.al 2013), two-server authentication (Chattaraj,et.al 2018], etc.) are very simple and ineffective. These existing approaches still face the concerns of security challenges and privacy preserving. In this experimental research, a new authentication methodology: EMHT with multi-owner authentication technique is developed for securing the medical data in cloud storage. The main aim of using EMHT approach with RSA is to perform significant data integrity checking for healthcare application in cloud storage. Also, it ensures that every node in Merkle hash tree is sealed with the relative position information to its parent node. For downloading the encrypted medical data, the user gets public key from TPA by an authentication request. If the user is authorized, data owner gives the decryption key to the user for decrypting the encrypted medical data. There are no strict pre-conditions in RSA and also applied to almost all circumstances where secret sharing signature is required. This paper is organized as follows. Section II surveys several existing research papers on cloud data storage authentication with problem statements. In section III, an effective method: EMHT with RSA is presented with multi-owner authentication technique for cloud data storage authentication. Section IV shows comparative experimental result for proposed and existing strategies. The conclusion is made in section V.

Literature Review

This section reviews a few research approaches suggested by researchers in cloud data storage authentication. The brief evaluation of some essential contributions to the existing literatures is presented. (Chattaraj et.al 2018), proposed an effective authentication protocol, which overcomes the concerns of security loop-holes.

Figure 1. Cloud data storage architecture

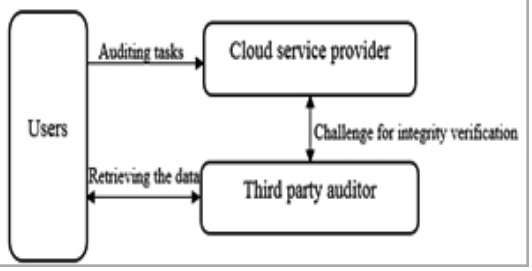


Figure 2. The system overview of TPA

The developed authentication protocol comprises of a new key exchange mechanism and active password based two server authentication for achieving strong user privacy property. The combination of both informal and formal security protects the protocol from attacks. The experimental outcome confirms that the developed methodology shows comparable and reasonable overheads compared to the existing authentication protocols by means of computational time, communication over-heads and cost. The developed methodology was based on password, which was vulnerable and leads to key rollover issue and stolen verifier attacks.

(Brogan,et.al 2018) focuses on the transport of health activity data generated by wearable and embedded devices to a distributed ledger. From the application layer of IOTA stack, the method employed a Masked Authenticated Messaging (MAM) for encrypting, authenticate and broadcast the activity data. This new model has the potential to restore patient agency over their health activity data, and improve data sharing capabilities across digital healthcare ecosystem. Though, the developed methodology provides insecure data sharing in the condition of one to one solution. (Zhang, and T. Tu 2017) presented a dynamic outsourced auditing scheme which was used to protect against collision, dishonest entity and also support verifiable dynamic updates. The multiple leaf nodes and their own indexes were batch-verified by using Batch-Leaves-Authenticated Merkle Hash Tree (BLA-MHT). The cost of initialization for both user and TPA was minimized when compared with traditional public auditing scheme. But, the BLA-MHT complex infrastructures and third party platforms in networks have vulnerabilities. (Garg, and S. Bawa 2017), implemented an integrity auditing protocol by using MHT and Boneh Lynn Shacham (BLS) signatures for cloud based data. The searching complexity was reduced by integrating the hash value of node with relative index of a node in tree. The data freshness was guaranteed by using the time stamp field combined with root hash. When compared with existing system, this protocol supported data dynamic procedure, data freshness and public auditing of data. The storage cost of MHT-BLS was high, because the size of cloud service provider varies linearly. (Xu et.al 2018), implemented a Dynamic Fully Homomorphic encryption-based MT (DFHMT) to solve the problem of predetermine data size in FHMT. The less space consumption was achieved by key algorithms of DFHMT which consists of initialization, data appending, tree extension, query and verification. The length of authentication path in DFHMT was used to reduce the communication overhead and burden of client. When calculating the root nodes, DFHMT used weights. If the corresponding weights was not matched with verifier, then the root node calculation was wrong, which lead to verification fail.

(Aljawarneh, and M. B. Yassein 2017) proposed a resource-efficient encryption system to encrypt the data by using Feistel encryption scheme, AES and genetic algorithms against attacks such as tampering attacks and denial of service attacks. The data assurance was achieved in cloud storage by using third party auditor and hash code techniques. AES algorithm was highly efficient for server colluding attack and malicious data modification attack with minimum computation overhead. In AES, prover cannot construct the collisions according to cipher text weights, which was the key to prevent some attacks. (Patel .K 2019) an efficient cipher text retrieval techniques such as AES, Blowfish and Data Encryption Standard (DES) on a large and small volume of data was proposed. The porter stemming was used to generate an index, whereas Blowfish was used to encrypt the files which was outsourced to user. The key for authorized access was generated by public key encryption based ECC. The method provided security for outsourced data, and the experimental results showed better efficiency based on execution time and memory. The encryption procedure has used for decryption, however the input of sub keys was applied in reverse order. (Anbuchelian, et al. 2017) established secure cryptography hashing algorithm in the TPA to improve the security. After uploading the data, the user was provided with a private and public key for trustworthy retrieval of the data file, where modified RSA algorithm was used to generate these keys. The data files were effectively audit by using a multilevel hash tree algorithm occasionally. This

method was tested with attacks and this provided the privacy against the attacks. The complexity is high for developed hash tree function, which needs more time for the auditing process.

Problem Statement

This segment depicts about the issue explanation of merkle hash tree in cloud medicinal information stockpiling validation and furthermore point by point about how the proposed technique offers answer for the portrayed issues. The worries of merkle hash tree approach are point by point underneath.

- Looking through I-th leaf hub in explicit information uprightness evaluating is computationally unpredictable in merkle hash tree approach. In the event that, if the capacity structure is ceaseless, the tasks like addition and cancellation of information is calm high.
- Subsequent to performing erasure and inclusion activity, the arrangement number of hubs presumably gets changed and furthermore the stature of the tree ends up imbalanced (Wang et.al. 2015).
- Merkle hash tree approach has no capacity to deal with the information trustworthiness examining, which is named as unfilled verification. Additionally, it doesn't give any freshness certifications to information, since freshness conveyed confirmation that the out-sourced information is unblemished.
- The traditional merkle hash tree uses either Message Digest (MD) or SHA as hash function. Most of the time, these functions does not indicates the tree depth, so it leads to second preimage attack.
- In data auditing process, the traditional methods used the number of Meta data, which is stored in a huge dataset, and consumed more storage space.

Solution

To overcome the above mentioned drawbacks, EMHT with multi-owner authentication methodology by threshold RSA is implemented for enhancing the performance of cloud medical data storage authentication. Here, a new hash function: tiger tree hash function is replaced with MD or SHA hash function in merkle hash tree, because it is a truncated version with specific hash size, so there is no need of distinguishing the defined values. Totally, it contains twenty four rounds with digest sizes of 128, 160 and 192. The tiger hash function uses compression function on 16th round in order to avoid equivalent time complexity and also it uses compression function on 19th round for securing the stored medical data from collision attack. The detailed description about multi-owner authentication and EMHT is given in the section 4.

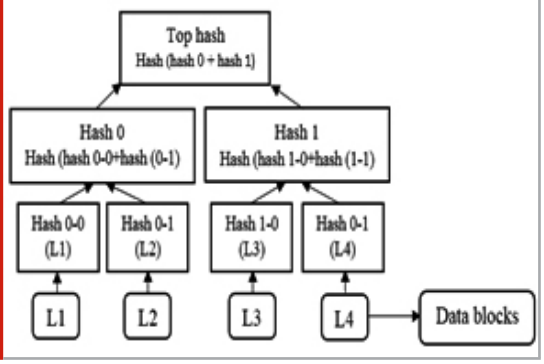
Proposed Methodology

The proposed methodology is used for data integrity, load balancing and multi-owner authentication mechanism in cloud environment. A publicly verifiable methodology (EMHT with multi-owner authentication) is used for protecting the cloud medical data integrity and also to support dynamic maintenance.

Multi Owner Authentication

In order to secure the medical data storage in the cloud server database, a highly secure multi-owner authentication methodology is implemented. Initially, the medical data are uploaded in the cloud server in the encrypted format using EMHT approach by the data owner. The user is provided with a public key for viewing and downloading the medical data and the data owner checks the user (authorized or unauthorized) using the public key. If the user is authorized, then the decryption key is provided to the user for decrypting the medical data by the data owner. Load balancing concept is also implemented for processing the

Figure 3. Sample binary tiger hash tree structure



user requested job. Finally, the user request is past to the cloud server, if the user is authenticated, the cloud server reply to the user query. The general design of cloud data storage is denoted in the figure 1. The brief evaluation of the proposed technique is determined below.

System Model

Figure 2 shows the auditing system used in this research work for cloud storage, which consists of TPA, cloud users and Cloud Storage Service (CSS). The cloud users are the data owners, who have a bulk of data to be stored in CSS. A massive amount of computational resources and storage space are effectively handled by CSP, which is used to manage the CSS. The CSP managed and maintained the user's data which is stored in CSS, where the user can dynamically update or access their remote data whenever they need. Most of user are lacked in auditing the outsourced data due to less expert and capabilities in this process, which are effectively handled by TPA.

Data Owner

The data are stored in the cloud by the data owner, which can interact with CSP for managing their stored data on cloud. Without having the local copy of data, the security of data should be periodically verified by the owner. If they don't have time or resource to verify the security, these jobs can be assigned to trusted TPA by the data owner.

Cloud Service Provider

The distributed cloud storage servers are built with major resources and managed by CSP, which is also offered software or storage services to the end user over the Internet. The major role of the CSP is to response the verifier queries and maintain the data properly.

Third Party Auditor

The vulnerability of user's privacy data is improved by the auditing process and the DI which is stored in the cloud is checked by TPA. The outsourced data can be managed or monitored under the delegation of data owner which is considered as a major responsibility of TPA. Whenever TPA receives the DI verification request from the data owner, immediately TPA send the challenge request to the cloud server. The TPA receives the proper response from cloud auditing task and sends the result back to the user. In proposed EMHT with RSA, these three entities performed the following activities such as:

1. The pre-processed files are sent to CSP by the data owner and also sends the metadata to TPA or user can keep locally for verifying the integrity later.
2. Then, files are stored by CSP, where metadata is stored by TPA.
3. The validity of response is checked and generated a challenge by verifier (either TPA or user), then send it to CSP. If the response is valid, it will return 1, otherwise return 0.
4. The response is generated by CSP, then sends to verifier.
5. An update request is generated by data owner and send to CSP for verification.
6. The CSP updates data and generates an update response based on data owner's requests.

Table 1. Comparison between proposed approach and other related key methods

Methods	Encryption type	Decryption key size	Cipher text size	File classification
Symmetric key encryption with compact key	Symmetric key	Constant	Constant	Irrelevant
Tree based key assignment method	Public key	Non-constant	Constant	Irrelevant
Key aggregate encryption	Public key	Constant	Constant	Relevant
key-aggregate authentication cryptosystem [19]	Public key	Constant	Constant	Irrelevant
Proposed approach	Private key	Constant	Inconstant	Relevant

7. When the insertion or modification process occurred, the updated metadata should be stored by TPA.
8. Even though TPA is secure, there are also some challenges faced by these models because of CSP. These threat model are described as below.

Threat Model

In this work, consider the CSP as semi-honest, but it is a curious server for securing the end user's data. A passive attacker is a probabilistic polynomial time adversary, which is a traditional honest-but-curious model and follows the designed specification correctly. An ability-limited active attacker adversary is considered as semi-honest-but-curious model, which can able to modify the designed specifications such as insert, update, delete and return only a small portion of search results, instead of retrieving all the query results.

Merkle Hash Tree Approach For Key Generation

The merkle hash tree is a binary tree data structure, where each node is an integration of leaf node. The node at the top of merkle hash tree is root node and the hashes of the medical data are represented as leaf nodes. The root node authentication delivers integrity declaration of all the leaf nodes. For instance, if the auditor requests the data-owner for data integrity verification at position one. The data-owner shares the auxiliary information as

$$AI(d[1]): \{(H_D, R), H(d[1]), (H(d[2]), R), (H_B, R)\}$$

to the auditor. Then, the auditor generates the root as follows,

- Calculate $H_D \leftarrow (H(d[1]) \| H(d[2]))$
- Calculate $H_A \leftarrow (H_C \| H_D)$
- At last, determine the root

$H_{Root} \leftarrow (H_A \| H_B)$

All the blocks are automatically authenticated by verifying the authenticity of root node. Generally, each node in merkle hash tree approach have two information such as, relative index and hash value. The traditional merkle hash tree approach contains three stages: set up stage, challenge-prove stage and updated stage. The brief description about each stage is detailed below.

Set-Up Stage

The set-up stage is a series of operation at the client end for initializing the system. This stage includes three functions,

- Key generation (1^{key}): This section includes probabilistic key generation methodology $\{skey, pkey\}$, which considers security parameter key as an input. The inputs are considered as a private key $skey$ and the outputs are denoted as a public key $pkey$. The data-owner publishes public key $pkey$, and keeps private key as a secrete key for decrypting the respective medical data.
- Tag generation ($skey, pkey, m \rightarrow meta\ data$) : The meta-data considers the client document $skey, pkey, m$ as an input and the outputs (meta-data tags δ) are stored locally by the client. At the server end, the corresponding documents m and δ tag are remotely stored by the client.
- Block-sig-generation: After generating the tag document δ, the data-owner creates signatures for each medical data block using cryptographic hash function. Generally, either MD or SHA is used as a hash function in cloud medical data storage authentication.

Challenge-Prove Stage

- The challenge-prove stage is an interaction process between the server and client. The client determines the issues and sends the challenges to the server. The server evaluates the corresponding challenges and replies output to the client. The challenge-prove stage contains three operations, which are listed below.
- Gen-challenge $(c) \rightarrow \{chal\}$: This operation considers the client's private parameter as an input and the output challenge for the future query.

- Gen-proof (: It takes user public parameters , meta-data , document and challenge as an input and the output is given to the user for verifying the server, whether it out-sourced the document correctly or not.
- Check-proof ($p_s, m, \delta, chal) \rightarrow \{G\}$: This operation is used to check the server possession of the target documents. It considers the user public key p_s, challenge made by the client, evidence and meta-data as an input. By analyzing the evidence , the function results as either "accept" or "reject".

$pkey, chal, meta\ data, G) \rightarrow$
{"reject", "accept"}

Updated Stage

In merkle hash tree, update stage is a verification stage for supporting the dynamic medical data operation. The key functions of this stage are determined below.

Perform-update

$(pkey, m, \delta, update) \rightarrow \{m', \delta', G_{update}\}$This operation is performed after the server gets requirement from the client. It considers public key , meta-data , update and document m as input and the updated document m', new tag and updated evidence G_{update} as an output for future checking.

- Verify-update:

$(pkey, update, metadata, G_{update}) \rightarrow$
$\{(metadata', "accept"), "reject"\}$ This operation gives a verification process to the client for checking the correctness of the dynamic operation outcomes at the server end. The verification function is triggered by update and considers public key $pkey$, meta-data δ and G_{update} as input. If the server evaluates the updates correctly, it results as "accept" and retain the new metadata locally, otherwise, the process output as "reject". The merkle hash tree protocol effectively supports the data dynamic process and public auditing of data. Still, a few major flaws in merkle hash tree protocol is detailed in the section 3. To overcome these issues, an EMHT approach is developed in this research study.

Enhanced-Merkle Hash Tree Approach

This sub-section describes about the EMHT approach. In this proposed technique, a new hash function (tiger tree hash function) is used in merkle hash tree instead of MD or SHA hash function. In tiger hash function, the one way compression function operates on sixty four bit words, where it process eight words of data and maintains three words of state. Totally, the tiger hash function includes twenty four rounds, using a combination of operations like S-box lookups, rotates, and XOR (addition and subtraction). An effective intricate scheduling key technique is used to derive twenty four rounds keys from the eight input words. This operation makes the implementation easy in micro-controller and other hardware's. A sample binary tiger hash tree is shown in the figure 3.

Threshold-Rivest, Shamir, And Adelman Algorithm (Threshold-Rsa)

The detailed descriptions of these algorithm (RSA) of three phases are described in the following sections.

Setup Phase:

Before storing the file in cloud, it should be pre-processed by user for ensuring the availability, DI and confidentiality of file.

- Encoding: The file is encoded by user to check the availability of data in cloud.
- KeyGeneration: In this algorithm, the user generates private and public key pair for the later processing the file in the propose system.
- Encryption: In case, the data owner wants to ensure the data Confidentiality, the users encrypts the data using public key cryptography.
- MetadataGeneration: The metadata for each block of file is computed by user for verifying the DI stored in cloud storage system.

4.6.2. Verification Phase

- At whatever point the client needs to confirm the information that is put away in the cloud servers, the verifier (either client himself or his masterminded operator TPA)

checks the DI without having the nearby duplicate of information through Challenge-Response Protocol. The check stage comprises of three techniques portrayed underneath.

- Challenge: A random challenge is created and send it to CSP by verifier to check the DI.
- Response: Once a challenge request received from the verifier, the integrity proof as response is generated by CSP based on the challenge and forward back to verifier.
- Check Integrity: The response received from CSP is compared with previously computed metadata and identified whether the updated proof is valid or not by verifier. To hold the Integrity, the response must be equal with the metadata otherwise it indicates data have corrupted.

Secret Sharing Rsa Threshold Algorithm

A new threshold RSA algorithm is developed by applying the digital signature to secret sharing scheme, that are as follows: Computerized mark plan is a triple (KeyGen, Sign, Ver) of productive calculations.

- KeyGen is the key age calculation. This yields a key pair (P,S). P is the open key and S is the mystery or private key.
  Sign is the marking calculation. Given a message μ and the mystery key S, it yields an advanced mark σ.
- Ver is the check calculation. Given a message μ, the relating mark and the open key P, it succeeds if σ is a substantial mark of the message μ.
- There are four major components presents in a RSA threshold signature scheme, that are described as below:
- Consider n as security parameters, generation of Q_N using *k* number of elements, singing servers as as threshold parameters and ω is a random string, which are all taken as input for key generation algorithm and produce the outputs as (N, e) is a public key, where is the size in bits of *N*, the private keys $d_1, \dots d_l$ only known by the correct server and for each $u \in [1, k]$ a list v_u, $v_{u,1} = v_u^{d_1}, \dots v_{u,l} = v_u^{d_l} mod\ N$ of verification keys.
  The input of a share signature algorithm is (N, e), an index $1 \leq i \leq l$, the private key d_i and a message ; this outputs a signature share $s_i = x^{d_i}\ mod\ N, where\ x = H(m)$ and is a hash-and-pad function, and a proof of its validity $proof_i\ (for\ all\ u \in [1, k], log_{v_u} v_{u,i} = log_x s_i)$.
- The public key (*Ne*) , a message m , a list $s_1, \dots, s_l$ of signature shares, for each $u \in [1, k]$ the list $v_u, v_{u,1}, \dots, v_{u,l}$ of verification keys and a list $proof_1, \dots, proof_l$ of validity proofs are considered as input and a signature may be an output of combining algorithm.
- Consider, (N, e) as a input public key, as message and s as signature for verification algorithm and it outputs a bit *b* indicating whether the signature is correct or not.

RESULTS AND DISCUSSION

In this segment, the test result and talk of the proposed approach is point by point viably and furthermore depicted about the test set-up and execution measure. The presentation of the proposed strategy was assessed by methods for near and quantitative examination.

Experimental Set-Up

The proposed approach was experimented using Net-Beans (version 8.2) with 4 GB RAM, 3.0 GHz Intel i3 processor and 500 GB hard disc and MY-SQL server as a cloud service provider. For estimating the proposed methodology effectiveness, the proposed approach (EMHT with multi-owner authentication) performance was compared with several existing approaches: AES [23] and blow fish [23]. In this experimental research, the proposed approach performance was compared by means of encryption time and decryption time. Usually, more number of delegation decryption keys will increase the information leakage risk and communication overhead. In existing key assignment schemes (symmetric-key encryption, key-aggregate encryption, etc.), the decryption key generation

depends on the previous classification files. These methods need to change the whole classification structure, when a new file class is uploaded to the cloud server. The proposed scheme generates a constant decryption key size and inconstant cipher text size. Also, it is relevant to the file classification, so it supports incessant updating of files. The comparison ratio for dissimilar tree height and delegation ratio for different key sizes (i.e. 8 and 12) and their graphical representation are shown in Figure 4, and 5.

Table 1a. Proposed and existing methodologies comparison by means of precision and recall.

Methodologies	Precision				Recall			
	Positive	Negative	Neutral	Average	Positive	Negative	Neutral	Average
Bernoulli naive Bayes [18]	0.83	0.90	0.64	0.74	0.26	0.24	0.99	0.67
Multinomial	1	1	0.61	0.78	0.12	0.19	1	0.63
naive Bayes [18] SVM [18]	0.95	1	0.79	0.87	0.84	0.59	1	0.84
LDA [18]	0.89	0.32	0.81	0.74	0.41	0.68	0.70	0.62
Decision tree [18]	1	1	0.61	0.78	0.12	0.19	1	0.63
Proposed (MGWO)	0.99	1	0.87	0.94	0.90	0.75	1	0.89

Table 2

Key size	Delegation ratio	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
8	Dkey	36.7	38.9	43.2	54.44	55.78	67.98	70	78.42	87.66
	Dkey/N (%)	14.33	15.19	16.8	21.26	21.78	26.55	27.34	30.63	34.24
12	Dkey	809	834	865.23	899.33	936.47	995.41	1096	1145	1199
	Dkey/N (%)	19.75	20.36	21.12	21.96	22.86	24.30	26.75	27.95	29.27
16	Dkey	12568	13245	13946	14524	14888	16127	17002	17894	18324
	Dkey/N (%)	19.17	20.21	21.27	22.16	22.71	24.60	25.94	27.30	27.96

Figure 5. Performance of Delegation Ratio for Key Size = 12

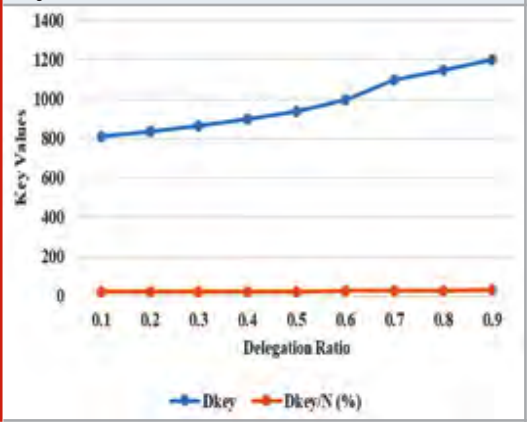
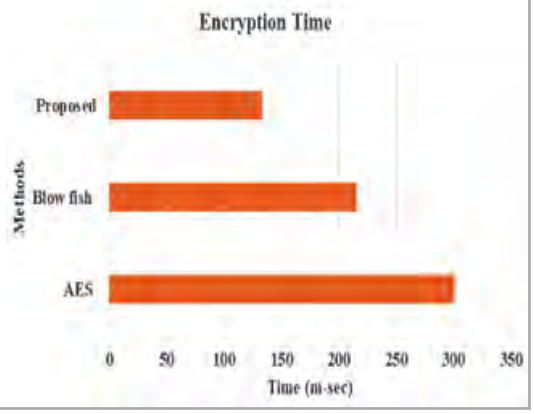


Figure 6. Graphical representation of encryption time comparison.



Performance measure

The exhibition measure is characterized as the connection between the information and yield factors of a framework is comprehended by utilizing the reasonable execution measurements like exactness and review. The general recipe for figuring the exactness and review of the TSA is given in the conditions (13) and (14).

$$Precision = \frac{TP}{TP+FP} \quad (13)$$

$$Recall = \frac{TP}{TP+FN} \quad (14)$$

Precision is the proportion of measurable fluctuation and a portrayal of arbitrary mistakes. The general recipe of exactness for deciding the TSA is given in the condition (15).

$$Accuracy = \frac{TP+TN}{TP+TN+FP+FN} \times 100 \quad (15)$$

Where, speaks to as obvious positive, indicates false negative, speaks to genuine negative and is false negative. F-measure is the proportion of exactness test and it considers the both accuracy and review of the test so as to ascertain the score. The general recipe for F-measure is given in the Equation (16).

$$F.M = 2.\frac{presision.recall}{presision + recall} \times 100 \quad (16)$$

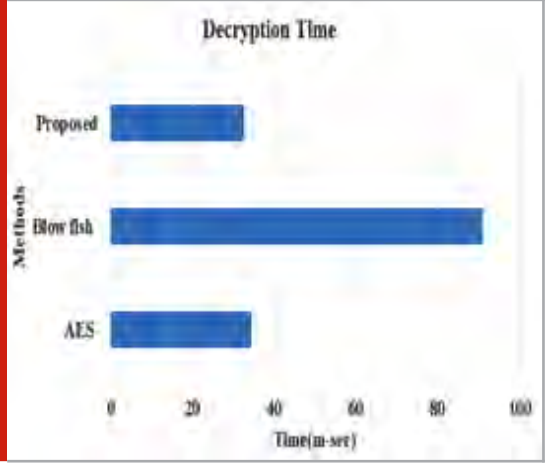
Experimental analysis on acquired DeMon twitter data

In this trial explore, reproduced DeMon twitter information is utilized for looking at the presentation assessment of existing systems and the proposed methodology. In table 1, the accuracy and review estimation of proposed and existing techniques are looked at for three classes: positive, nonpartisan and negative. The normal accuracy estimation of the proposed system: MGWO conveyed 0.92 and the current procedures: Bernoulli gullible Bayes, multinomial innocent Bayes, SVM, LDA and choice tree conveyed 0.74, 0.78, 0.87, 0.74 and 0.78 of exactness. Also, the normal review estimation of the proposed system conveyed 0.88 and the current techniques conveyed 0.67, 0.63, 0.84, 0.62, and 0.63 of review. The graphical portrayal of a normal accuracy and review is meant in the figures 3 and 4. In table 2, the proposed scheme is tested with dissimilar key sizes (8, 12, and 16) and the delegation ratio, ranged from (0.1 to 0.9). The numbers of nodes in these three structures are 256, 4096 and 65,536, respectively. The following table clearly shows that the delegation key increases with the increasing in delegation ratio.

Quantitative Analysis Using Encryption And Decryption Time

In this section, the performance evaluation of existing methodologies (AES and blow fish [23]) and the proposed approach (EMHT with multi owner authentication) is evaluated by means of encryption and decryption time. For experimental analysis, ten different file sizes are considered such as, 83.3 KB, 108 KB, 249KB, 333KB, 416KB, 1370KB, 2740KB, 5480KB, 10003KB and 15483KB. In table 4, the performance evaluation of proposed technique and existing approaches are evaluated in terms of encryption and decryption time. The average encryption time of the proposed technique (EMHT with multi owner authentication) delivers 132.9 msec. The existing methodologies (AES and blow fish [23]) attain 300.4 m-sec and 215.4 m-sec of average encryption time. The graphical comparison of encryption time is denoted in the figure 6. Correspondingly, the average decryption time of the proposed methodology achieves 32.5 m-sec and the existing methodologies attain 34.4 m-sec, and 91 m-sec of average decryption time. The graphical comparison of decryption time is denoted in the figure 7. Table 3 shows the performance evaluation of existing methodologies and the proposed method. The evaluation metrics (encryption and decryption time) confirms that the proposed scheme performs significantly in cloud medical data storage authentication compared to previous methods. AES [23] is a symmetric block cipher Feistel protocol, which utilizes a similar key for both decryption and encryption process. This protocol contains fourteen rounds, and only accepts the block size of 128-bits. In choice, it contains another two keys with the length of 192 and 256 bits and with the variable rounds of ten and twelve. Blowfish [23] is another symmetric key Feistel structure algorithm. It consists of 64-bit block size, which varies from (32-448

Figure 7. Graphical representation of decryption time comparison.



bits) with sixteen rounds. Also, the blow-fish algorithm contains a large key dependent box for encryption and it uses 4 s boxes for decryption. In this algorithm, the level of security depends on the size of key. Blow-fish algorithm is easy affected by the different key attacks, because several rounds are used as a masker key that makes the algorithm as infeasible.

CONCLUSION

In current decades, cloud computing paradigm is standard in computer services, due its flexible computational abilities and huge storage. In this research article, a new authentication methodology is presented to further ensure the security in cloud medical data storage. In this paper, EMHT with multi-owner authentication technique is used for cloud medical data security. The proposed algorithm: EMHT approach encrypts the user medical data and store it in the cloud storage. The stored medical data is retrieved using decryption function based on the user query. The proposed multi-owner cloud authentication method delivered an effective performance, compared to the other obtainable approaches in cloud medical data storage authentication. The experimental evaluation of proposed algorithm performance is measured by using encryption time and decryption time. The proposed methodology saves 2-167 m-sec of encryption and decryption time than the existing methods (AES and blow fish [23]). In future work, a secure relevant medical data retrieval approach is incorporated in the cloud medical data storage application.

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Pentagonal Ring Slot Antenna with SRR for Tri-Band Application

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ABSTRACT

In modern communication system, the interference is the major problem and this can be minimized with the help of reduced number of antennas in wireless devices.in this paper we proposed triple band microstrip patch antenna, which operates at 3.10GHz, 3.31GHz and 5GHz.The proposed antenna can be used for Radiolocation services WiMAX & IEEE802.11ax (WIFI) application. The proposed antenna is vertex fed pentagonal ring slot antenna and the SRR is included in the design to achieve the multiband operation. In all the operating band the proposed antenna meets the desired requirement of VSWR less than 2. With the help of parametric analysis, the optimum dimensions are selected and the structure is confirmed with analysis of return loss, radiation pattern and Gain. The pentagonal ring slot antenna has a multiband operation with impedance matching in all the resonating bands.

KEY WORDS: METAMATERIAL, MULTIBAND ANTENNA, SRR.

INTRODUCTION

Multiband antennas play a vital role in the modern wireless communication devices. To minimize the interreference, from various communications systems the multiband antenna is perfect choice when compared to the ultrawide band antenna. Various methods have been utilized to achieve dual band (Jhamb et al., 2011), triple band (Moosazadeh et al., 2014), quad band and Penta band (Mopidevi et al.,2014; Alsath et al., 2014; LiMembe et al., 2014; Hattan et al., 2012). All the above reported techniques have a major drawback of larger size, which can be overcomes with the help of metamaterials. The materials with effective homogeneity limit P<λg/4 are known as metamaterials, which has well defied macroscopic constitutive parameters (Christophe et al. 2006) Because of the outstanding electromagnetic behavior, the researchers have been showing great

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interest in utilizing the metamaterial structures in the antenna design. In the recent past many metamaterial structures such split ring resonator (Elavarasi et al., 2016), omega shaped (Javid et al., 2017) and Complementary split ring resonator (CSRR) (Francisco et al., 2013; Boopathi et al., 2017) has been reported. A pentagonal ring slot patch antenna (PSRA) is proposed in this paper with triband operation. It has four stages of evolution which is depicted in Fig 1. The entire structure is simulated with the help of CST microwave studio. The simple pentagonal slot antenna (Antenna C) operates at 5GHz and after the inclusion of split ring resonator, the proposed structure (Antenna D) has a tri band operation at 3.01GHz, 3.31GHz and 5GHz. The Antenna D is validated with the help of Simulated results of return loss, Surface current, Radiation pattern and gain. All the analysis is presented in this paper along with measured return loss plot. The simulated results are in good compactability with the simulated results.

MATERIAL AND METHODS

Design of Pentagonal Ring Slot Antenna (PRSA):

The proposed antenna design consists of pentagonal ring slot with split ring resonator. The proposed PSRA is having a dimension of 50 x 50 x 16mm3. The entire structure is fabricated on a single layer FR-4 material. Fig 2 depicts the proposed pentagonal ring slot antenna with its parameters and the parameter values are given in the Table 1.

The PSRA design has the following steps:

- A pentagonal patch with dimension in the Table 1 with vertex feed is designed on a FR-4 Structure. (Antenna A)
- A circular slot with radius of 11 mm is etched in the pentagonal radiating patch which operates at single band. (Antenna B)
- A strip of length 7mm and slot 0.5mm in between them is introduced at the top of the pentagon projecting inwards in order to shift the frequency of operation with good impedance matching at 5GHz. (Antenna C)
- A square shaped SRR, which is designed to operate at 3GHz is introduced in the slot bottom to achieve tri band operation. (Antenna D).

The dimension which have effects on the final output is obtained with the help of parametric

Figure 1. Evolution of the proposed antenna

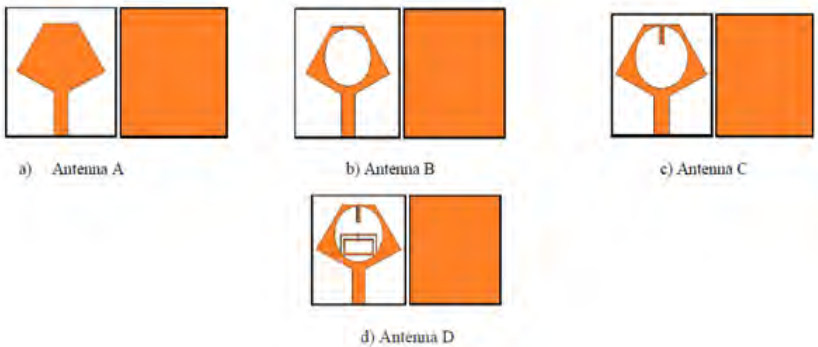


Figure 2. View of the Proposed PRSA

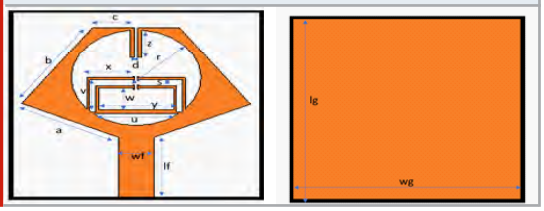


Table 1. Proposed PRSA Dimensions

lg	wg	lf	wf	a	b	c	d
50	50	17.2	6.2	19.8	7.5	7	0.5
r	u	v	w	x	y	s	z
11	1	7.5	5	6.5	14	0.5	7

analysis using CST software for the entire structure. Initially the pentagonal patch (Antenna A) is designed to operate at 6 GHz, but because of the impedance mismatch a slot is introduced along with the strips (Antenna C) which operates at 5GHz for IEEE 802.11ax (WIFI) application. In order to obtain triple band operation, the SRR is included in the proposed antenna (Antenna D) which operates at 3.01gHz,3.31GHz and 5GHz for Radiolocation services, WiMAX & IEEE802.11ax (WIFI) application. In Fig 3 the s11 plot is compared for the various antenna structure evolved during the design of proposed PRSA.

Parametric Analysis

In order to select the optimum value for the parameters which have critical impact on the desired output is analyzed with help of parametric analysis of feed width (wf), ground length (lg) and SRR Ring. When the feed width is increased in steps of 1mm, from 5.2mm to 7.2mm, from the fig 4 it is reviled that the feed width of 6.2mm is able to achieve very decent impedance matching in all the resonating bands. And therefore, the optimum value of 6.2mm is choose for the feed width wf. In Fig 5, the parametric analysis of the ground length is presented from that figure we can Clearly able to observe that the ground length of 50mm is providing the desired result and therefore it is selected as the optimum value for the ground length. The parametric analysis of the SRR rings is depicted in fig 6, without the SRR ring the proposed structure have a operating frequency of 5GHz. With the inclusion of First SRR ring the proposed structure has a dual band operation at 3.01GHz and 5 GHz. And when the second SRR ring is included in the proposed structure, the entire structure operates at three bands (3.01GHz, 3.1GHz and 5GHz).

Figure 3. Return loss comparison plot for Antenna A, B, C & D

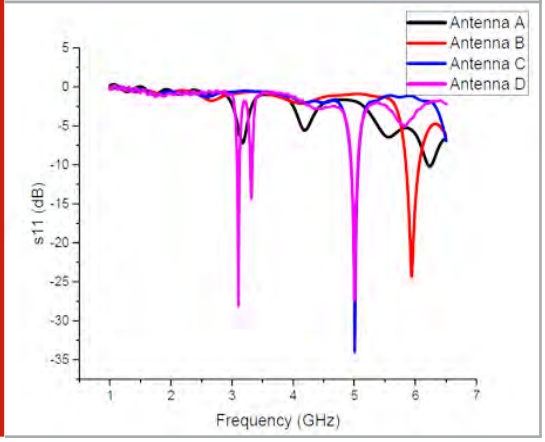


Figure 4. Parametric analysis of feed width (wf)

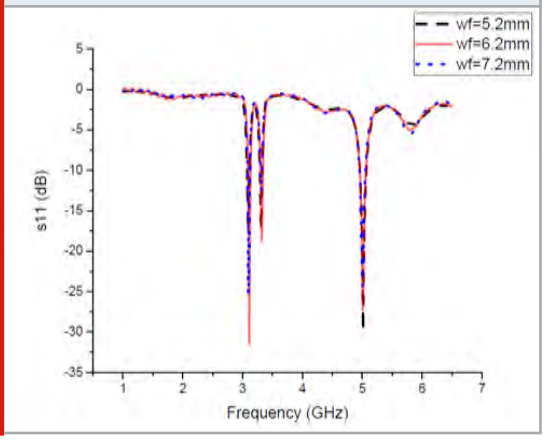


Figure 5. parametric analysis of ground length (lg)

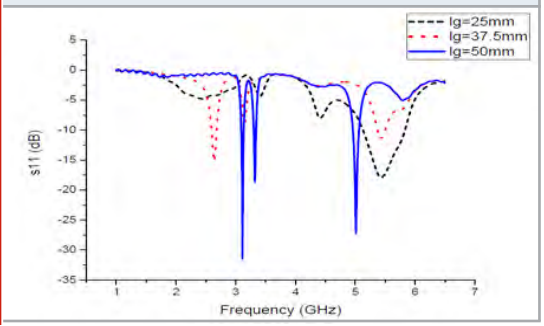


Figure 6. Parametric analysis of SRR rings

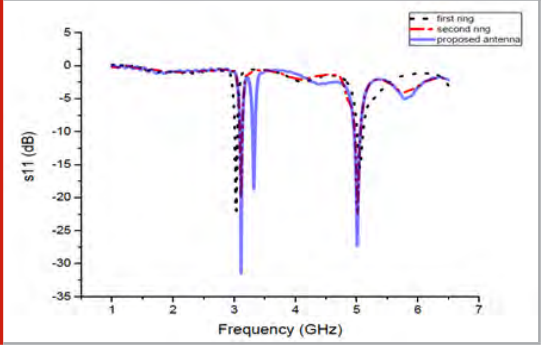


Figure 7. E Plane and H Plane at 3.01GHz, 3.31GHz and 5GHz

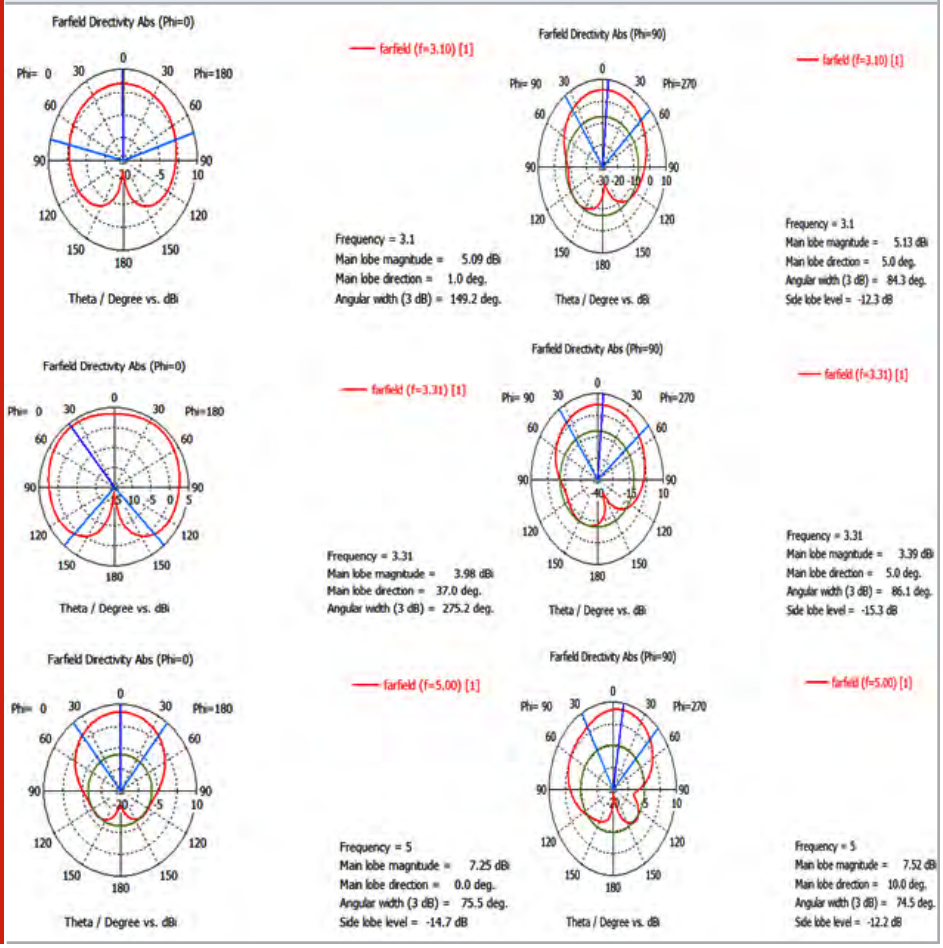


Figure 8. Gain of the proposed PRSA

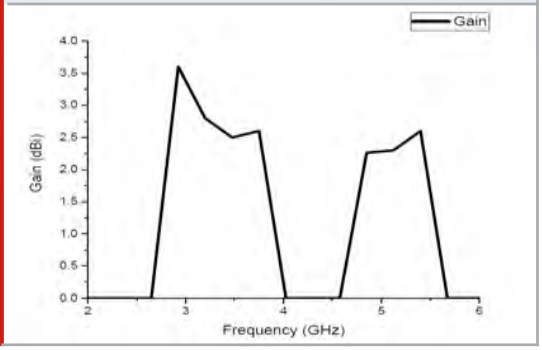
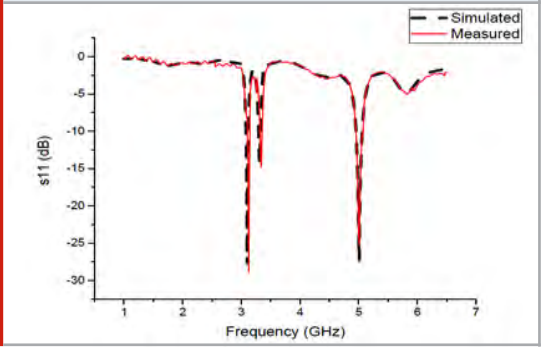


Figure 9. Simulated vs Measured s11 plot



RESULTS AND DISCUSSION

In fig 7, the simulated E plane and H plane are presented at 3.01GHz, 3.31GHz and 5 GHz, the E plane and H plane is nearly omnidirectional in all the resonant frequency except third resonance. At third resonance the H plane has bidirectional radiation pattern which is due to symmetry with respect to vertical axis. In fig 8, the proposed antenna gain is presented, which depicts that the proposed antenna has reasonable gain of above

2dBi in all the operating bands. The resonant frequency is dictated by the orientation and dimensions of the pentagonal ring slot and SRR. In Fig 9, the measured s11 and simulated s11 result of the proposed pentagonal ring slot antenna is presented. The deviation in the results are due to fabrication inaccuracies and substrate parameters. The conductor and dielectric losses are the losses associated with the proposed Design.

CONCLUSION

A novel microstrip patch antenna with vertex feed pentagonal ring slot patch antenna is proposed for triple band operation. The operating frequency are 3.01GHz, 3.31GHz and 5GHz. The measured and simulated return loss plot are well agreed to each other. The proposed antenna is the good candidate for the wireless application like Radiolocation services, WiMAX & IEEE802.11ax (WIFI). the major attractive features of the proposed structure are the reduced size, easy fabrication and simple design

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Computer Communication

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BBRC Bioscience Biotechnology Research Communications

A Study on Information Sharing Framework for Industrial Internet of Things

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ABSTRACT

IIOT has been wide in industries like producing and F&B. It permits contour knowledge that may management and monitor the economic activities among the sensing space. Security issues arise within the space wherever IOT is utilized in observance. the safety issues that area unit originating on the IOT are often solved by implementing parallel system in CEP technology and combination of reference metaphysics with cyber security. For securing IIoT object SEC IIoT authorization framework issued to search out secure resolution. Supervisory control and data acquisition systems (SCADA) systems area unit usually accustomed management IIoT for urban crucial infrastructure. We have a bent to build a customizable SCADA risk prioritization schema which will be utilized by the safety community to higher recognize SCADA-specific risk. This paper proposes a secure IIoT that is capable of meeting the need for process knowledge and performance industrial activities.

KEY WORDS: INTERNET OF THINGS; COMPLEX EVENT PROCESSING; CYBER SECURITY; INDUSTRIAL INTERNET OF THINGS.

INTRODUCTION

Internet of things as the name itself says, is that the property of day to day devices connectivity with one another. With the development in the today's technology, various devices such as victimisation sensors, actuators, embedded computing and cloud computing the communication between devices are made easier to place it merely, the IoT permits devices to progress and synchronize with one another thereby reducing human involvement in fundamental day by day tasks. In order for a better understanding of Internet of Things think about the state of affairs of a sensible house. Consequently, several enterprises have in recent times revealed a developing interest in IIoT, that mentions any or all tasks done by businesses to model, observe and improve their business operations through datas collected from a large

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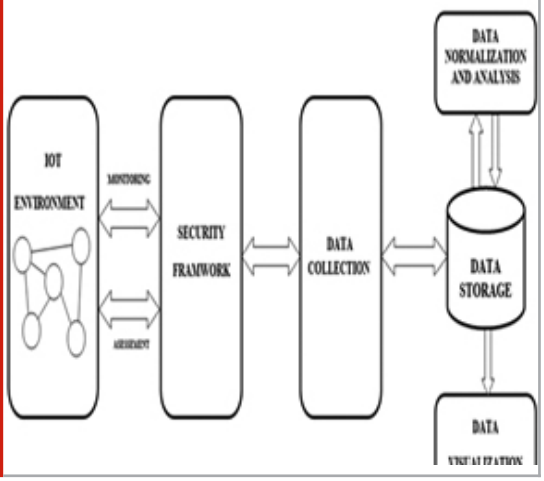
number of connected net of things, machines, computers and folks to help them in achieving a better improvement over their competitors'. Associate degree trade net of Things (IIoT), as the name itself says, may be a conception that proactively manages however good devices, computers, applications and folks, execute in holistic end-to-end trade processes across one or additional systems victimization advanced massive information analytics. Security may be a major concern whereas managing the net of Things. A vast number of IoT installed devices aren't completely safe from attacks and may be accessed easily by a 3rd party. The different types of the wireless technologies are connected to the net and additionally to smaller embedded devices. This helps to improve the day after day works around us throughout innovative applications. These devices merged with the net of Things (IoT), wherever totally dissimilar technologies joined with net offer many applications to alter people's way. Conversely, such combination of heterogeneous devices causes several new issues in the security and privacy due passiveness of technologies, causing unnecessary problems to the people using IoT technologies. During this situation, a reference metaphysics (IoTSec) with security ideas of M2M communications is introduced to assist notice safe environment to the IoT atmosphere.

Figure 1. System Architecture



Related Work

A generic IoT system is totally diagrammatic and described by mistreatment 3 important levels: Perception, Transportation and Application. The security problems of each layer are analyzed individually and by this method we can find the best and appropriate solution (Ala Al-Fuqaha et.al.2015).Analysis of the primary prepared subdirectories will begin quickly and is handled by services enforced as parallel multi threaded application mistreatment multiple cores of recent CPUs. The objective is to assess accomplishable speed-ups and verify that factors influence quantifiability and about to how much extent. Processing services are being enforced for evaluation of situation (positive or negative) within which the given keyword seems to fit during a document. The applications being used for testing make use of these services to work out. On the other hand a specific set of complete will be accepted either by the article's author or by the readers in comments in an exceedingly precise internet gateway centred on latest technologies. Obtained carrying out period furthermore as speed-ups square measure given for the information sets of varied sizes in conjunction with discussion on however factors like imbalanced loads and bottlenecks that arises in the memories or disks limit performances (Alexey Kushnerevich et.al (2017). Methodology for Enterprise Reference ontology Development (MENTOR) could be a method to hold up the event of general reference metaphysics and support the linguistics modifications among totally dissimilar ontologies. This system consists by 2 parts: Lexicon Settlement (Phase 1) and Reference ontology Build (Phase 2).The primary section represents a site information acquisition, that can be diagrammatic during the linguistics organized structure with details. The primary section createsthe synonym finder and wordbook mistreatment nomenclature gathering so as to ascertain the glossary of a selected field. The secondary section represents the structure of the reference ontology and also the linguistics mappings between all the ontologies. In expectation of this section, existing ontologies and different forms of information illustration is used as input to harmonization ontology method along of synonym finder and

wordbook (Alessandro Oltramari et.al. 2016). A machine ontology corresponds to a computer code linguistics model of the world. Amongst different tasks, such a model is retrieved, inquired, modernized and A Study on Information Sharing Framework for Industrial Internet of Things employed by the humans, agents, automatic reasoners and call support systems. In an exceedingly network, supply and target processes interact by transmission formatted data employing a communication protocol. The formatted information unit is termed as a packet. These are of nice significance for several features of network communications, like the equalization of the loads and routing improvement. From network security and intrusion detection perspective, these packets square measure of goodly attention furthermore, it also includes management data within the headers and also the actual information is approved on behalf of this method (Bonomi et.al 2014). The secondary part contains a massive range of heterogeneous finish devices (sensors and actuators). These are firmly as well as in the physical world; such firm pairing allows the devices to effectively observe the physical world. The heterogeneous finish devices might have notably totally diverse potentials in terms of computation, storage, communication, and power provide. For an instance, some devices like good meters square measure potent, sufficient to convince affordable serious computation necessities, whereas additional such as the RFID tags will solely accumulate large amount of knowledge and scarcely have any computation ability. The actuators during the part are used to perform commands from the IoT applications (Bruno et.al 2016).

MATERIAL AND METHODS

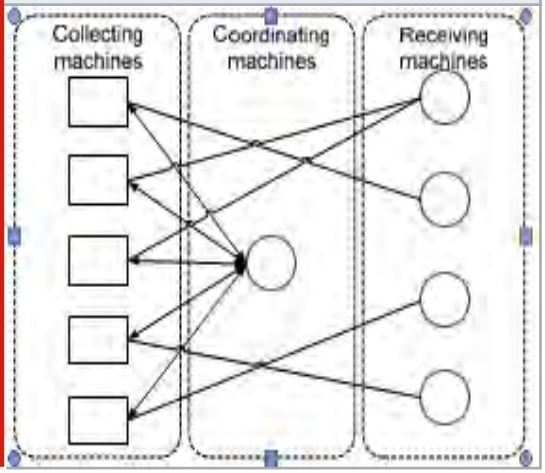
Security Framework

The parallel processing system for IoT security observation is meant for assortment and pre-processing of huge amounts of knowledge regarding security events that ar received from the terminal devices. the safety event sources generate massive volumes of heterogeneous traffic that may be classified as huge information. It consists of the subsequent purposeful elements: the information collector element that's liable for the timely and correct receipt of knowledge regarding security events from sources of various types; component of the information storage, providing secure storage of information and economical process of requests; element for data normalisation and analysis, changing the information collected to the unified format and working on them the most pre-processing steps; the information mental image element, permitting period visual analysis mistreatment antecedent developed models of visual image. The overall system design that has these parts and also the relationships between them is depicted in Fig.1. The arrows indicate the direction of information flows. The information collection element organizes the distributed information acquisition and their storage within the data storage element. the information have normalization and analysis element gets information from data storage element and it transmits back the results of their work to save lots of them. The information of visual image element receives from the information storage element the ensuing data that were generated by the information normalisation and analysis element, and presents them in an exceedingly kind appropriate for more perception by the operator.

Information Collection

Figure 2 shows the data collection element is meant to gather traffic on machines of the controlled IoT network and to send it to the information storage element. Machines concerned within the knowledge assortment element, by their

Figure 2. Data Collection



practical purpose are divided into the subsequent types: grouping, accustomed collect the data; coordinative, designed to manage knowledge collection; receiving, supposed to receive the information collected. At assembling machines of the controlled network the appliance agents are put in with the subsequent functions: affiliation to the coordinating machine; obtaining the address of the receiving machine to send the logs of the traffic; obtaining the list of receiving machines to be enclosed within the set of machines, not forming traffic that's logged within the collection; beginning of traffic collection; causation traffic log to the receiving machine.

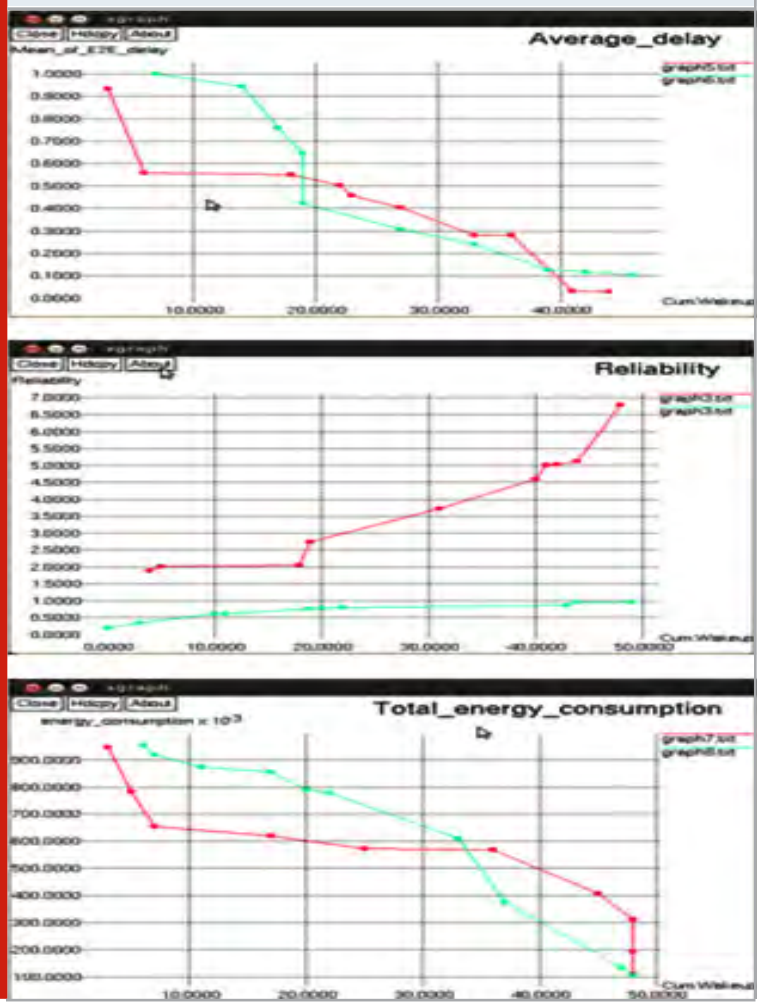
Threats In Iot System Model

A standard IoT system will be totally depicted and explained by exploitation 3 basic type of layers: Perception, Transportation and Application. Actually, in (Bonomi et.al 2014). the security problems of every layer are examined independently by wanting for new strong as well as possible solution.

First Layer

The First layer is connected to the physical IoT sensors to maintain information assortment and process on completely diverse general technologies like RFID,WSN, RSN (RFID sensing element Network) and GPS. This layer includes sensors and actuators to carry out completely diverse datas (i.e., temperature, acceleration, humidity, etc.) and functionalities like querying location [5]. Because of these restricted node resources and dispersed

Figure 3. Time of Extinguishing.



structure, the most security threats returning from the Perception layer are the following:

Material Attacks
This kind of varieties of attack is targeted on the hardware parts of the IoT system and the attacker wants to be physically shut or into the IoT system in order to create the attacks operating. Some examples of those attacks are:

Device Tampering
The aggressor will effect harm to a device node, by physically exchange the total node or a division of its hardware or perhaps electronically examine the nodes to achieve access and modify sensitive info.

Malicious code Injection
The invader compromise a node by physically introducing it with malicious code that will provide him right of entry to the IoT system. Impersonation: Validating within the dispersed surroundings is extremely troublesome, permitting malicious nodes to use a fake characteristics for malicious attacks. Denial of Service (DoS) Attacks: Attackers make use of the limited process ability of the nodes, creating them inaccessible. Routing Attacks: In-between malicious nodes (e.g. in aWSN) would possibly alter the proper routing methods throughout the data collection and advance method. Data Transit Attacks: Different attacks on the confidentiality and integrity throughout information transit (e.g. Sniffing, Man-In-The-Middle).

Second Layer
This part principally provides the access to surroundings for the perception layer. The aim of this layer is to broadcast the gathered data, received from the perception layer, to any specific data processing system through active communication networks employed by both Access Networks (3G, WiFi, unintentional network, etc.) or Core Networks (Internet). Figure 3 shows the performance of Security framework for industrial control application. The IIOT shared information is used to establish the Security and confidentiality. It shows the delay, reliability and energy consumption of the entire networks. The receiving machines receive logs of the traffic from grouping ones and send them to the info storage element. The total energy consumption result is drawn in figure 3.Energy consumption result is based on the transmission speed during the working hour in industry. It transmit data to the Administration server. We are trying to reduce energy consumption so that we have to find the Delay and reliability of the particular area transmission. After the calculation of delay and reliability we have find the energy consumption. Initially all the nodes are in idle state relevant nodes are automatically change their states to Active. Again when Machines are stopped, the nodes are going to sleeping state.

CONCLUSION

The IIoT has more security problems. In this paper we attend the issues to provide proper security mechanism to make the IIoT environment to be more secure and free from security threats. It encodes the device's collective message and send it to the IIoT administration. This system decodes the device message and compares it with the previous system operations. After this process, finding the progress changes in the industry. IIoT data transacted over a wide area network. Security frameworks are more searable tool that provides a security for the entire application. In future researches are directed at developed practical level IIoT application. We are also planning to evaluate our framework for IPSEE of IIoT.

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Technological Communication

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Load Management Strategy for Residential Microgrid Application with CCCV Charging of Storage Battery

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ABSTRACT

An ever-increasing demand of electric power has struck a new challenge for researchers around the world to come up with innovative and efficient strategies for household load management. A large number of appliances that run on the distribution network need various converters and adapters for proper functioning. The losses due to these peripherals can be minimized by employing a DC based microgrid for in-house charging applications and to run DC lighting systems. The functioning of such loads can be configured using a DC microgrid in a closed area. This will lead to an improvement of the load profile of the AC grid and fewer losses in the system. A constant current constant voltage (CCCV) charging technique has been employed for charging the backup storage battery. This paper proposes an implementation of this system for a residential building. Simulation based results have been achieved for various real-time situations using MATLAB/Simulink environment and the results have been discussed.

KEY WORDS: DC MICROGRID, LITHIUM-ION BATTERY, CCCV CHARGING, RESIDENTIAL APPLICATIONS.

INTRODUCTION

Energy demands of the present day world are increasing at an exponential rate and require the attention of expert researchers around the world. The demands are being ad- equately addressed by investing in discrete energy power stations powered by coal and other fossil fuels. A major part of the energy demand is also fulfilled by hydro power generation stations and renewable forms of energy. However, a proper management of the grid load plays a pivotal role in the performance of a particular power system. The load on the power system includes several devices that can be operated on a DC based system rather than employing separate adapters and converters for their proper functioning. These peripherals add up to the load on the overall power system and introduce extra transients in the system. This reduces the overall efficiency of the device under operation as much of the energy supplied to it is dissipated during several

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conversion processes. This paper suggests a DC based microgrid load distribution for the DC loads like laptop and mobile phone batteries, led lights, etc. These loads are fed by the DC microgrid power and all the other essential AC loads of the residential building are operated by using a household AC grid supply. This creates a semi-autonomous microgrid system which enables the charging and operation of utility devices under any given situation. The proposed strategy for load distribution uses a PV based microgrid design due to the easy availability and overall reliability of solar power in a country like India, which experiences adequate irradiation around the year. A backup storage battery has also been added to the system so as to facilitate proper operation during the night hours. Alithium-ion battery has been chosen for this system owing to its advantages over other battery types. Lithium-ion batteries possess high energy density and have low self-discharge rates. Due to the widespread innovation and research carried out in the recent years, lithium-ion batteries provide a reliable and cost effective solution for backup energy woes. This study proposes a CCCV charging scheme for the storage backup battery. CCCV charging scheme is efficient for charging the battery in a short duration while maintaining a nominal voltage after the charging process is completed. Stand-alone microgrid has not been used here because of its unreliability during high load conditions or at instances of low power availability. The utility storage battery is charged using the grid AC power in case it runs out of power during late night hours.

The paper is organized as follows. Section II discusses the related work carried out in the domain of DC based micogrids, CCCV charging, residential load management and battery based storage schematics for load distribution. Section III consists of the modeling of the entire system in Simulink based environment. A comprehensive experimental validation of the proposed DC microgrid has been carried out in section IV.A detailed analysis and result discussion of the entire system is presented in section V, followed by a final conclusion in section VI. DC microgrids and their performance and effectiveness in comparison to AC microgrids has been a controversial topic of discussion. Over recent years, a lot of research has been going on in this domain owing to multiple advantages such as higher reliability, stability and efficiency Peyghami et al. [2016]. In Chaudhari et al. [2015], a control system has been implemented that incorporates load sharing between DC-DC converters that have been used in a microgrid. A constant voltage is maintained on DC bus of the microgrid by limiting the droop characteristic's voltage axis intercepts. Even though this strategy addresses the drastic voltage variations in the system, there is a trade-off between voltage regulation and load sharing which is a major disadvantage of droop control method. Optimal load sharing has been carried out in Thomas et

Figure 1. Block diagram of the proposed system

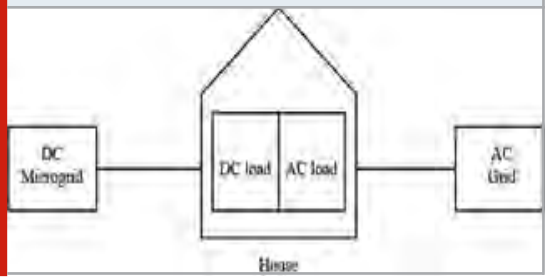


Table 1. Tabular representation of related work proposed in various papers

S.No.	Topic discussed
1	DC microgrid
2	PV based DC microgrid
3	Energy management in residential units
4	Battery energy management systems
5	CCCV charging of battery

Table 2. PV array parameters

S.No.	Component parameter	Value
1	No. of parallel strings	4
2	Series connected modules	1
3	Open circuit voltage	48.0001 V
4	Voltage at maximum power	48 V
5	Cells per module	10
6	Short circuit current	10.451 A
7	Current at maximum power	10.45 A

al. [2016] using the above-stated methodology for DC-DC converters connected in parallel in the microgrid using virtual output impedance topology. This has been done to prevent overstress on individual converters; however the system has slow dynamic response. Paper Li et al. [2017] proposes an energy management topology where a fuel cell is taken to provide a base load power supply along with a lead acid battery that buffers the imbalance in power between the PV generation unit and the load demand. The converters used have been coordinated by CAN-Bus communication protocol. Even though the system has high efficiency and makes use of renewable energy sources, continuous supply of power by fuel cell increases the cost of the network dramatically. Fernando and Kularatna [2015] proposes the usage of super capacitors to make a localized energy storage device that combats the short term energy fluctuations that may occur in a DC microgrid system. Super capacitors have a very high self discharge rate when compared to lithium ion batteries, hence they cannot be used for long term energy storage and supply applications. Paper Singh and Lather [2018] discusses a PWM based second order sliding mode technique to control voltage and generate duty cycles for the boost converters present in the DC microgrid. Although the system has inherent advantages, sliding mode control is very complex to implement.A PV based microgrid utilizes the solar power output generated by PV panels for the loads associated with it, in either connected or island mode. A fuzzy logic controller has been proposed in Sreeleksmi et al. [2017] for a PV microgrid's energy management, where various switching actions have been

Table 3. Battery parameters for Simulink model

S.No.	Battery parameter	Value
1	Nominal voltage	48 V
2	Rated capacity	104.17 Ah
3	Power output	5 kWh
4	Cut-off voltage	36 V
5	Fully charged voltage	55.8714 V
6	Nominal discharge current	10.417 A
7	Internal resistance	4.6 mΩ

Table 4. DC charger parameters

S.No.	Parameter name	Value
1	Effective input voltage	48 V
2	Current ripple at input	0.01%
3	Ripple frequency at input	1000 Hz
4	Bulk current	10.1467 A
5	Float voltage	48 V
6	Absorption voltage	50 V
7	Current ripple at output	0.01%
8	Ripple frequency at output	100 Hz
9	Settling time	20e-3 s

Table 5. AC charger parameters

S.No.	Parameter name	Value
1	Effective input voltage	325 V
2	Frequency	50 Hz
3	Bulk current	52 A
4	Float voltage	48 V
5	Absorption voltage	50 V
6	Current ripple at output	0.01%
7	Ripple frequency at output	1000 Hz
8	Settling time	0.01 s

Figure 2. Schmetic Diagram of entire system

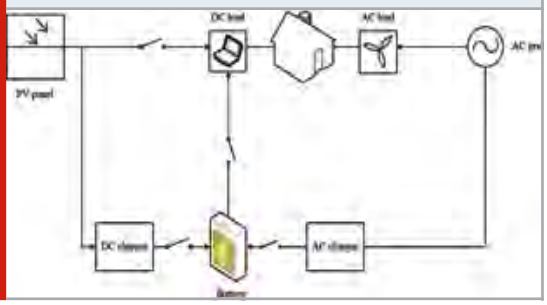
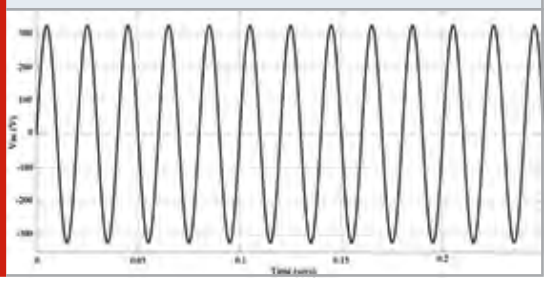


Figure 3. AC source voltage across AC load



performed for proper flow of energy. Similar types of study has been carried out in Shah et al. [2017] and Hashmi and Khan [2015] as well. Although the system gave efficient outputs, for a system working on a huge set of unpredictable real-time data, the computational time and cost is very high. Paper Singh et al. [2014] discusses the usage of a PWM inverter to convert the DC output to AC. The switching signals of the same are proposed by a 2-layer ANN control algorithm. At any point, a problem has to be translated to numerical values for ANN to work, hence this influences the network's performance.

In Rafı et al. [2015], the effect of a VSI embedded in a PV based microgird system has been studied on grid performance parameters such as power quality, voltage stability and reactive power balance. Paper M´ırez[2017] proposes the integration of AC grid-DC microgrid systems through four-quadrant inverters to mitigate the impact of voltage disturbances on distribution feeders. However, as there is no communication layer between the two individual systems, the entire network becomes unreliable on accounts of any disturbance occurring on either side. A real time energy management network has been implemented in Rodriguez-Diaz et al. [2017] that connects the renewable energy source with the energy storage system i.e, battery through a DC distribution bus. A scheduling 24 hours prior to the dispatch of energy is done on the basis of weather forecast and prediction of consumption of power by the residential settlement. Though the operational costs of the proposed system shows a drastic decrease, it cannot be assumed that the system's prediction even in cases of rapid disturbances will be correct. In Jing et al. [2016], a hybrid energy storage system (HESS) is designed to meet the energy demands of a microgrid. The HESS control technique meets the current demand and reduces the damages to the battery caused by rapid charge and discharge cycles but such large scales to rage is still expensive. Kakiganoetal.[2009]proposes that each house in a DC microgrid system to consist of a co-generation system, like fuel cell or a gas engine and the total power output from these systems can be shared efficiently at the distribution line to various loads. However, the cost of the entire system when multiple houses are taken into consideration is very high. In Yuasa et al. [2017], a numerical analysis has been presented that focuses on a

Figure 4. PV source voltage across DC load

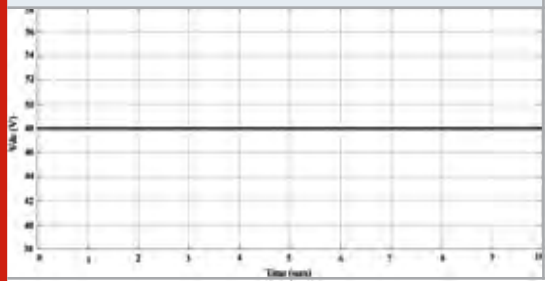


Figure 5. Grid current characteristics during emergency condition

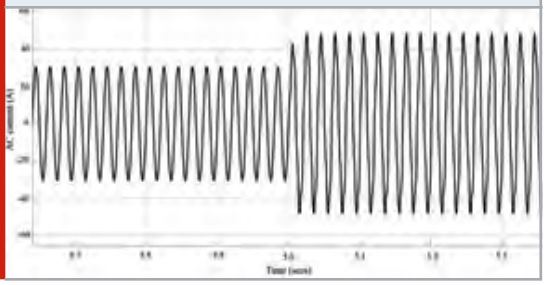


Figure 6. AC side charger input current during emergency condition

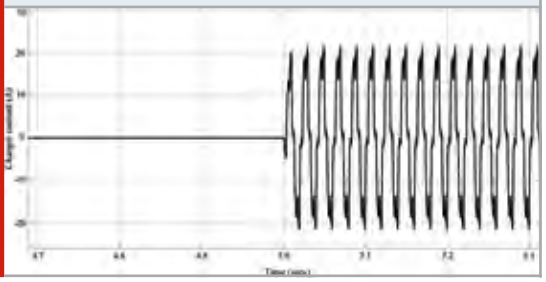
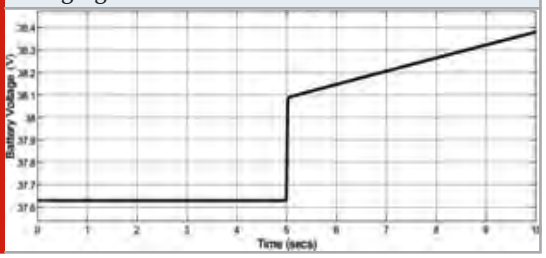


Figure 7. Battery voltage characteristics while AC charging



PV based microgrid with a battery energy storage system and shows that, as compared to a DC system, when AC supply is employed in the system, the self-consumption rate of the battery increases by 10%. As numerical analysis are performed at fixed step rates, they cannot give completely accurate results. A 4-switch bidirectional Cuk converter that works on voltage doubling concept has been deployed in Braga de Almeida and Illa Font [2018] to connect battery storage unit to microgrid. Even though the performance of such a system is better as lesser ripples are produced in charging and discharging cycles of the battery but a high number of reactive components have to be employed which disturbs the voltage profile of the grid. CCCV charging has been employed to charge batteries due to its multiple advantages over its counter parts Naetal.[2018]. Paper Hoque et al. [2016] proposes CCCV charging of a lithium-ion battery using PI controller and a flyback converter achieves efficient charge utilization. PSO algorithm has been used to efficiently find the optimum values of the PI controller parameters. However, the computational speed of the system becomes very slow when higher accuracy is targeted which becomes an issue in real life systems. CCCV charging is said to be more effective and with this, an optimal charging time can be achieved Dungetal.[2016]. This paper proposes a novel load management system to overcome the drawbacks presented previously. The system has been designed for household applications where the DC loads are powered by a PV based microgrid system with a 24-hour backup being supplied by a lithium-ion battery. An AC grid supplies the house's AC loads and further can be used to charge the battery using a CCCV charger during emergency outrages.

MATERIAL AND METHODS

System Modelling

The proposed load distribution system consists of various components to assure proper functioning of all devices. The residential load is assumed while considering an Indian house- hold with a DC load power demand of 500 Watts and an AC load power demand of 5 kW Jhunjhunwala et al. [2016]. The above specifications ensure a PV power availability of 500 W when there is an optimum solar irradiation of 1000 W/m2 and a surrounding temperature of 25 degree Celsius. This system provides appropriate power to run all the DC loads of the house and also provides adequate power to charge a backup battery. The backup battery proposed for the DC microgrid is the lithium-ion type battery. These batteries provide a reliable power backup during night situations, when there is no solar power available to run the DC loads. The battery is rated at 48 V of nominal voltage with an adequate capacity to run the DC loads of the house for a period of 10 hours at a stretch. the parameters of the proposed battery are stated in the following table. A lithium-ion battery with the following parameters provides sufficient power for the DC load of the house. The battery is charged using a CCCV methodology. A CCCV charger with a constant current charging during the entire charging period ensures a rapid charging of the lithium-ion battery. With the proposed charger, the lithium-ion battery can reach its fully charged condition in a time period of 2 hours. The constant voltage mode is then switched on so as to prevent any over voltage situation in the fully charged battery. It also gradually eliminates the charging current from the charging current by maintaining the nominal voltage across the battery terminals while the battery attains its maximum state of charge configuration. The following table suggests the parameters used to design a DC based CCCV mode charger for the backup storage battery. The proposed system might face many conditions of emergency when the battery can go out of power at night hours. These situations can be addressed by employing an AC power adapter for the battery charging during emergency situations. The adapter is also designed in such a way that the lithium- ion battery gets charged within 2 hours of time. The following table shows the parameters considered for the AC based CCCV mode charger for back up storage battery.

Experimentalvalidation

An experimental validation of the entire setup is performed by designing the simulation model of the system in Simulink environment as shown in Fig.2. Real time situations have been considered where the system can intelligently switch its

power source as per the requirement. A PV array supplies power to the DC microgrid compo- nents. It is connected to the household DC loads and alsofeeds the DC based battery charger which charges the storage battery. The battery feeds power to the household DC load during night hours. Both the battery and the PV array are self-sufficient to provide 500 W of undisturbed power to the adacrossa DCvoltageof48V. The in-house application load is fed by rms AC grid supply of 230 V. It runs all the AC loads of the house like fans, coolers, washing machines, etc. These loads are powered by stand-alone AC grid, considering that they are the essential loads of the house and require continuous power atany given instant of time. This AC supply also supplies enough power to charge the storage battery of the DC microgrid in case of emergency situations. The switching in the system is performed at the appropriate instances so as to imply proper energy flow between the components of the entire system.

RESULTS AND DISCUSSION

The system is basically designed to distribute the household load amongst the DC based microgrid and the AC grid supply so as to improve the load profile of the AC grid and to improve the efficiency of the overall system. Fig. 3 shows the voltage supplied across the AC loads of the house at normal day-time condition. It is a 325 V peak-to-peak supply from the AC grid which can also be used to charge the battery under emergency conditions during night hours. PV array used in the DC based microgrid is used to supply DC power to the DC household loads during the day-time. It supplies 48 V DC voltage across a total DC load of 500 W. This voltage characteristic can be seen in Fig. 4. During the conditions of emergency, the grid supply based AC charging device is switched on to charge the battery. The node connecting the house hold AC load and the AC battery charging adapter is studied in this paper. Fig. 5 shows the variation in the nodal current characteristics during such emergency situations. The current drawn from the node increases by around 20A for the battery charging process. This value is justified because the CCCV charging methodology employed to charge the battery uses 52A of constant current in the constant current mode of charging which is achieved by internal circuitry of the CCCV charger. The current going into the AC adapter at the grid side also registers a change when the charging circuit is switched on at the AC side. Fig. 6 shows the change/ sudden increase in the current going to the AC adapter when the AC supply is turned on. A comprehensive analysis of battery characteristics can also be performed for the real-times scenario where the AC adapter is suddenly switched on across a fully discharged battery Fig. 7 shows the characteristics for battery voltage during the case when the AC charger is suddenly switched on. We can see an instantaneous rise in battery voltage to a value higher than its cut-off voltage. The battery voltage can be then observed to be following a generic charging scheme. Battery charging current characteristics also register a change in value at the instant when the charger is switched on and this can be observed from Fig. 8. A constant current of 52 A starts flowing through the battery during the constant current mode, which allows a rapid charging of the backup battery Fig. 8: Battery charging current during emergency situation Fig. 9 shows the characteristics of battery SoC at the instant of switching on the AC based CCCV charger. Since SoC is a linear function of time, we can see a

Figure 8. Battery charging current during emergency situation

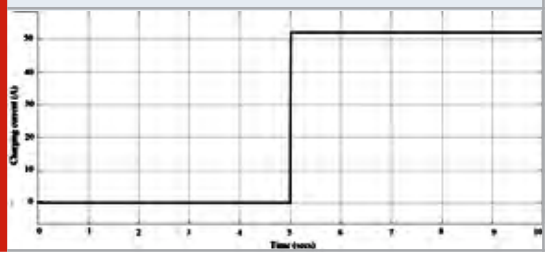
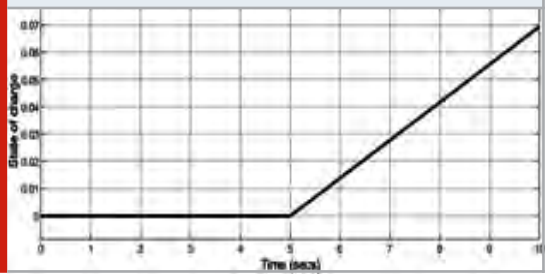


Figure 9. Battery SoC during emergency condition



steady increase in the battery SoC as soon as the charger is switched on.

CONCLUSION

DC based microgrids can play a significant role in improving the load profile and over all efficieny of a power system. DC loads of an Indian household have been powered by PV based microgrid backed up by a lithium-ion battery pack. The proposed system utilizes the AC power only in the cases of emergency, where the backup battery pack runs out of energy during the night hours. In all other scenarios, the DC load is powered by a self sufficient PV based microgrid system. All the results show the impact and scenarios that may occur due to the proposed system. The study analyzes the possibilities in a comprehensive manner and provides judicious solutions for the same.

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Review on 5G Healthcare Using IoT Based Sensor Devices

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ABSTRACT

Healthcare is going to be a paradigm change in our future technology, which increases the evolution of multiple devices with sensor equipment and telemedicine. Besides, it can handle large amount of data with low latency and it requires more bandwidth for proper diagnosis. Therefore, 5G is a best choice to achieve these requirements. It can done through Internet of Things (IoT), which is an effective technology for future generation. Further, this paper review about IoT based sensor devices for observing patient's health data. Also, it discuss mobile apps and devices for continuous monitoring with the help of wearable sensor devices, which is based on sensor node architecture to observe patients health issues in an easy and comfort zone.

KEY WORDS: INTERNET OF THINGS (IoT), FIFTH GENERATION (5G), WEARABLE SENSOR DEVICES.

INTRODUCTION

In our competitive world, the demands of wireless technology has been increases day by day which requires more bandwidth, high speed and low latency to meet the demands of increasing data rates. The technology which achieve these requirements is known as (5G) fifth generation. It deals with speed up to 10x times faster than 4G and supports for ultra-high definition videos, movies in a fraction of time. 5G plays an important role to increases the number of connected devices towards the data transmission. Further, the number of connected devices are achieved through Internet of Things (IoT). In general, the IoT based wireless sensors and wearable devices are followed in our routine life. It integrates with medical devices and sensor equipment's for continuous monitoring. Then the observed data are transmitting through digital technology such as Wi-Fi, Wi-Max, Zig bee, Bluetooth and LoRa. Besides, these technology needs high speed network access like 5G which

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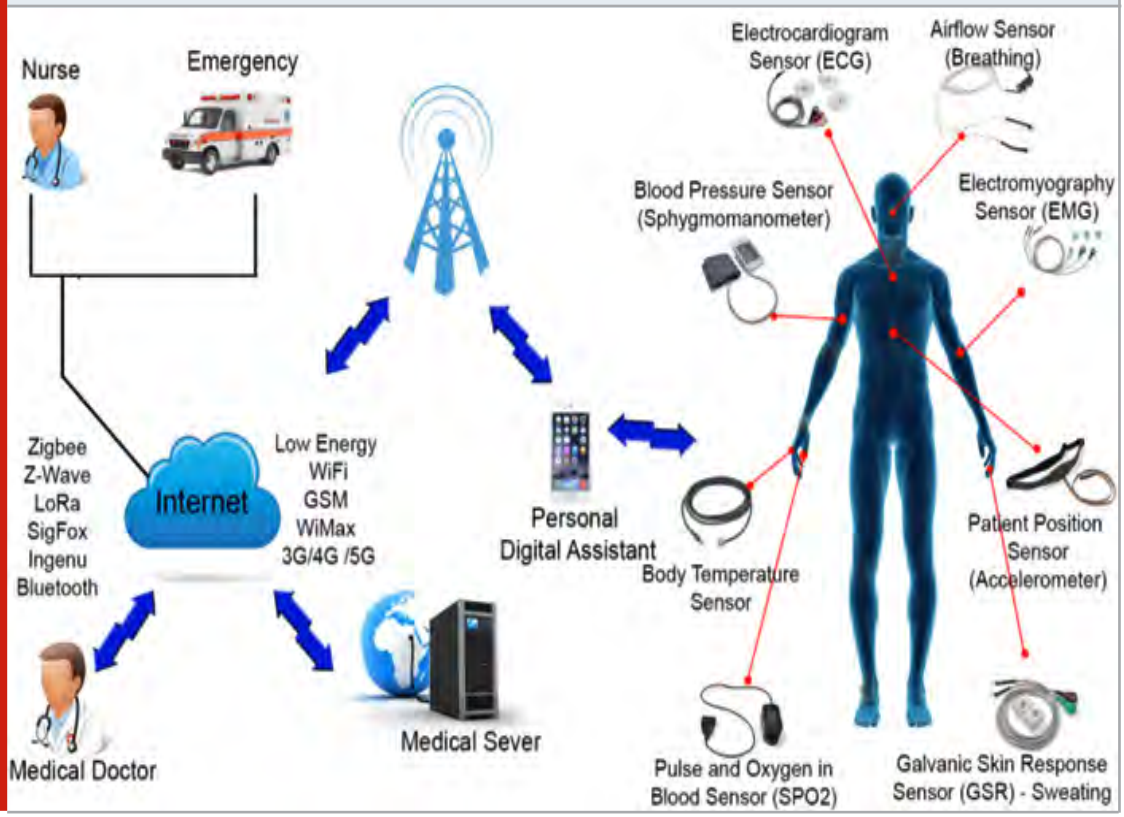
have ability to transfer ultra-high quality images, supports for high reliability and low latency. This technology helps the doctors to monitor patient's data via video calling, and online mobile apps. For anytime access the entire online records are in the cloud storage with the help of IoT (Changak et.al 2011; Hina Magsi 2018). Out of these, some scarcity and improper distribution of medical treatment are still under obstacles so, telemedicine is a best choice for solving the demands and challenges of existing method (An King 2016). As such, it is a cost saving method for improving patient's health care with chronic illness, and it prevents the health monitoring for disease complication. The main contribution of this paper follows as: i). review about remote monitoring healthcare system, ii). Discuss about various sensor devices, iii). Open issues and challenges for future generations. Therefore, this review related to Internet of Things (IoT), biomedical engineering and daily routines in hospital, clinic (or) homecare environments (Joel et.al 2018). Generally, the rest of the paper organized as follows. Section II, represents the remote healthcare monitoring using IoT. Section III, discuss about mobile apps and devices. Section IV, presents the key technologies and challenges. Section VI discusses some of the application scenarios and finally this article is concluded in Section VII.

MATERIAL AND METHODS

Illustration of Remote Healthcare Monitoring System Using Iot

Remote healthcare technologies are usually adopted in hospitals, clinics and homecare environment. It plays an important role in remote monitoring of individual real time communication for patients and physicians, at the same time it reduces time, cost and improve quality of medical healthcare system. It can be performed by application which requires patient's medical data for remotely diagnosed. Further, these applications include user interface devices like smart phones, tablets, biosensors, computers

Figure 1. Architecture for remote healthcare monitoring system [6]



and internet connectivity. It can be accomplish with the combination of IoT, mobile computing and cloud storage. As such the infrastructure of data communication was proposed by (Machado et.al 2016), the main objective of this method to transmit, capture, and store biomedical signals in real-time applications. The Eco Health was developed for IoT which connects patients, healthcare providers and sensor devices. It is a Web-based scenario that permits data management and IoT applications for future development, it mentioned issue like interoperability that occur between various devices (Maia P. 2014).The same approach was developed by (Serafim 2018), to monitor patient's healthcare in rural and low population areas with the help of IoT based senor network. Based on their necessity the healthcare providers refer the patient's data in remote locations and emergency assistant. In (Laine et.al 2014), they proposed an alternative method called U-Healthcare. It is based on the mobile gateway for every healthcare system which collects data, processes it and stores it in the cloud for remote access method. An overall infrastructure was developed by wireless area network, personal server using personal digital assistant, and medical server for continuous monitoring as shown in figure 1. It consists of different types of body sensors that collect patient's data immediately. Thus the respective data are communicated via internet through doctor, medical server and personal digital assistant. (Matar et al. 2016), proposed a remote body pressure monitoring for sleep analysis, anesthetic surgical procedures, and other area detection. (Istepanian et al 2011) proposed a non-invasive glucose level sensing by sending patient data to healthcare providers in real-time analysis. Another prototype proposed by (Senthilkumar et al. 2016) using a humidity and heart rate sensor. Also, mHealth is highly capable for monitoring the patient's cardiac rehabilitation in (Kitsiou et al. 2017). Therefore, the collection of data sent to the cloud for remote access by healthcare providers. Similarly, a body sensor was discussed by (Khan 2017), that sensors are directly connected to smart phone users to receive the data which processed and stored in the cloud to allow access and monitoring by healthcare providers. (Abawajy et al. 2017) establish a patient health monitoring (PPHM) system integrated with cloud computing and IoT. It is applied in the real-time monitoring of a patient who suffered from congestive heart failure using ECG for a flexible, scalable, and energy efficient system. (Mamun et al. 2017)] proposed cloud computing for monitoring and detecting Parkinson patients that will enable healthcare service in low cost setting. Further, (Ganapathy

Figure 2. Use of Robots (Tung et.al 2015)

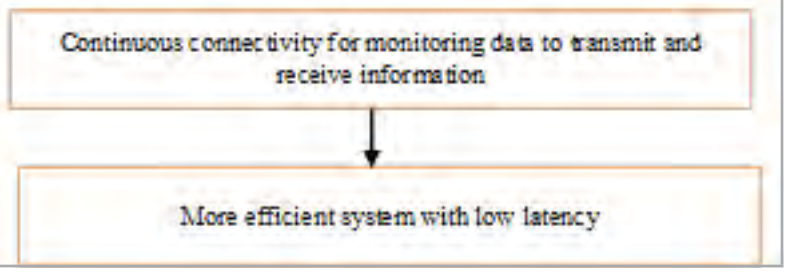


Table 1. 5G Connectivity parameters

Evolution	Data rates
LTE	100Mbps
LTE - A	1Gbps
LTE – A Pro	3Gbps
5G	10Gbps and beyond

Figure 3. Hospital Management [32]

et al. 2016) concluded a remote self-monitoring system of blood pressure to detect highest blood pressure for pregnant women and the proposed model is testing a blood pressure at home itself. These types of sensors are used to detect the patient's health at remaining place itself.

Mobile Apps And Devices For Digital Healthcare System

This section explains mobile apps and devices which created for "Digital healthcare system". The development of mobile apps has been constantly difficult in existing and present system because, the design and functionality of the system is complex by carrying high data rates with lesser bandwidth requirements. To compete these demands, healthcare moves forward into 5G network. It offers high data rate, speed and reliable connection of mobile devices towards next generation. Here, some example mobile apps are discussed for monitoring patient's health issues such as: It is a motion control for games, but now it is being used in orthopedics for patients who need to exercise after a fracture. With the help of Myo, patients can monitor their progress and doctors can easily measure the angle of movement.

Zio Patch

It measures the heart rate and electrocardiogram (ECG) signals (Tung et.al 2013).

Glaxo

It is recently announced that investing in electroceuticals, bioelectrical drugs that work by micro-stimulation of nerves (Famm et.al 2013).

In accordance, Google developed J&J for robotic surgery and wearable devices like blood pressure monitors are manufactured by collaborating with Philips. The sensor technologies such as smart lens and wearable device are established by Novartis with Google to measure the blood glucose levels (Senior M. 2014); My Dario.com). These sensors are connected to gathered information about patient's health issues, but particularly fit for the right patients by right clinical trials. Furthermore, there are several types of sensors available in markets such as body sensors and gadgets which are mainly used by athletes and runners. In addition, it gathered lot of advanced data such as inflammation and sleep patterns instead of pulse, blood pressure, ECG and respiratory rate. Nowadays, some of the mobile apps like myDario and SleepBot which supports devices for handling several applications (https://mysleepbot. Com). As well as it has been predicted as future technology because, the health outcomes are look at our phone, smart watch and tablet itself.

Key Technologies And Challenges

Today the wireless technology faces many issues towards infrastructure, network connectivity, latency, and real time monitoring. In order to enhance those requirements, several key technologies and challenges are discussed below.

Key technologies

IoMT devices

The IoMT devices can able to manage a large amount of data, which stored by using some electronic devices such as wearable sensor, implantable medical devices like pacemakers, and smart (or) remote sensor devices.

Smart wearable

In smart wearable, the health parameters are calculated as heart rate, measuring blood pressure, and monitor patients breathing rate, were those analysis are done through sensor devices, which wearer according to the patient's health issues.

Tactile Internet

It is referred as next evolution of IoT that combine ultra-low latency with high reliable process that involved in robotic surgery to maintain latency in a millisecond level and immediate response to the patient's.

Critical Communications

The critical communication is a remote health monitoring system which analyzes the blood sugar, ECG, temperature with Quality of Service (QoS).

Emergency Services

The emergency medical services are done through communicating nodal hospital by appropriate patient information with the help of high resolution images/videos in correct a manner.

Privacy and Security

The patient data's in an accurate manner, which is based on the necessities to adopt the importance of special mechanisms. Thus the entire data must be secure with high level privacy and increased Quality of Service (QoS) towards the network.

Challenges

Connectivity

Based on the necessity of applications sensor devices are connected in the body. It can handle through Wi-Fi, Bluetooth and Zig bee technology. For sensor applications it takes data rate up to as followed in below table.

Bandwidth

The bandwidth requirement may vary from few Mbps to several Gbps, depends on the consumer usage. This bandwidth could be served by Wi-Fi, LoRa, Bluetooth, LTE and 5G cellular networks. It is a dependent technology that based on the ecosystem, primary health care center, network connectivity towards hospitals, internal and external hospital connectivity, and telemedicine.

Latency

The respective devices could response a time about few seconds to few milliseconds. It would be to identify the level of latency. For example, advanced robots could need to take several times for monitoring data within the order of seconds for reporting their information to the central cloud system.

Spectrum

It plays an important role in the intra-hospital type communication. It supports for short range communication as well as the usage of high frequency band towards digital healthcare system. For remote healthcare, it needs lower band usage about 6 GHz range to accommodate the coverage areas.

Network slicing

The unique part in medical field is network slicing, it was reviewed by as per ABI research institute. The term network slicing act as a starter point for analyzing high level technology in healthcare system and it is used to manage millions of connected devices for maintaining privacy, security between patients and doctors. Therefore, slicing could also provide e2e support for performing specific task like active monitoring, condition analysis, and vital data transmission in the healthcare technology.

Application Scenarios

In 5G healthcare, the application scenarios are involves several smart technology such as transportation, medicine, robotics and electronics sensor devices. It offers at high data rates, low latency level that integrates into variety of advanced technologies like robotic surgeries. Further, it includes some electronic devices such as biomedical, wearable sensors and video transmission which are done through GPS technology. It gives better efficiency to the system, higher bandwidth requirement and supports for multiple technologies (Ali Hassan et.al 2017). Thus the wearable sensor collect more information about various body parameters such as EEG, ECG, blood oxygen and EMG. In order to improve the transmission performance through videos and images then the lifetime of sensor get increased [31]. So, the analysis of big data and continuous monitoring tends to integrate from every home to hospital as well as the wireless sensor network (WSN). It supports thousands of sensor nodes that are combined with each other and gathered information are transferred through gateway devices which communicates to cloud for secure connection (Pallavi Sethi et.al 2017). In accordance, it consists of several application with the combination of sensor technology such as smart clothing, robotics, hospital management, and monitoring healthcare data.

Smart clothing

Smart clothing is a monitored technology, which act as a smart shirts (or) suits to analyze the human physical condition. It is a multimodal process which incorporated by multiple physical data that can be transmit via bluetooth for real time application. It is essential for diagnosing the biomedical data such as pulse rate, heart rhym and physical movement. Similarly, the main goal of this technique is, to track EEG and ECG signal also measures oxygen level in the blood. Further, it gives more comfortable, and better accuracy for

disease diagnosis. Also it tracking chronic health issues than wearable devices [Changak et.al 2011; Chen M et.al 2016).

Robotics

The main objective of robotics is to transmit and receive patient's healthcare details in anaccurate manner. Remote surgery is a best choice to reduce the latency in digital health care system. For example, sometimes the specialist are not available in larger hospital at that time the robot can remotely connected with local surgeon which needs some experts knowledge for further treatment. In future, entering an operation theatre is a time consumption process. To meet out these, the robots can operate from their office via mobile connection which reduces end to end latency below 200ms, such robots are assisted in tele surgery scenario.

Hospital management: The below diagram shows that services which can be performed in the hospital management.

Monitoring healthcare system

This section describes, how the data can monitored as back to back analyses. Due to improper treatment facilities it is difficult to monitor the patient's data in rural areas and hospitals are located far away from the residential area. To overcome these problems, some of the medical issues are discussed below.

At first step, enhance the coverage areas (rural areas are the primary concern). Second stage, good indoor coverage to provide the continue connectivity towards doctors and patients. Third stage is to enhance the energy and battery life consumption and finally increase the mobility of high speeds networks. Along with it supports for low power consumption, longer lifetime, better coverage area and larger connected devices. These are achieved through 5G network which provide reliable, secure connection in a way that sensors authentication by the network (Pallavi Sethi et.al 2017).

CONCLUSION

Nowadays, the usage of smart phones are increases rapidly because, people have using their mobile phone for every process. When it comes into healthcare industry, mobile apps can easily improve the communication between doctors and patients for each and every second. It collects patient's health report in a secure manner, this leads to store large amount of information for proper diagnosis. As well as, it enhance the spectrum efficiency, bandwidth, low latency and increases the system performance for future developments. Further, it concluded with mobile apps and different application scenarios towards 5G cellular networks

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Remote Access of Programmable Logic Controllers

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ABSTRACT

This paper highlights the need for modern, cheap and efficient ways of remotely accessing programmable logic controllers or PLCs for remote troubleshooting and maintenance. The PLCs are often located at places far away from the control room and this makes it difficult to monitor the parameters of the devices connected to the PLCs.A secure remote access solution that gives real-time data would help solve this issue.This is achieved by accessing the Modbus RS 485 ports of the Modbus gateway connected to the PLC. Odisha Mega-Lift projects or Cluster Projects developed by Larsen & Toubro are being used as a case study for the same . Arduino microcontroller is being used to process the data and send the data to a cloud server using SIM800l module. MAX485 is being used to act as an interface between the incoming Modbus data and the TTL logic used in the microcontroller . This technique offers a very robust and cheap mechanism for the unique problems faced by the industry of industrial automation.

KEY WORDS: EMBEDDED SYSTEMS, INDUSTRIAL INTERNET OF THINGS (IIOT), INDUSTRIAL AUTOMATION, DIGITAL COMMUNICATION, MODBUS PROTOCOL.

INTRODUCTION

Programmable Logic Controllers or (PLCs) are devices that are used to automate the I/O devices connected to it. These devices are often located in remote locations. A major problem faced by the industry involves the remote monitoring of the parameters of the sensors connected to the PLC. Current monitoring systems involve either remote solutions optimized for specific PLCs or systems that are costly. The solutions that the majority of the vendors offer are in Ethernet protocol. Many a time, Ethernet ports are not available for remote access as encountered in Odisha Mega-lift Cluster Projects. The Ethernet ports that are provided are not available to be used for remote communication. Thus we are using Modbus RS- 485 port provided in the Modbus gateway to remotely access the PLC.

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Programmable Logic Controllers

A Programmable Logic Controller, or PLC, is an industrially rugged PC used for mechanical motorization. These controllers can robotize a specific method, machine work, or even an entire age line.The PLCs CPU stores and systems program data, anyway data and yield modules partner the PLC to the rest of the machine; these I/O modules are what offer information to the CPU and trigger unequivocal results. I/O can be either straightforward or propelled; input contraptions may join sensors, switches, and meters, while yields may consolidate exchanges, lights, valves, and drives. Customers can mix and match a PLCs I/O to get the right course of action for their application.Despite data and yield devices, a PLC may in like manner need to interface with various sorts of systems; for example, customers should need to convey application data recorded by the PLC to supervisory control and data getting (SCADA) structure, which screens various related devices. PLCs offer an extent of ports and correspondence traditions to ensure that the PLC can talk with this diverse machinery. To associate with the PLC persistently, customers need an HMI, or Human Machine Interface. These interfaces can be simple displays, with a substance readout and keypad, or immense touch screen displays like consumer devices, yet regardless, they engage customers to review and input information to the PLC constantly. [unitronicsplc.com].The 1769 CompactLogix controller offers control,communication, and I/O elements in a distributed control package or (DCP).This PLC is currently being used in the Cluster projects or

Figure 1. Compact Logix Controller 1769 and I/O modules(from Allen Bradley CompactLogix manual)

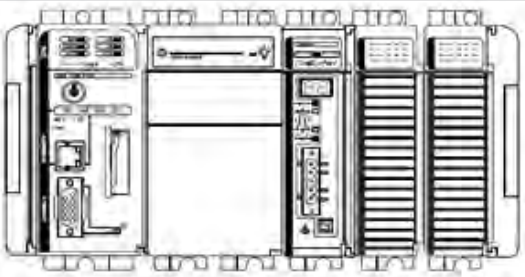


Figure 2. Modbus Port and Logic diagram [www.simplymodbus.ca]

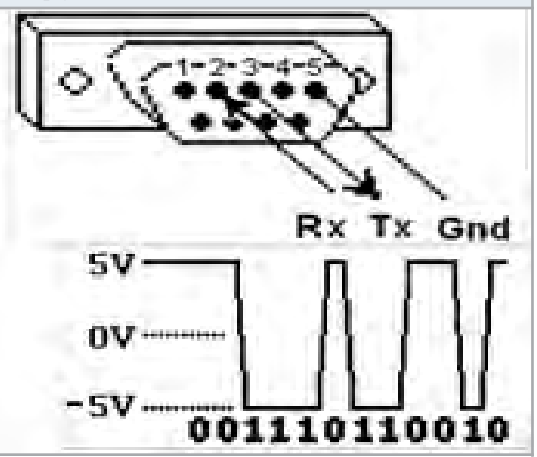


Figure 3. Micro 850 Modbus Gateway(from Allen Bradley micro 800 series manual)

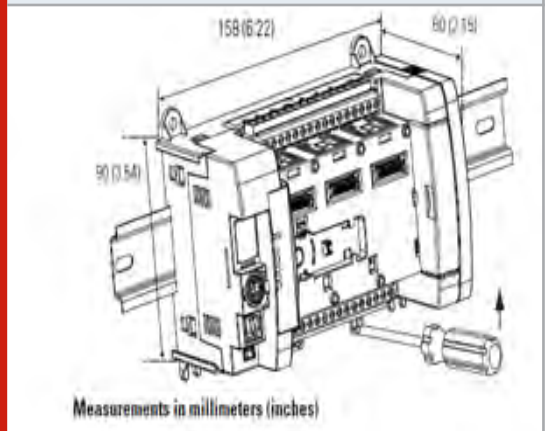
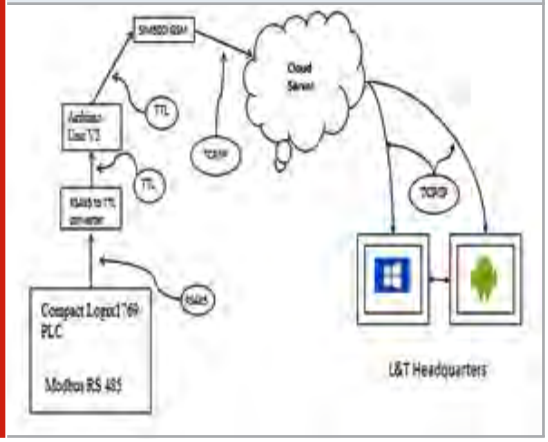


Figure 4. Block Diagram



Mega-lift projects in Odisha that were assembled by Larsen & Toubro.

Modbus Protocol

The Modbus is a sequential protocol created by Modicon in 1979 for use with industrial controllers. In basic terms, it is a strategy utilized for sending data over serial lines between electronic gadgets. The machine asking for the data is known as the Modbus Master and the machine providing data are Modbus Slaves and this is done by a mechanism called polling. In a standard Modbus arrange, there is one Master and more than 240 Slaves, each with separate addresses for slaves ranging from 1 to 247. Modbus is an open convention, implying that it's free for manufacturers and application developers to incorporate into their controllers without paying sovereignty fee. It has turned into a standard in industrial automation and is presently the most accessible methods for connecting PLCs[Paavni Shukia]. It is used by a lot of PLC manufacturers for inter machine communications. Modbus is used to transmit signals from instrumentation and control sections back to a principle controller or data logger, for instance a PLC that estimates motor winding temperature and sends the outcomes to a PC. Modbus is frequently used to connect various sections such as a I/O control and HMI with a remote terminal unit (RTU) in supervisory control and data acquisition (SCADA) . Forms of the Modbus protocols are used for sequential buses (Modbus RTU and Modbus ASCII) and for Ethernet (Modbus TCP).Modbus is transmitted over a sequential bus between machines. The most simplest setup would be a sequential link associating the various sequential ports on two machines, a Master and a Slave.). The information is sent as an arrangement of logic zeroes and ones called bits. Each piece is sent as a voltage. Logic zeroes are sent as positive "high" voltages and ones as negative "low". The bits are sent all around rapidly. Common transmission speed is 115200 baud (bits per second).All Micro800

Figure 5. MAX 485 (from MAXIM data sheet)

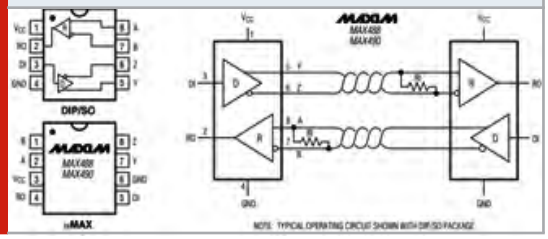


Figure 6. SIM800l Functional Diagram (from SIMCom data sheet)

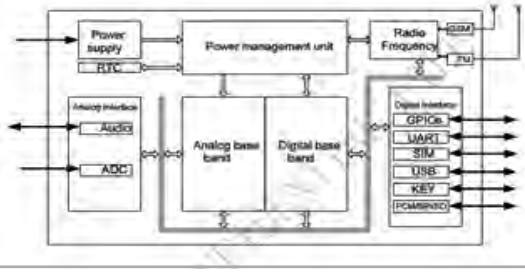


Figure 7. Arduino Uno V3 Schematic (from Arduino.cc)

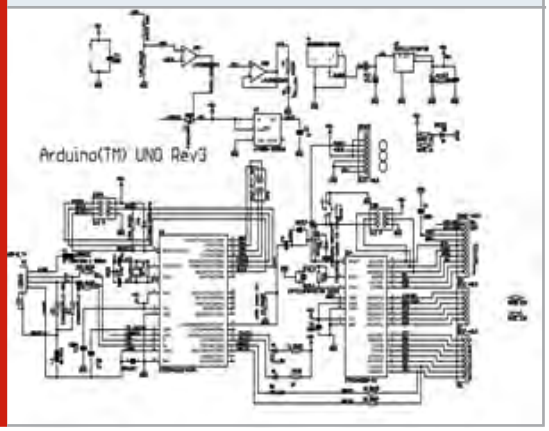
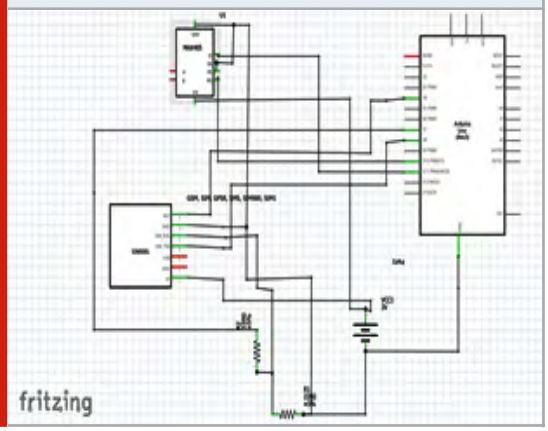


Figure 8. Circuit Schematic



controllers support Modbus RTU over a serial port through the embedded, non-isolated serial port. The 2080-SERIAL isolated serial port plug-in module also supports Modbus RTU. Both Modbus RTU master and slave are supported. [www.simplymodbus.ca] Here Larsen & Toubro is using Micro850 controller as a Modbus gateway [Claudiu Chiculita].

MATERIAL AND METHODS

Proposed System

The proposed method is an IIoT or Industrial Internet of Things based technology which will bring forth a cheaper, better and efficient alternative to the existing remote access systems out in the market that will be in a plug and play format [DAEIL KWON1].The system will give remote access to the PLC in a way that gives the remote user access just enough to see the parameters of the devices connected to the PLC and not entire remote takeover . This will ease off the security concerns that potential clients might have about handing over their system to a remote user for maintenance purpose. The following block diagram shall explain the technology used in the proposed system. The connection will be made to the RS485 port in Modbus gateway through which it will send the data to Arduino via RS485 to TTL converter .The converter is used to change the protocol of the data obtained from the Modbus and convert it to a protocol compatible with Arduino microcontroller.Arduino Microcontroller is programmed to obtain the data from the Modbus and send it to a GPRS moduleThe GPRS module will send the data to a cloud server which can be accessed from any mobile or PC device at the headquarters.

Harddware Components

MAX 485 RS485 to TTL Converter

RS 485 is an industrial protocol that is used in PLC controllers for inter - machine communication .Since Arduino microcontroller uses TTL(transistor transistor logic) for microprocessor logical operations , the converter module is required as an interface between Modbus gateway and Arduino microcontroller.

Sim800l Gsm/Gprs Module

SIM800L is a scaled down cell module which takes into account GPRS transmission, sending and getting SMS and making and accepting voice calls. Minimal effort and little pcb area and quad band frequency support make this module ideal answer for any undertaking that requires long range availability. Subsequent to interfacing power module boots up, scans for cell organize and login naturally.

Arduino Uno V3 Microcontroller

Arduino Uno is the most widely documented series of Atmega-16U2 type microprocessor based microcontroller. This microcontroller has more than enough capability for the task in hand for this project

Circuit Diagram

The above Circuit Diagram is used for the connection of the components as shown in section

Figure 9. Arduino Serial monitor output

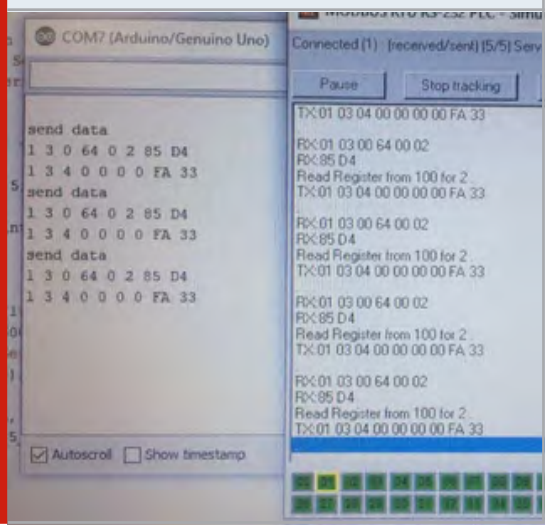
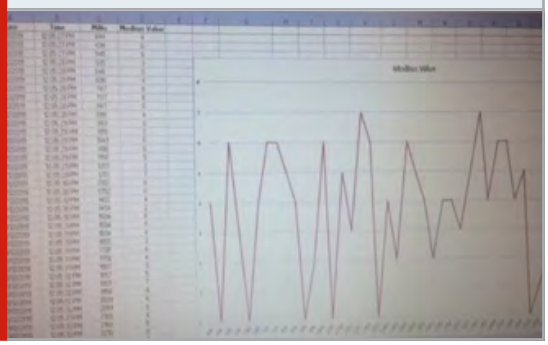


Figure 10. Excel Modbus Output



VI. The Modbus Gateway Micro850 is connected to MAX 485 . Here the Arduino acts as a master thereby polling data from the gateway. RO and DI are connected to PIN 10 and 11 respectively of Arduino Uno.The SIM 800l module aids in the transmission of data received by the Arduino to Cloud Server.PIN 7 of Arduino Uno is connected to RX pin of SIM800l via a voltage divider as the module is sensitive to 5V logic level of the Arduino output. PIN 8 is connected to TX pin of SIM800l and a 3.7 V power supply is given to the SIM800l module.

RESULTS AND DISCUSSION

The data was retrieved from Modbus gateway via the MAX 485 module and processed in the Arduino. Below shown is the figure of the Serial monitor display of Arduino showcasing simulation of the data transmission and reception. The data can be sent to a cloud server and can be downloaded at L&T headquarters in an excel or .csv format This data can be received with a time-stamp and plotted into a graph using excel's inbuilt functions . The figure shown below showcases the same.

CONCLUSION

This System gives a lot of advantages compared to prevailing market solutions in the following ways :

1. Cheaper solution compared to all the existing Industrial routers that offer the same.
2. Can get the real time data without much hassle.
3. Robust solution that is compatible with all PLC systems Eg: Siemens, Allen Bradley etc.
4. Plug and play solution.
5. More Secure as Remote Users cannot take over the PLC system.

In Conclusion , this is the best possible solution for the remote access solution that companies like Larsen and Toubro desire.In the future this can be integrated with all the PLC systems data and create a central database for monitoring using big data solutions .Machine learning can be implemented to predict the maintenance schedules and probable problems that might occur in the sensors.

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Metamaterial Inspired Slotted Rectangular Patch Antenna for Multiband Operation

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ABSTRACT

A Rectangular slotted metamaterial antenna with defected ground structure is proposed for multiband application. The proposed structure has the maximum dimension of 17 x 18.5x 1.6 mm3and the entire structure is fabricated on a single layer FR- 4 substrate material. It has 5 design stages namely antenna A, B, C, D and E. Antenna A is a simple rectangular patch antenna which operates at 2.9 GHz, antenna B is the rectangular patch with slot in the left side with dual band resonance at 2.8 GHz and 5.8 GHz, antenna C with slots in the right side of the rectangular patch has triple band resonance at 2.25 GHz, 3.5 GHz & 4.6 GHz, antenna D which is the combination of slots at both sides has the operating frequency at 2.5 GHz, 3.5 GHz and 5.1GHz. Finally, the antenna E with metamaterial structure can able to achieve tri band application at 2.42 GHz,2.8 GHz and 4.7 GHz. All the structure are simulated with the CST software. The entire structure is characterized with the help of return loss, radiation pattern, surface current and gain. The optimum values of the critical parameters are chosen with the help of parametric analysis.

KEY WORDS: METAMATERIAL, ISM, WIFI, WLAN.

INTRODUCTION

Now a days, for monitoring the physiological parameters the wireless medical devices plays a vital role. The frequency band approved for theses application is MICS and ISM band. With the invention of these wireless devices, the health monitoring system of the patient who is located in the remote place can be easily monitored, facilitating the diagnosis and treatment. Due to the low profile and its conformality ability the microstrip patch antenna is widely used in such wireless devices. The major demand of such antenna used in these devices is compactness. There are many techniques used for miniaturization (Huang et al,2011; Liu et al, 2008). Many techniques used for multiband and wide band operation. Of which the introduction of slots in the patch are Widley

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used for achieving wideband. Introduction of Metamaterial in the design of microstrip patch antenna for the multiband and wideband is also presented in [Prasad et al, 2017]. The major disadvantage of the microstrip patch antenna is its narrowband operation, which can be achieved with the help of introducing slot. The multiband operation is difficult to achieve, which can be done with the help of metamaterial. Due to the outstanding electromagnetic behaviour of the metamaterial and its effective homogeneity limit P<ʎg/4(Christophe et al., 2006), the antenna performance is enhanced. In the recent past many metamaterial structures such split ring resonator (Elavarasi et al., 2016), omega shaped (Javid et al., 2017) and Complementary split ring resonator (CSRR) (Francisco et al., 2013; Boopathi et al., 2017) has been reported. And the researches are widely utilized the artificial Electromagnetic structure in the design of antenna for improving the bandwidth, band of operations and return loss. In this paper, a Metamaterial inspired slotted rectangular patch antenna with defected ground structure is proposed for multiband operation. The proposed antenna is fabricated on a Single layer FR4 structure. The design steps of the proposed structure is depicted in Figure 1 and the Geometry of the proposed antenna, its respective parameters are shown in Figure 2 and Table 1 respectively.

MATERIAL AND METHODS

The rectangular patch antenna A is designed to operate at 2.8 GHz which is denoted as antenna A. and then the slot of 3.5 x 2.5 mm is introduce on the left side of the rectangular patch to design antenna B which operates at two bands 2.8 GHz and 5.8 GHz. Then again, a slot on 12 x2.5 mm is introduced to design antenna C, which operates at triband 2.25 GHz, 3.5 GHz & 4.6 GHz. Antenna D which has slots at left side as well as right side is designed to operate at 2.5 GHz, 3.5 GHz and 5.1GHz. Finally, antenna E is designed by introducing a metamaterial structure called split ring structure at the bottom of the substrate,

Figure 1. Evolution of Proposed Design

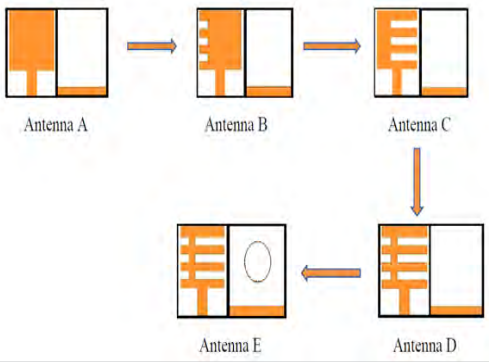


Figure 2. Geometry of the proposed Design

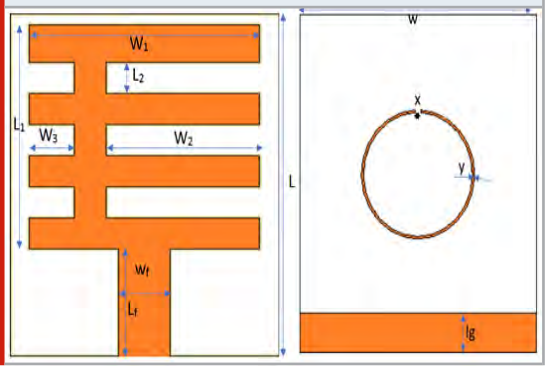


Table 1. Parameters Values in mm

H	T	L	L1	L2	Lf
1.6	0.035	18.5	17.5	2.5	8.6
Lg	W	W1	W2	W3	Wf
3	17	18	12	3.5	4

Table 2. Resonant Frequency and Bandwidth comparison of Evolved antenna

Antenna	Resonant Frequency (GHZ)	Bandwidth (MHz)
A	2.9	876.81
B	2.8	805.04
	5.6	652.75
C	2.25	343.81
	3.5	90.01
	4.6	734.87
D	2.5	506.73
	3.5	240.57
	5.1	430.68
E	2.42	456.76
	2.8	143.85
	4.7	821.18

which has a tri band resonance at 2.42 GHz,2.8 GHz and 4.7 GHz. Figure 3 shows the return loss plot for various evolved during the design of proposed antenna. Table 2 give the details of the resonant frequency and its respective bandwidth. From the table 2, we can conclude that because of the introduction of slot in the rectangular patch the single band antenna is converted in to multi band antenna. This multiband operation is due to the increase in current length. With the introduction of metamaterial antenna E is having triband operation with enhance bandwidth at third band. From Figure 4, which shows the return loss plot of the initial designed antenna A and the final proposed antenna E, it can be concluded that the multiband and wideband response of the proposed structure is due to the introduction of slot and split ring resonator at the bottom of the substrate.

Figure 3. s11 Comparison graph

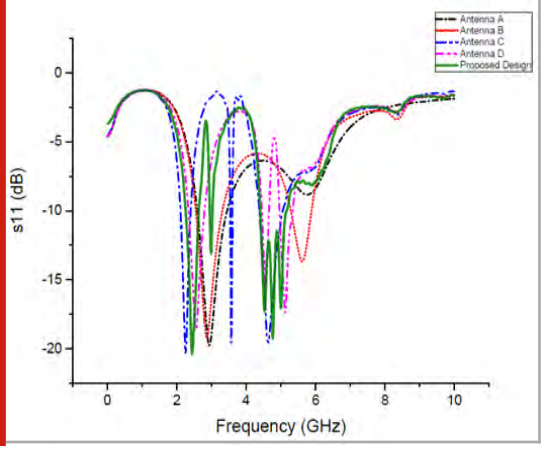


Figure 4. Return loss plot of Antenna A vs Antenna E

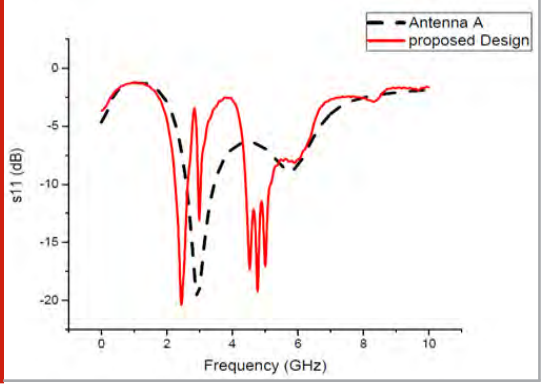
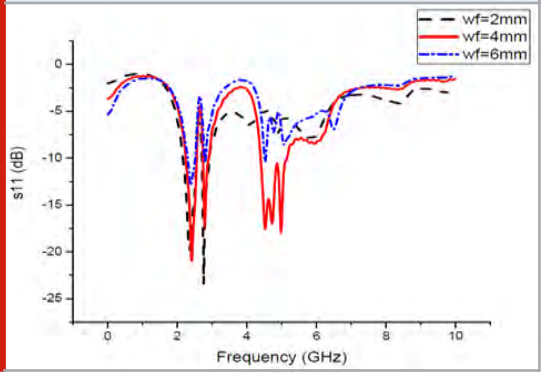


Figure 5. Parametric analysis of feed width (wf)



Parametric Analysis

The critical parameters which has the impact on the desired output is considered for the parametric study in order to finalize the optimum value for that parameter. Feed width, slot width and the strip width of the split ring resonator is considered for the parametric study. Figure 5 clearly depicts the change in return loss characteristics because of the change in feed width. The width of the feed

Figure 6. Parametric analysis of Strip width (x)

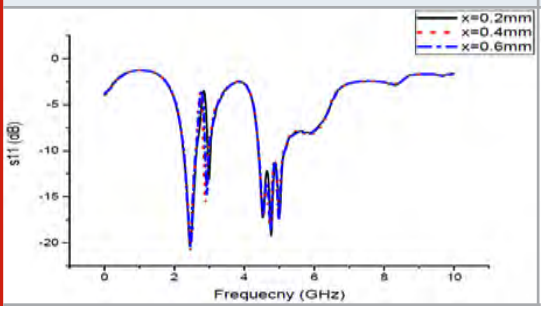
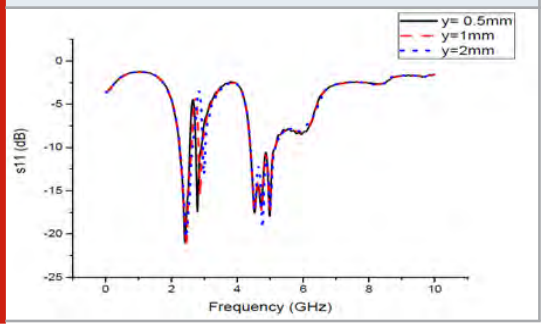


Figure 7. Parametric analysis of Slot width (y)



(wf) is increased in steps of 2 mm, from 2 mm to 6 mm. The optimum value for wf =4 mm is selected since it can able to achieve triband operation and good impedance matching in all the resonating bands. In Figure 6, the return loss characteristics of the proposed antenna with respect to the strip width is shown. It is clearly observed that as the value of x increaser the impedance matching in all the band reduced and therefore the optimum value of 0.2mm is selected for the x. From Figure 7, it is noted that the width of the SRR slot has impact on the second and third resonating bands. And the optimum valor of 0.5mm is choose for y, since it can able to achieve reasonable bandwidth as well as good impedance matching.

RESULTS AND DISCUSSION

Figure 8 depicts the surface current distribution of the proposed antenna at various operating frequency. It is clearly seen that current is event

Table 3. Comparison of Various Evolved antenna

Design	No of Operating Bands	Resonant Frequency (GHz)	Return loss (dB)	Bandwidth (MHz)	VSWR	Application	Band
Antenna A	1	2.9	-18	957	1.054	Aviation	S
Antenna B	2	2.8,5.6	-19.17, -13.17	781,613	1.16,1.43	Aviation & WLAN	S & C
Antenna C	3	2.25,3.5 & 4.6	-20.52, -14.51, -21.12	362,45.3,652	1.24,1.44,1.24	MSS, WIMAX, INSAT	S & C
Antenna D	3	2.5,3.5 & 5.1	-20.62, -19.78, -19.78	362,45.3,652	1.13,1.1.,1.1	ISM, WIMAX, WIFI	S & C
Antenna E	3	2.42,2.8,4.7	-21.14 -17.48 -16.98	339,180,769	1.15,1.3,1.3	ISM, WLAN, WIFI	S & C

Figure 8. Surface cureent distribution of the proposed structure

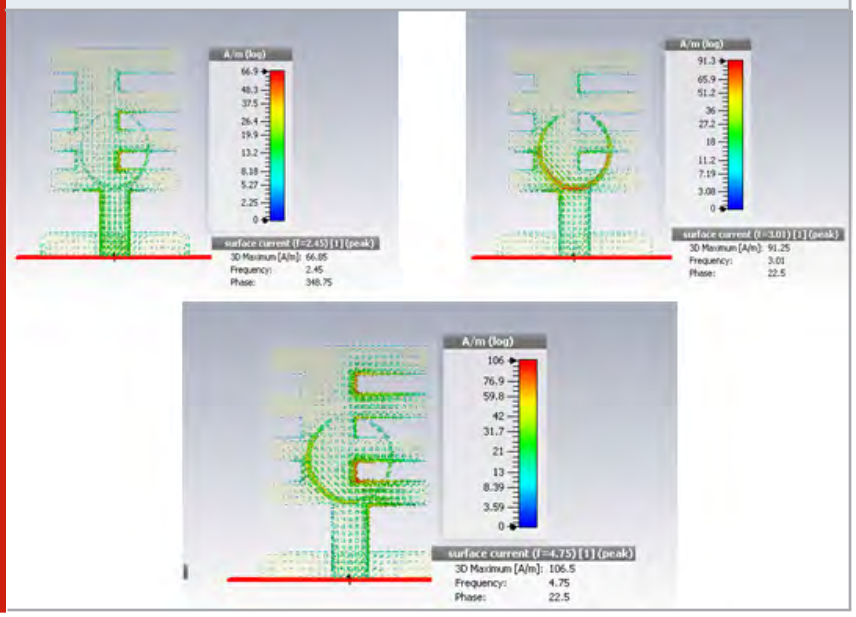


Figure 9. E plane and H Plane pattern at various operting frequency

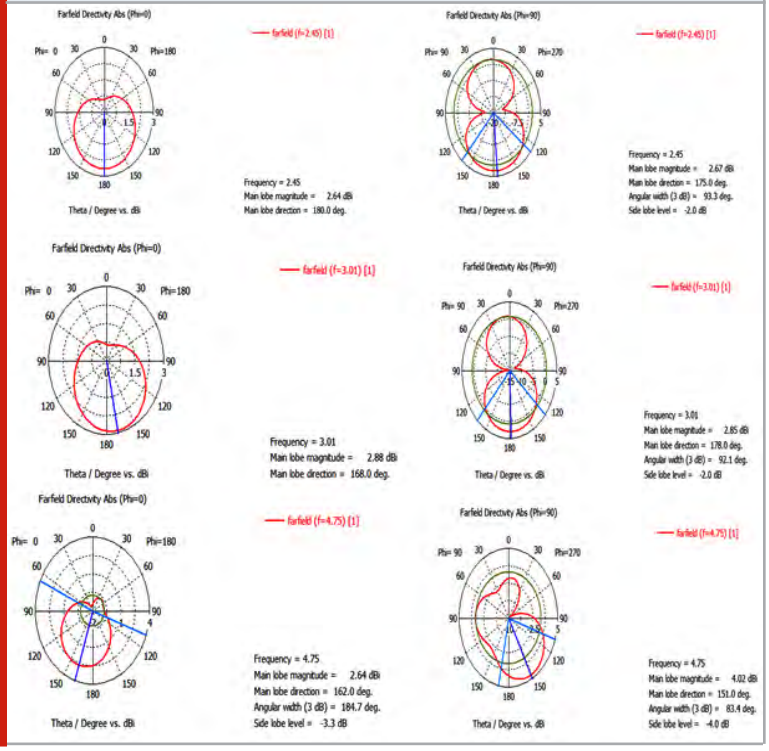
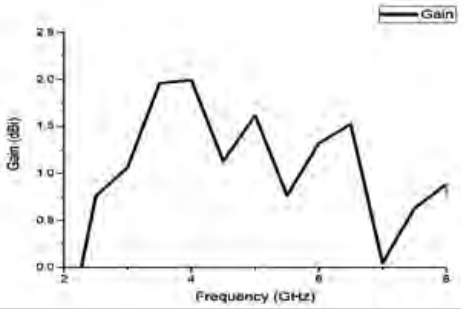


Figure 10. Gain of the proposed structure



distributed at all the operating frequency in the radiating patch. It is evident that the second and third resonance is greatly affected by the introduction of the split ring resonator at the back of the substrate, since most of the current concentrate around the SRR at the 2.8 GHz and 4.75 GHz. Table 3 shows the comparison of evolved antenna during the entire design of the proposed antenna. Figure 9 shows the E plane H plane pattern of the proposed structure at the various operating structure. The E plane had an omni direction pattern while the H plane has a bidirectional radiation pattern which is due to the symmetry with respect to the vertical axis. In figure 10, the simulated result of the gain is projected, it is evident the gain of the proposed structure is above 1.5 dBi in the operating bands.

CONCLUSION

A metamaterial inspired slot antenna with defected ground structure is proposed for the wireless medical device and other wireless application. The simulated result using CST software is presented. The entire structure is characterized with help of return loss, gain, current distribution and radiation pattern. The initial design of rectangular patch antenna has a single band operation, by introducing slots in the radiating patch and metamaterial at the back of the substrate the structure can have a multiband operation. The proposed structure can able to operate at 2.42 GHz, 2.8 GHz and 4.7 GHz for ISM, WLAN and WIFI application respectively.

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BBRC Bioscience Biotechnology Research Communications

PSO- Solar Based for PV System Using Maximum Power Point Tracking

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ABSTRACT

This paper presents Particle Swarm Optimization and Incremental conductance – ANN strategies are utilized to locate the ideal working parameters of a sun-powered photovoltaic board under shifting environmental conditions. Most extreme power point following (MPPT) should more often than not be incorporated with photovoltaic (PV) control frameworks so the photovoltaic exhibits can convey the greatest power accessible. In this paper subtleties of the work, completed to advance and execute a fluffy rationale controller (FLC) utilized as a most extreme power-point tracker for an independent PV framework, are exhibited. This paper introduces the greatest power point tracker (MPPT) utilizing the Fuzzy Logic hypothesis for a PV framework. The work is centred around the outstanding Perturb and Observe (P&O) calculation and is contrasted with a planned fluffy rationale controller (FLC). The recreation work managing MPPT controller; a DC/DC C' UK converter sustaining a heap is accomplished. Among all the MPPT procedures, bother and perception (P&O) and slope climbing strategies are broadly connected in the MPPT controllers because of their straightforwardness and simple execution. The strategy depends on shut circle current control, in which the reference current is resolved from the fitted capacity of stanzas, purposes of a specific PVG. The got recreation results to affirm the great following proficiency and fast reaction to changes in natural parameters.

KEY WORDS: MAXIMUM POWER POINT TRACKING (MPPT); PHOTOVOLTAIC (PV); FUZZY LOGIC CONTROLLER (FLC); GENETIC ALGORITHMS OPTIMIZATION (GAO); SOLAR ENERGY; PHOTOVOLTAIC SYSTEM; FUZZY LOGIC CONTROL; PV SYSTEMS; PERTURB AND OBSERVE; INCREMENTAL CONDUCTANCE.

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INTRODUCTION

In this work, we propose a progressively proficient structure for an FLC-based MPPT intended to be utilized to remain solitary PV frameworks. Our system depends on GAs which pick ideally and at the same time both enrolment capacities and control rules for the FLC. The methodology pursued makes the structure of this sort of MPP tracker more straightforward and progressively proficient by (A. Messaiet. Al). Be that as it may,

the improvement for improving the productivity of the PV framework is as yet a difficult field of research. MPPT calculations are fundamental for PV applications on the grounds that the MPP of sunlight based module changes with the light and temperature by (A.M. Othman et.al). The irritation and perception strategy is another calculation which is utilized in most extreme power following. In spite of the fact that it is an entrenched calculation, a few disarrays and insecurities may happen when the light and (or) load changes quickly and arbitrarily. The shady climate is a run of the mill case of such a circumstance by (H. Tarik Duru et. Al).

Figure 1. Block diagram of Dc-Dc Cuk converter with solar PV system.

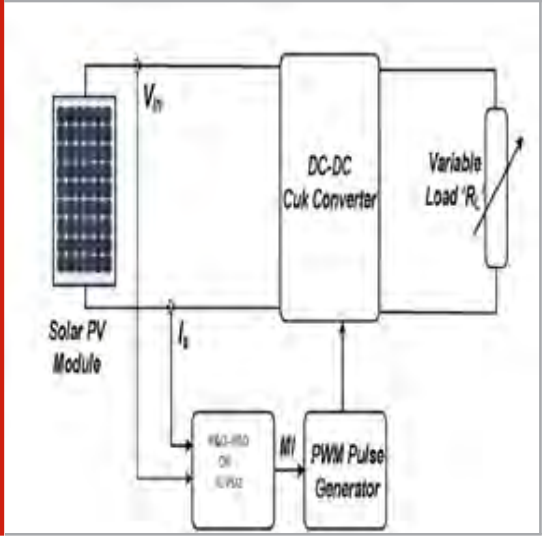
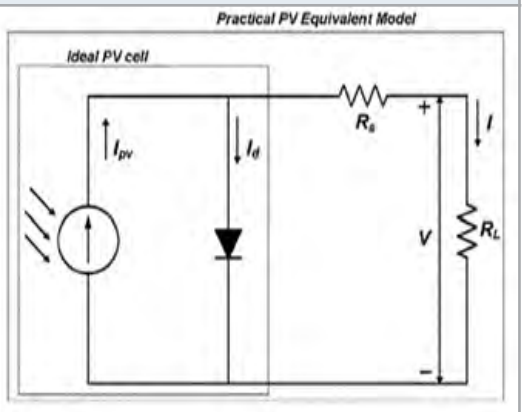


Figure 2. Diagram solar PV cell.



The utilization of sun oriented photovoltaic vitality discovered its value in power control creation for little scale, independent frameworks at low voltage and furthermore in high power establishments, typically associated with the lattice and working at medium or high voltage. Whatever the kind of establishment – a couple of stage matrix, associated or not – photovoltaic vitality is an intriguing wellspring of vitality: it is sustainable, endless and non-dirtying by (M. Zegaoui et. al).

In this paper, two straightforward and amazing most extreme power-point following strategies (in view of "computational" techniques) known as voltage-based VMPPT and current-based CMPPT are recreated, built, and thought about by (M.A.S. Masoum et. al). It is made out of a lift converter and a solitary stage inverter. Accordingly, the control framework comprises of two sections, which are the MPPT controller and inverter controller by (F. Liu et. al). Be

Figure 3. Dc-Dc Cuk Converter.

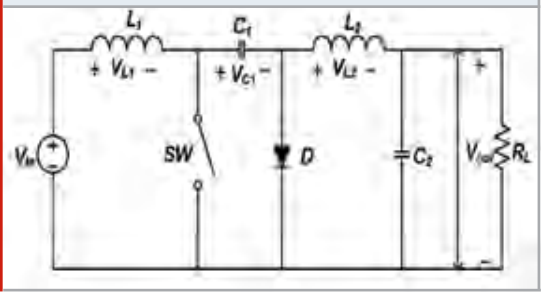


Figure 4. Architecture of feed forward network

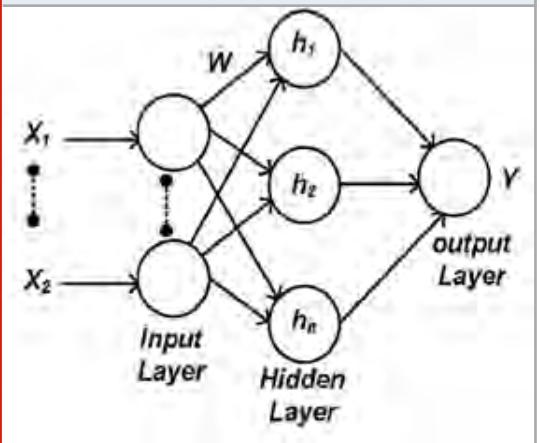
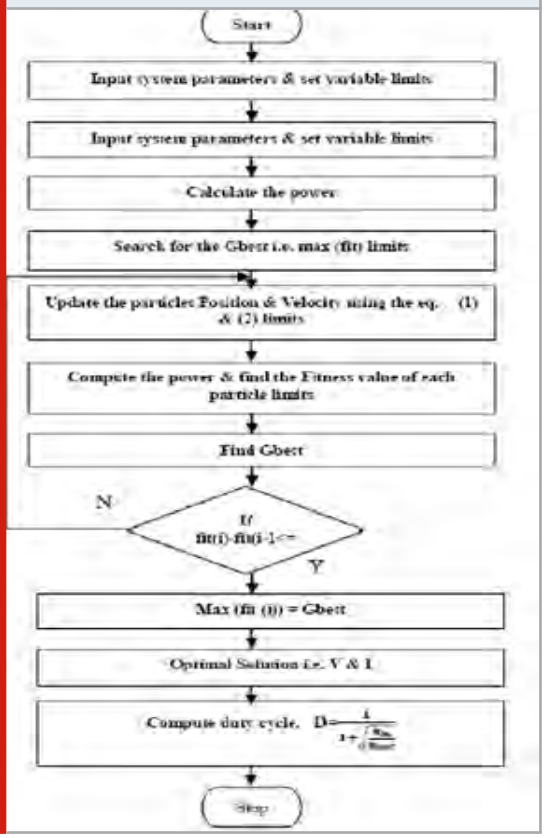


Figure 5. PSO method flow chart



that as it may, in spite of these unmistakable advantages, the principal impediment for open acknowledgment of PV framework is as yet obvious, for example, the high capital venture, because of the high module cost. Subsequently, it is of most extreme worry for PV planners to build the productivity in PV framework in order to make up for the underlying cost issue by (K. Ishaque et. al). Countless MPPT control has been expounded since the seventies; beginning with straightforward procedures, for example, voltage and current input based MPPT to progressively improved power criticism based MPPT, for example, the irritation and perception (P&O) system or the gradual conductance methodby (M.M. Algazar et.al). In the event that the major standards of calculation inserted in the sensory systems are comprehended, a completely new age of control strategies could be created some long ways past the capacities of the present procedures dependent on an unequivocal scientific model. These new strategies could serve to actualize definitive smart frameworks by(K. Karabacak et. al). Throughout the years, a few analysts have considered the qualities of PV modules and the outside variables that influence them, and different MPPT techniques have been proposed

Figure 6. INC-ANN Method flow chart

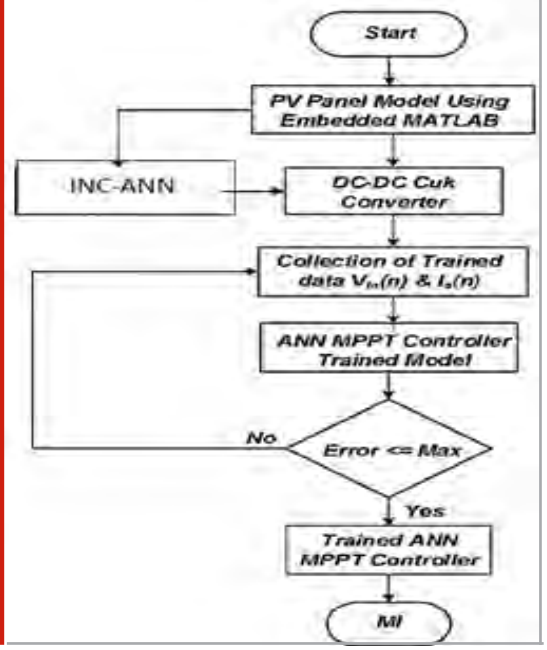


Figure 7. Block diagram of overall system

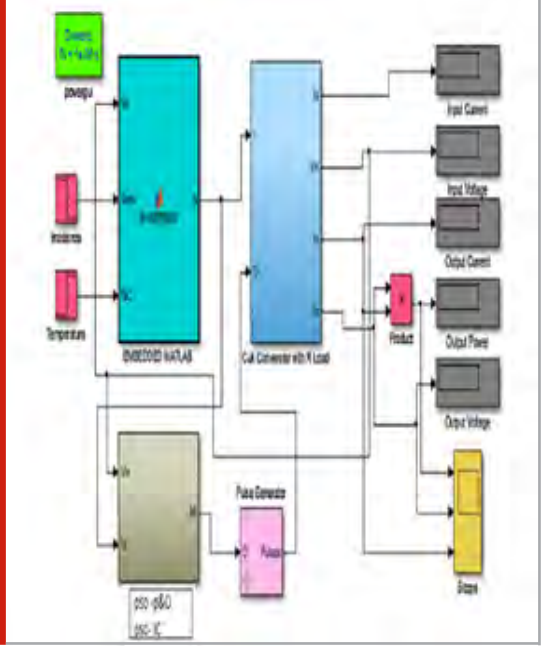


Figure 8. (a)G at T for various irradiation of P –V curve= 25°C and (b) G at T for various irradiation of I–V curve = 25°C.

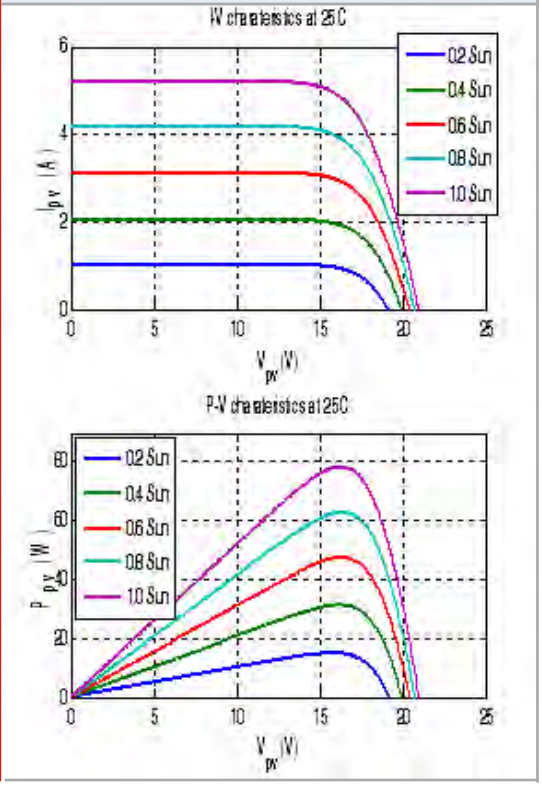


Figure 9. (a) T at G for various temperature of P–V curves = 1 suns (1000 W/m2) and (b) T at G for various temperature of I–V curves = 1 suns (1000 W/m2).

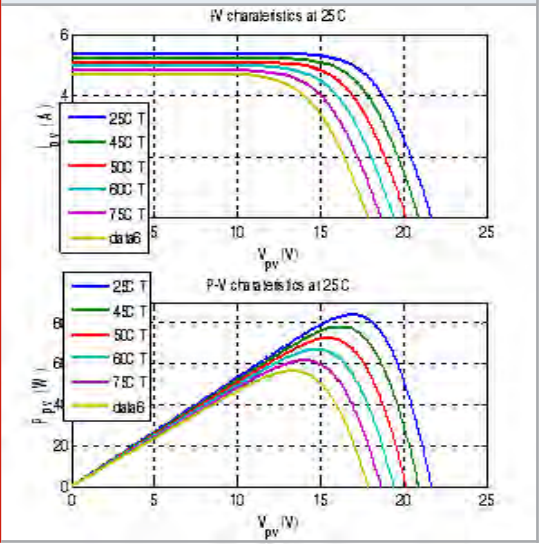
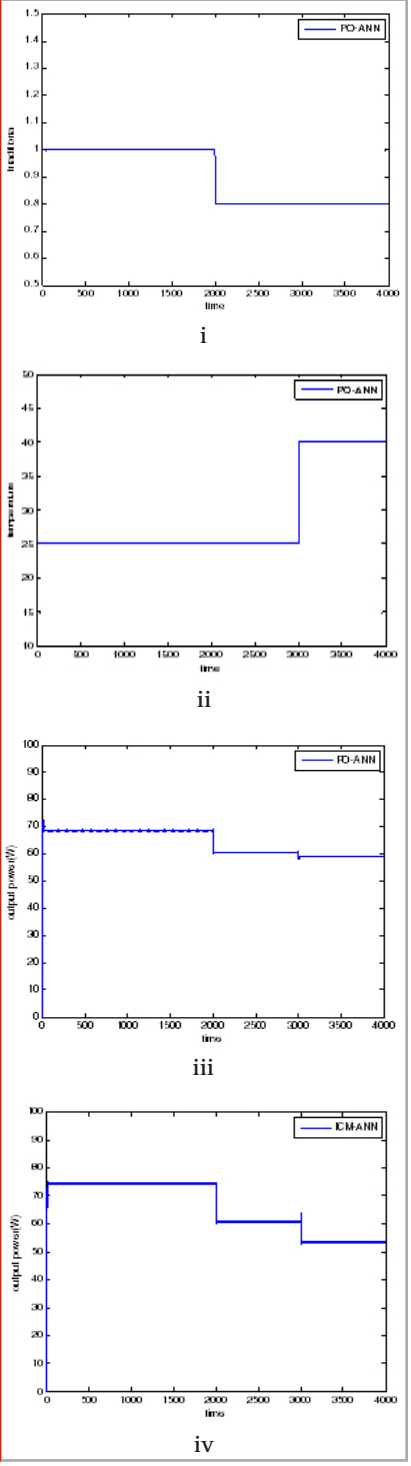


Figure10. Simulation of (i) & (ii)irradiance and temperature (iii) & (iv)Yield Power relates to INC-ANN and PO-ANN MPPT Controllers under unique varieties



and used to extricate most extreme power from PV exhibits under shifting climatic conditions by (Y. Shaieket.al). The eminent detriment of the model-based techniques is it needs intermittent shedding to follow MPP (greatest power point). Under the classifications of them without a model strategy, it isn't reasonable for quickly differing climate conditions. The strategy which utilizes the swell in the ability to play out the following of MPP is known as the swell remedy control (RCC). In both ESC and RCC techniques achievement of MPP is ensured however they experience issues in equipment usage. The thought behind the IC strategy is to increment or reduction (reference voltage) esteem dependent on the examination of prompt conductance to gradual conductance (K. Punitha et. al.)

A standout amongst the most prominent uses of the PV vitality usage is water siphoning framework driven by an electric engine. In this application because of expenses of PV hardware's and water, siphons are relied upon to diminish increasingly more throughout the following couple of years, it is no big surprise that the interest for the PV power winds up across the board. These components can make PV water siphoning frameworks progressively financial soon. PV fuelled water siphoning frameworks require more often than not where satisfactory daylight and a wellspring of water exist by (S.A.K.H. Mozaffari Niapour et. al). In any case, despite everything, it introduces a huge territory of rivalry contrasting with ordinary vitality assets because of its surprising expense and low productivity during vitality transformation. As to, it is important to improve the presentation of PV frameworks through the task of change frameworks to build the yield effect of the general framework by (A. Chaouach et. al). A noteworthy number of MPPT control plans have been explained since the seventies, beginning with basic strategies, for example, voltage and current input based MPPT to increasingly improved power based MPPT, for example, the P&O procedure and the gradual conductance method. As of late canny based plans have been presented by (C. Larbes et. al). Due to the non-direct nature of lattice associated PV frameworks criticism linearization and man-made reasoning based techniques are utilized in structuring the control framework. An information yield input linearization procedure with variable advance MPPT is exhibited by (L.K. Letting et. al). Because of high establishment expenses and low vitality change efficiencies of photovoltaic (PV) modules, the effectiveness improvement thinks about on power hardware parts of the PV frameworks are viewed as valuable. The nonlinear idea of photovoltaic vitality commits the utilization of a moderate converter executing a control calculation to work the PV modules at their most extreme power focuses (MPPs) under various ecological conditions. Different MPP following techniques, for example, the model-based strategy by (A.A. Kulaksýz et. al).

The Maximum Power Point Tracking (MPPT) controllers are utilized in a PV framework to extricate the Maximum power from the PV modules by (S. Sheik Mohammed et. al). The delicate processing systems like Fuzzy, Neural Network (NN), the hereditary calculation (GA) and Particle Swarm Optimization based MPPT are additionally ordered as backhanded strategies. Greatest Power Point Tracking Techniques for the lattice associated half and half sustainable power age frameworks. Electronic converter creators are normally keen on displaying PV boards (called clusters from now on in this paper), which are the universally useful off-the-rack PV gadgets accessible in the market by (M.G. Villalvaet. Al). The sunlight based radiation is made out of photons of various energies. Photons with energies lower than the band gap of the PV cell are futile and create no voltage or electric flow. Photons with vitality better than the band gap produce power, yet just the vitality relating to the band gap is utilized—the rest of the vitality is scattered as warmth in the body of the PV cell. The yields from these models are the current and voltage information focuses, which can be associated with produce the I–V bend. One essential target of the examination is to fit the anticipated I–V bends to the trial bends of the down to earth framework, especially at the three trademark focuses by (T. Ma, H. Yang et. al). The single diode models depended on the presumption that the recombination misfortune in the consumption district is missing. In a genuine

sun-powered cell, the recombination speaks to a generous misfortune, which can't be satisfactorily demonstrated utilizing a solitary diode. Thought of this misfortune prompts a progressively exact model known as the two-diode model by(K. Ishaqueet. Al).

A tale rearranged two-diode model of a PV module is proposed. In this model, to decrease the computational time and multifaceted nature and to improve the current two-diode model that was exhibited in, the arrangement and shunt protections are disregarded by (B. Chitti Babu et. al). PV cell speaks to the central transformation unit of a PV control age framework. Sunlight based insolation, PV's cell temperature, and working voltage firmly impact the yield current and power attributes of PV. With nonlinear attributes, the PV model is first worked to plan the most extreme power point tracker (MPPT) for PV framework applications by (Huan-Liang et. al). In any case, PV frameworks ought to be intended to work at their most extreme yield power levels for any temperature and sun-powered illumination level whatsoever occasions by (V. Salas et. al). The last huge factor, which decides the PV throughput control, is the impedance of the heap. In remain solitary frameworks, MPPT calculations are typically actualized on DC-DC converters, battery banks are required to store surplus vitality. In framework associated frameworks, the vitality delivered by the PV exhibit can be moved to the network by means of a DC-DC converter which is utilized as an MPPT controller and an inverter which changes over the DC transport voltage to the AC lattice voltage. In any case, this can be accomplished utilizing just a particular DC–AC inverter by(Velappagari Sekhar et. al). Regardless of headway in sun based cell materials, from polycrystalline, monocrystalline to a shapeless and slender film, the vitality transformation proficiency still stays poor and framework cost is high. Along these lines, the presentation of the power conditioner assumes a critical job in upgrading by and large power change effectiveness and decrease in expense by (Velappagari Sekhar et. al). The chose MPPT are methodically sorted into two principle gatherings. In the first place, which is by a long shot the most prominent, is alluded to as the regular MPPT by (Velappagari Sekhar et. al).

Analysis of PV modules
single-diode model for Mathematical modeling

Photovoltaic (PV) age is winding up progressively significant as a sustainable source since it displays a large number of merits, for example, cleanness, little upkeep, and no clamor.. Created nations are attempting to lessen their ozone-harming substance outflows. Sustainable power sources are considered as a mechanical alternative for producing clean vitality. Among them, the photovoltaic (PV) framework has gotten extraordinary consideration as it has all the earmarks of being a standout amongst the most encouraging sustainable power sources. A functional exhibit comprises of the quantity of arrangement associated cells are modules which increment the framework voltage and various arrangement associated cells are modules which increment the framework voltage. The technique recommended here utilizations a stage down sort DC-DC converter to control the working purpose of PVG. The voltage and current of the PVG are persistently checked and the normal power is determined. The numerical model of I – v relationship and perfect PV cells, the condition as follows in fig. 2.

$$I = I_{ph} - I_d \tag{1}$$

Where

$$I_d = I_o\left[\exp\left(\frac{qV_d}{AKT}\right) - 1\right] \tag{2}$$

Substituting Eq. (2) into Eq. (1)

$$I = I_{ph} - I_o\left[\exp\left(\frac{qV_d}{AKT}\right) - 1\right] \tag{3}$$

There are different models accessible and various investigates are going on the displaying of the sun oriented board to anticipate the precise qualities execution of sunlight based PV model.

$$I = I_{ph} - I_o\left[\exp\left(\frac{q(V+IR_S)}{AKT}\right) - 1\right] \tag{4}$$

$$I_O = I_{rs}\left(\frac{T}{T_r}\right)^{\frac{3}{A}} \exp\left[\frac{qE_g}{AK}\left(\frac{1}{T_r} - \frac{1}{T}\right)\right] \tag{5}$$

I which depends on solar irradiation G and temperature T.

$$I_{ph} = I_{sc}[1 + \alpha \times (T - T_r)] \times G \quad (6)$$

The estimation of "a" just relies upon semiconductor materials utilized in PV innovation and is autonomous of cell temperature and sun-powered irradiance.

Cuk converter topology

The Cuk converter (articulated chook; now and again erroneously spelled Cuk, Cuk or Cúk) is a kind of DC/DC converter that has a yield voltage greatness that is either more prominent than or not exactly the information voltage size. The capacitor C is utilized to move vitality and is associated then again to the information and to the yield of the converter by means of the substitution of the transistor and the diode. The impedance coordinating can be gotten by ceaselessly shifting the obligation proportion D of intensity MOSFET. The information opposition of the Cuk converter during the persistent conduction mode is given by

$$R_i(CCM) \varepsilon [0, \infty] R_i(CCM) = \frac{2L_{eq} f_s}{D^2} \quad (7)$$

Where $L_{eq} = L_1 + L_2$ and

f_s – Frequency switching

R_i input resistance

$$R_i(DCM) = \frac{K * R}{D^2} \quad (8)$$

Greatest power point following

The core of MPPT equipment is a switch-mode DC-DC converter. It is broadly utilized in DC power supplies and DC engine drives to change over unregulated DC contribution to a controlled DC yield at the ideal voltage level. The yield intensity of the PV exhibit primarily relies upon sunlight based illumination and encompassing temperature. The impact of the encompassing temperature is moderate and both two MPPT techniques have no challenges to follow the greatest power indicate due to the innate cycle calculation. Nonetheless, the mists some of the

Figure 11. Shows the output control variety under illumination (460wb/m2) and cell temperature (27) for varying load with PO-ANN & IN-ANN

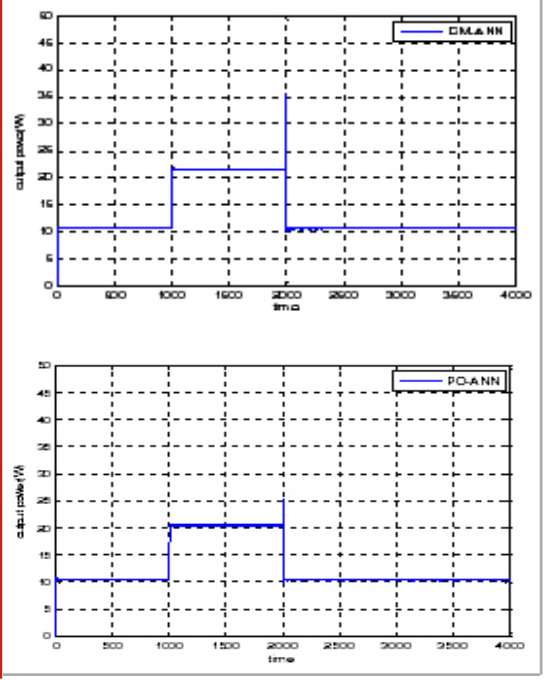
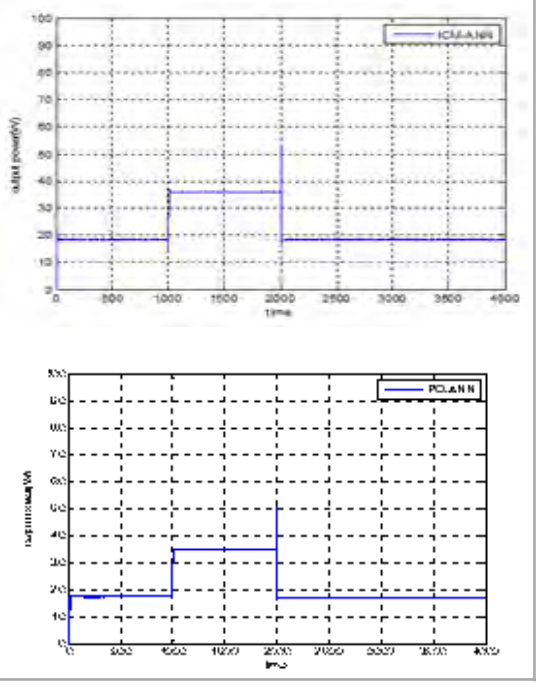


Figure 12. Shows the output control variety under illumination (600wb/m2) and cell temperature (31) for varying load with PO-ANN &IN-ANN



time move rapidly by and by and the MPPT controller needs to manage such unexpected difference in the sun based light. Along these lines, the presentation of the two MPPT strategies under an unexpected difference in illumination is examined.

Artificial Neural Network

Artificial neural network (ANN) can be seen as a parallel and circulated handling framework which comprises of an enormous number of basic and greatly associated components called neurons. The multilayer perceptron design is the most widely recognized worldview of ANNs being used today. The structure of a multilayer feedforward system has appeared in Fig. 4. The dataset used to prepare ANN was acquired from exploratory estimations and a connection between the sources of info (G and T) and yield (V_{MPP}) was built up

A two-layer system has appeared as a specific precedent in Fig. 4.

$$y_j = f[(w_{ij} + x_{ij}) + b_j] \quad (9)$$

The quantity of layers is an information layer, by which the information is moved, and a yield layer, where the information yield from the ANN. The quantity of neurons in these layers is referred to already as they are issue subordinate. Be that as it may, the assurance of shrouded layers and concealed neurons for some random issue is beyond the realm of imagination. Different scientists utilized hereditary calculation advancement for ANN engineering plan.

$$MSE = \frac{1}{n}\sum_{i=1}^{n}(P_{estimated} - P_{target}) \quad (10)$$

Particle Swarm Optimization Application To Mppt Control

PSO shares numerous similitudes with developmental calculation methods, for example, Genetic Algorithms (GA). The framework is instated with a populace of arbitrary arrangements and looks for optima by refreshing ages. Be that as it may, in contrast to GA, PSO has no advancement administrators, for example, hybrid and transformation. In PSO, the potential arrangements, called particles, fly through the issue space by following the present ideal particles. In this segment, the issue associated with unraveling the MPPT control utilizing PSO procedure is talked about. The PSO strategy is a basic and powerful meta-heuristic methodology that can be connected to a multivariable capacity enhancement having numerous nearby ideal focuses.

$$V_i^{K+1} = wV_i^K + c_1r_1(P_i^k - X_i^k) + c_2r_2(P_g^k - X_i^k) \quad (11)$$

$$X_i^{K+1} = X_i^K + V_i^{K+1} \quad (12)$$

V_i^{K+1} Is the particle velocity
X_i^{K+1} Is the current position of a particle?
P_i^k is the Pbest and
P_g^k is the Gbest,
r1 & r2 is the random number between 0 & 1,
c1 & c2 are learning factors. Usually c1=c2=2.

Algorithm for PSO Implementation:

Step 1-
the position of velocity to limit Set the number of particles and searching parameters

Step 2-
In each particle the velocityRandomly initialize Position.

Step 3-
In each particleCompute the fitness value

Step 4-
Gbest is theparticle having the best fitness value

Step 5-
Gbest position and velocity is updated

Step 6-
Repeat Step 3 & 4

Step 7-
Gbest at the end of the last iteration gives the optimized value.

Step 8-
Compute the Duty-cycle using the given formula.

$$D = \frac{1}{1 + \sqrt{\frac{R_{in}}{R_{out}}}}$$

The PSO is a swarm knowledge-based calculation used to locate the worldwide ideal arrangements. The reasons why PSO has picked up prevalence

is on the grounds that it was just not many parameters that should be balanced. The said systems locate the ideal electrical working focuses and relating obligation cycle at which the most extreme power can be moved. The presentation of the proposed MPPT techniques is tried by reproduction at various light and temperature utilizing MATLAB.

Incremental conductance algorithm

INC depends on contrasting prompt conductance (I/V) with steady conductance (ΔI/ΔV). The PV framework voltage is expanded or diminished depending on the yield got from the above examination. The MPP is achieved, when the dP/dV = 0.

Hybrid PSO and INC-ANN method

At first, the exhibition of INC-ANN MPPT controller is broke down for PV board with Cuk converter. The PSO and INC-ANN MPPT controller are tried under different lights and cell temperature, thus, the PSO displays more swaying than INC-ANN MPPT controller during an unexpected change in illumination.

SIMULATION RESULTS

The proposed investigation is dissected utilizing MATLAB/Simulink condition and the numerical outcomes are exhibited here. The P–V and I–V qualities are dissected. The SIMULINK square outline has appeared in Fig. 7.

Case: 1 dynamic variety of both light and temperature with Constant burden

In every way that really matters, the prepared ANN has been tried utilizing the unexpected change in light and temperature. The brightness is kept up as 1 sun and the temperature is also kept up as 25.C up to 2000 s. After 2000 s the light is all of a sudden changed from 1 sun to 0.8 suns anyway the cell temperature is kept up as 25.C up to 3000 s.

Case: 2 variable load with Constant irradiation and cell temperature

The reenactment results are exhibited to demonstrate the adequacy of the proposed

Figure 13. Shows the output control variety under illumination (750wb/m2) and cell temperature (30) for varying load with PO-ANN &IN-ANN

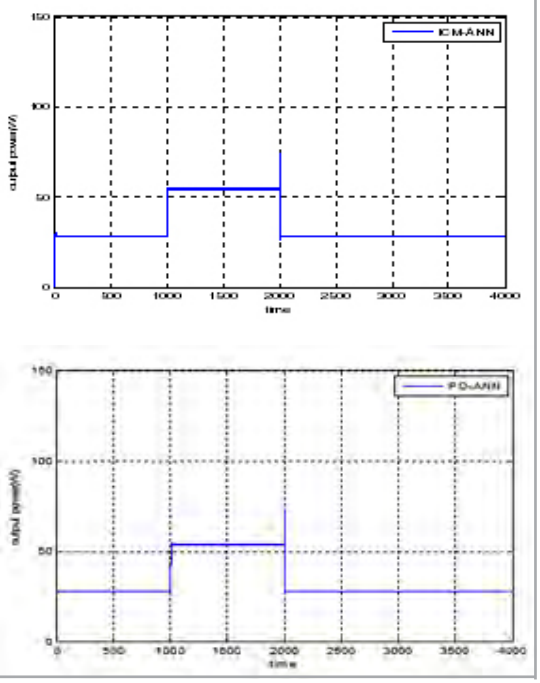


Figure 14. Shows the output control variety under illumination (800wb/m2) and cell temperature (35) for varying load

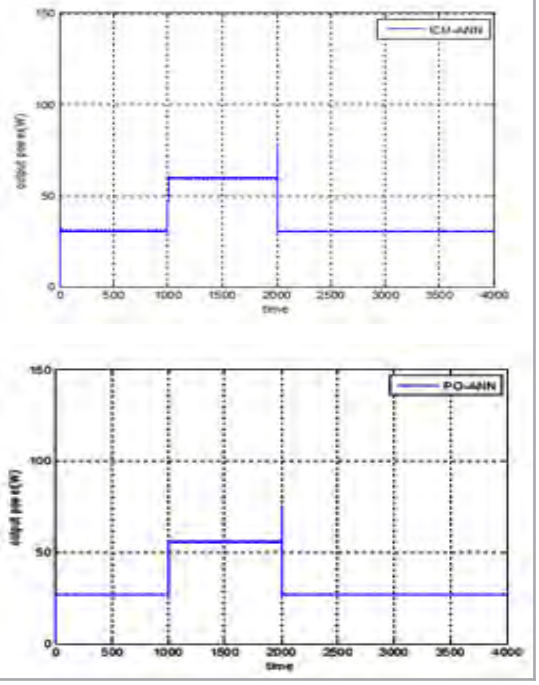
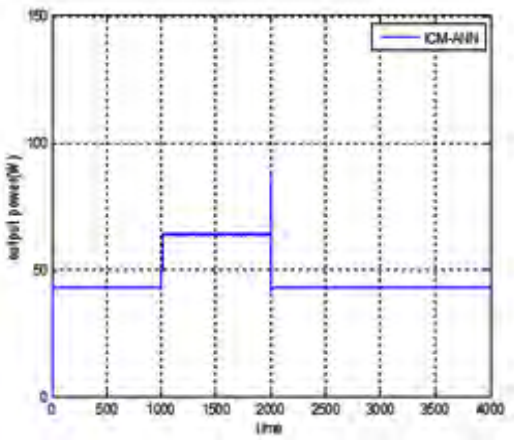


Figure 15. Shows the output control variety under illumination (950wb/m2) and cell temperature (40) for varying load



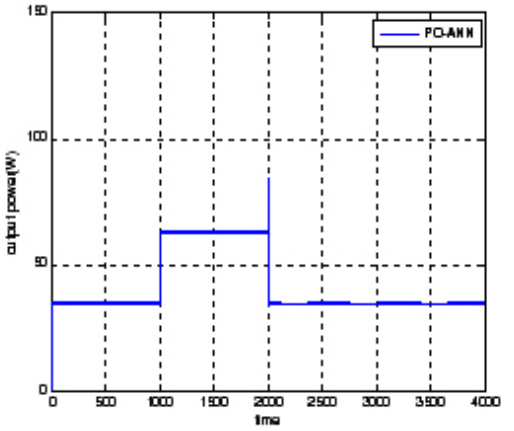


Figure 16. INC-ANN and PO-PSO MPPT Controllers of Simulation of Output Power corresponds to under dynamic variations.

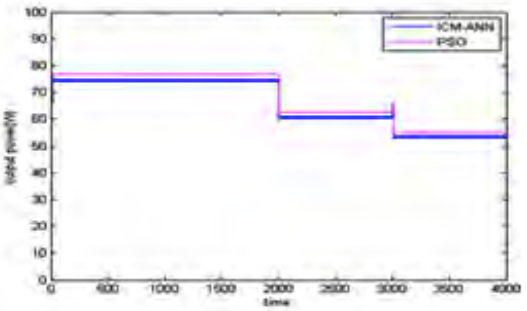


Figure 17a. Shows the control variety under illumination (460wb/m2) and cell temperature (27) for varying load

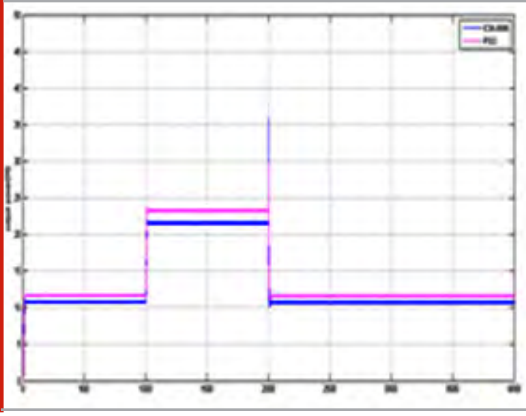


Figure 17b. Shows the output control variety under illumination (600wb/m2) and cell temperature (31) for varying load

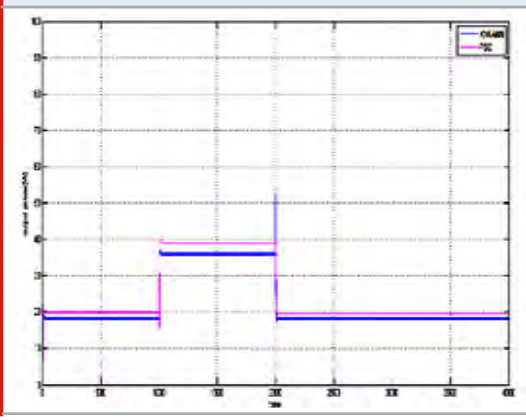


Figure 17c. Shows the output control variety under illumination (800wb/m2) and cell temperature (35) for varying load

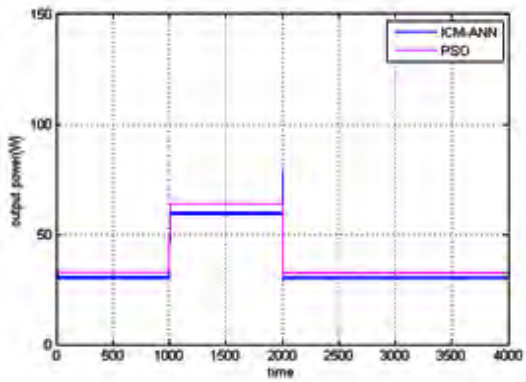
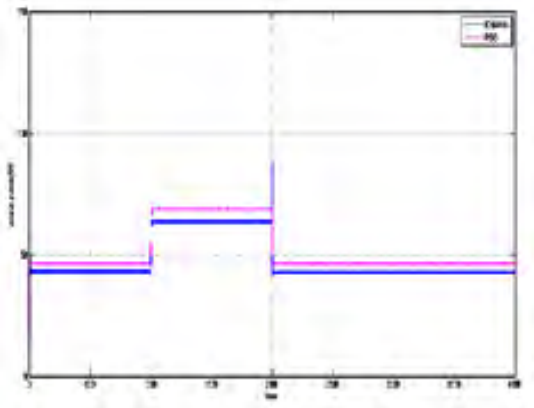


Figure 17d. Shows the output control variety under illumination (950wb/m2) and cell temperature (40) for varying load.



MPPT calculation for variable burden with steady temperature and illumination. The heap variety of 20 ohms from t = 1000 to 2000s and 10ohms from t = 2000 to 4000 s. In the heap variety, at steady light and cell temperature, the yield voltage rots rapidly.

CONCLUSION

In this paper, the presentation of the MP PT figuring is destitute somewhere around using a creamer keen controller reliant on PSO and INC-ANN with SA Es controllers for the V structure. To achieve the introduction through the proposed MP PT controller. Since the best power point following (MP PT) accept a critical activity in photograph voltaic (PV) control structures since they help the power yield from a PV system for a given course of action of conditions, and as such enlarge their display capability. To achieve the display through the proposed MP PT controller. A condition to express the dependence of the diode inundation current I on the temperature was proposed and used in the model. The results gained in the showing of two useful PV bunches have displayed that the condition is amazing and licenses to exactly change the I–V twist at the open-circuit voltages at temperatures not equivalent to the apparent. The proposed ANN with SA Es based MP PT controller can pursue the best power with less influencing for an unexpected change in enlightenment and temperature and can work gainfully during the snappy change in climatic conditions and moreover during weight assortments.

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Machine Learning Approach for Classifying Skin Cancer Using Moth Flame Optimization Based Cascade Network

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ABSTRACT

Recently, the machine learning approaches are increasing day by day for predicting the information based on the data. This machine learning can be done either in two forms supervised or semi-supervised approach. In supervised learning, the testing data is also included in the training phase of the network. A part of testing data only used for the training the network. In this paper, the supervised learning of cascade feed-forward neural network is used for classifying the different types of skin cancer. Cancer is a life threatening diseases by spreading the cancer cells day by day in the human body from its starting point. The cancer is also different types like stomach, blood, colon, and breast and skin cancer. The skin and breast cancer is the less invasive type of cancer if detected at an early stage. The skin cancer is not able to identify at the very early stage because it appears normal like other skin problems. Hence, this paper presented a supervised learning approach for the skin cancer classification. The classification of the cancer is based on its textural properties of the manual cropped cancer region and the whole image. To determine the cancer region, the images undergoes several processing steps and the cancer region is determined using ASLM method. The region is processed for the feature extraction. The most dominant feature is determined with the moth flame optimization which is used for training the cascade forward neural network. The trained network is tested with the data and it is evaluated with the metrics like accuracy, specificity and sensitivity. Based on the evaluation, the proposed method produced the better results. The MFO based cascade network improved its accuracy by 7.7 % as compared to the existing Wavelet and curvelet method.

KEY WORDS: SKIN CANCER IMAGE, MACHINE LEARNING, ASLM, FEED FORWARD NEURAL NETWORKS, CASCADE, EVALUATION, MFO.

ARTICLE INFORMATION

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INTRODUCTION

Machine learning is a method, which reduces the repeated need of observations of the human in interpreting the results. It reduces the human efforts and also improves the results by perfect training. The machine learning concept is mostly used for the classification and prediction. It is

used in the all fields like forecasting, disease classification and segmentation. It is highly used in the field of the disease classification. The Skin cancer is a disease, which is less hazardous when it is early detected and treated. The types of skin cancers are basal cell cancer, squamous cell carcinoma and melanoma. Among these cancer types, the melanoma is the most dangerous cancer type because its early detection is not that much possible in olden days. But, in this 20th century, due to the developments in the medical field like diagnosis, computer aided design and processing approaches helps to detect the melanoma at an early stage is possible.Most of the research works implemented the Raman spectroscopy approach for the skin cancer detection and spectral index for its evaluation. The working of this method is based on the Raman scattering principle [12] using hand held probe and collecting module to gather the skin information. Early detection approach is done by using machine-learning techniques [11]. Convolution neural network model is used to classify the skin cancer lesion [23], [25], and [27]. Deep learning technique for feature extraction and image classification [26]. Another prominent technique used for the melanoma detection is the Asymmetry, border, colour and diameter approach for the skin lesion segmentation. It is further improved by the extraction of features of the skin using its textural properties. The image processing techniques like wavelet transform, thresholding and segmentation is also used for the detection of cancer cell region [2]. Texture features are analysed in [6] & [7]. Month-flame optimization technique is used for image processing [22].The classification of the skin cancer is performed with the help of neural networks and machine learning methods with soft set model [28]. Mahmoud Elgamal proposed the automatic medical image classification techniques. In this work, the machine learning approach is combined with the other image processing techniques to perform the skin cancer cell classification [24].

Litrerature Survey

Adjed et al., (2017) implemented the structural and textural feature extraction process for the classification of melanoma skin diseases. For the structural feature extraction, wavelet and curvelet transformation is applied to the images. For the textural properties the local binary pattern is applied. The evaluation is performed for both the properties separately and in the combined form on the images. Guerra-Rosas, E., and Álvarez-Borrego, J. (2015) utilized the thresholding concept along with the Fourier spectrum analysis using three different filters like k-law, classic and median. It shows higher level of confidence 95% in distinguishing the cancer cells. The spectral index is used for the evaluation. Zhao et al., (2015) also implemented the Raman spectroscopy approach. Jain, S., and Pise, N. (2015) performed the classification of normal and melanoma skin. For the classification, they implemented the ABCD technique namely Asymmetry, border, colour and diameter for the skin lesion segmentation and used the texture and shape features for the classification. Sheha et al., (2012) performed the melanoma classification using the texture property called gray level co-occurrence matrix using multilayer perceptron classifier. The traditional multilayer perceptron produced the better accuracy due to the default iteration counter. Tchvialeva.Let al., (2012) proposed the polarized speckle pattern for the detection of the melanoma cancer cell to reduce the invasive approach for the detection. The classification of skin cancer is done by using the Raman spectroscopy method by Lieber et al., (2009). It detected the cancer by scanning the skin lesions in the range of 20 and 100 micrometre depth using the Raman spectrometer. These scanning gives different information of the skin lesions. Based on that, the cancer is classified as normal, basal or melanoma. The sensitivity of this methodology is 100 percentage. Lau, H. T., and Al-Jumaily, A. (2009) used the back propagation and auto association neural networks for the classification of the skin cancer. The cancer region is determined with the help of the wavelet and segmentation method. The segmented region features are used for training and testing the neural networks to classify the cancer and normal skin cells. Lieber et al., (2008) developed a portable non focal Raman spectroscopy with a handheld probe for the non- melanoma cancer

cell classification. The main advantage of this is portable spectroscopy and able to distinguish the cells due to its scanning property.Sigurdsson, S et al., (2004) also performed the classification of the skin cancer using the in vitro Raman spectrometer method.

Jerrant et al (2000) researched about the reasons behind the skin cancer formation and its remedies. The main reason for the skin cancer formation is due to the exposure of the sun. The skin cancer can be early detected using the lesion segmentation using ABCD and seven

Sentiment Analysis For Expressive Text to Speech Synthesis System

point formulas. The formation can be avoided by using sun cream and reduce the exposure of skin to sun during sunny days with high UV radiation. Hata et al., (2000) also used the Raman spectroscopy approach for the skin cancer classification. Based on the above research works, it is observed the skin cancer is a hazardous diseases when it is not early detected and treated. Among the different types of skin cancer, the melanoma is the most dangerous one. Hence, the detection of the melanoma at an early stage helps to save the life. To support this early detection, this work implemented the ASLM segmentation approach, texture feature analysis and different machine learning approaches to determine the best neural network for the classification of cancer cells. The proposed work is compared with the existing method which used wavelet and curvelet for the feature extraction process and implemented the SVM for the classification. The paper is arranged by explaining the proposed method in section 3, results and discussion in section 4 and conclusion in section 5.

MATERIAL AND METHODS

Proposed Methodology

The main objective of this paper is to analyse the various machine learning approaches for the skin cancer detection. To achieve this objective, the cancer region is determined with the help of the existing automatic skin lesion segmentation approach. By using the ASLM approach, the mask for the cancer region is created. Then, the cancer region is alone cropped and it is used for feature extraction process. The features are extracted from the both cropped region and the original image using its textural properties. These extracted features are reduced using the moth flame optimization algorithm to determine the optimal features for training the networks. The trained networks are tested and evaluated.

Automatic Skin Lesion Segmentation

The automatic skin lesion segmentation follows the following steps to extract the cancer region from the skin image.

- Artifacts removal
- Skin detection
- Lesion detection
- Merging the regions
- Final cancer region

Artifacts Removal

This process is used to process the input image, which is suitable for extracting the abnormal regions by removing the noise, hair and air or oil bubbles with the help of filters and imbothat transformation process.

Skin detection

The skin region of the image is detected with the help of thresholding and image conversion process like illuminance image space to hue saturation space.

Lesion detection

The lesion region is detected with the help of canny edge operator and Delaunay triangle method.

Cancer region

The skin and lesion region are merged which results in the mask for the cancer region. The cancer region is alone cropped from the image with the help of imcrop.

Textural properties Extraction

The textural information is an important property in the medical image analysis. Since the textural information gives the variation of the anatomy

of the human by varying the pixel intensities in the image. Hence, in this work the textural feature is used as a major feature extraction for the skin cancer classification. In this, 19 features which is used for the reduction and training process. These nineteen features obtained from the gray scale image of the cropped cancer region and the original cancer image. The features are based upon the mathematical calculation of the pixels based on the distance, angle. The nineteen features are obtained from the below metrics

1. Energy
2. Entropy
3. Contrast
4. Homogeneity
5. Short run emphasis
6. Long run emphasis
7. Gray level non- uniformity
8. Run length uniformity
9. Run percentage
10. Low gray level run emphasis
11. High gray level run emphasis
12. Short run low gray level emphasis
13. Short run high gray level emphasis
14. long run low gray level emphasis
15. Long run high gray level emphasis
16. Mean
17. Variance
18. Skewness
19. SFTA

The first four features are comes under the category of gray level co-occurrence matrix which was introduced by Mohanaih et al (2013). It describes the spatial properties of the image. The operations are performed on the gray scale images. The features from five to nine are obtained from the gray level run length matrix. It was observed from the paper in the year 2011 by sohail et al., (2011). These features based on the angle of directions, gray level and run length values. The formula for calculating those features are as follows:

$$SRE=\sum_{m=1}^{G}\sum_{n=1}^{R}\frac{a(m,n|\theta)}{n^2}\Big/\sum_{m=1}^{G}\sum_{n=1}^{R}a(m,n|\theta)$$

$$LRE=\sum_{m=1}^{G}\sum_{n=1}^{R}n^2a(m,n|\theta)\Big/\sum_{m=1}^{G}\sum_{n=1}^{R}a(m,n|\theta)$$

$$GLNU=\sum_{m=1}^{G}\left(\sum_{n=1}^{R}a(m,n|\theta)\right)^2\Big/\sum_{m=1}^{G}\sum_{n=1}^{R}a(m,n|\theta)$$

$$RLU=\sum_{n=1}^{R}\left(\sum_{m=1}^{G}a(m,n|\theta)\right)^2\Big/\sum_{m=1}^{G}\sum_{n=1}^{R}a(m,n|\theta)$$

$$RP=\frac{1}{N}\sum_{m=1}^{G}\sum_{n=1}^{R}a(m,n|\theta)$$

The features 10 and 11 are the extension of the above features. Chu et al (1990) take the formulae for the features from the paper in the year 1990. The mathematical calculations are given below:

$$1.\ \text{Low Gray level Runs Emphasis}=\sum_{m=1}^{G}\sum_{n=1}^{R}\frac{a(m,n|\theta)}{m^2}\Big/\sum_{m=1}^{G}\sum_{n=1}^{R}a(m,n|\theta)$$

$$HGLRE=\sum_{m=1}^{G}\sum_{n=1}^{R}m^2a(m,n|\theta)\Big/\sum_{m=1}^{G}\sum_{n=1}^{R}a(m,n|\theta)$$

The features 12 to 15 which combine the both gray level and run length. The calculations of these features are obtained from the Dasarathy and Holder (1991) paper. The calculations of the features are as follows:

$$SRLGE=\sum_{m=1}^{G}\sum_{n=1}^{R}\frac{a(m,n|\theta)}{n^2.m^2}\Big/\sum_{m=1}^{G}\sum_{n=1}^{R}a(m,n|\theta)$$

$$SRHGLE=\sum_{m=1}^{G}\sum_{n=1}^{R}\frac{m^2.a(m,n|\theta)}{n^2}\Big/\sum_{m=1}^{G}\sum_{n=1}^{R}a(m,n|\theta)$$

$$LRLGLE=\sum_{m=1}^{G}\sum_{n=1}^{R}\frac{n^2.a(m,n|\theta)}{m^2}\Big/\sum_{m=1}^{G}\sum_{n=1}^{R}a(m,n|\theta)$$

$$LRHGLE=\sum_{m=1}^{G}\sum_{n=1}^{R}m^2.n^2.a(m,n|\theta)\Big/\sum_{m=1}^{G}\sum_{n=1}^{R}a(m,n|\theta)$$

The features 16 to 18 are the properties, which are based on the histogram calculations of the gray scale image. The feature 19 is also the histogram calculation but it performed in segment manner on Otsu's multilevel thresholding concept. In this 10 level is used for the thresholding process. Hence, it is called as segmentation based fractal

texture feature.

Moth Flame Optimization

The optimization used in this work is the moth flame optimization, which is introduced by the Mirajali(2015) in the year 2015. Every optimization algorithm works based upon the cost function of a problem. For the skin cancer classification, the cost function of the algorithm is to reduce the error rate of the classifier. The feature reduction algorithm is inspired from the moth flame optimization properties like the movement of the moth towards the brighter region similarly in this the best feature is determined by reducing the error rate of the classifier. The

Figure 1. Flowchart for MFO

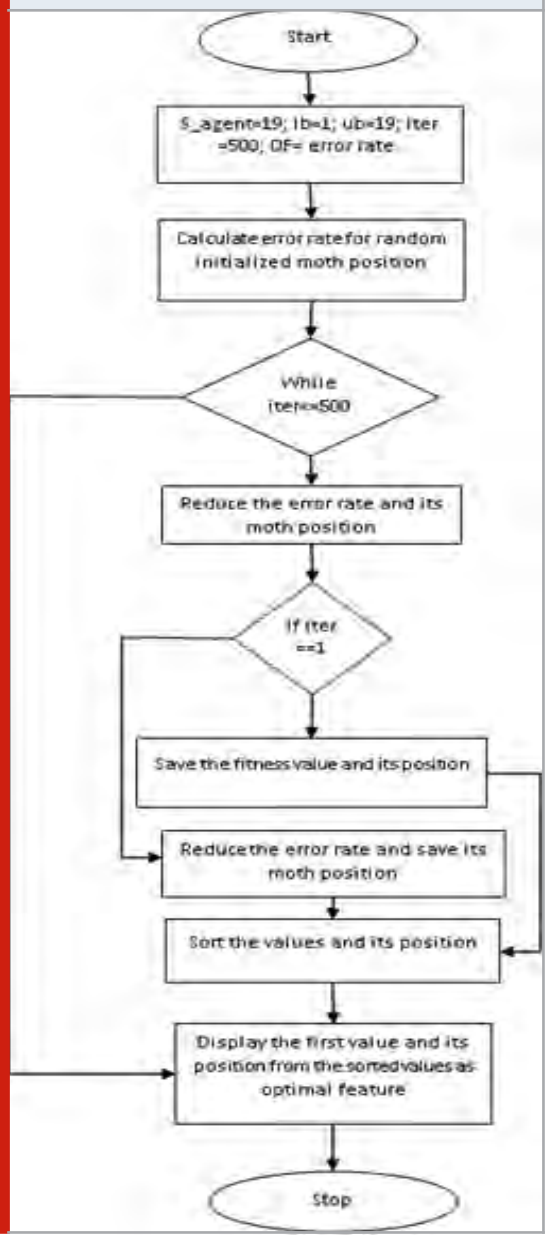


Figure 2. Single layer FFN

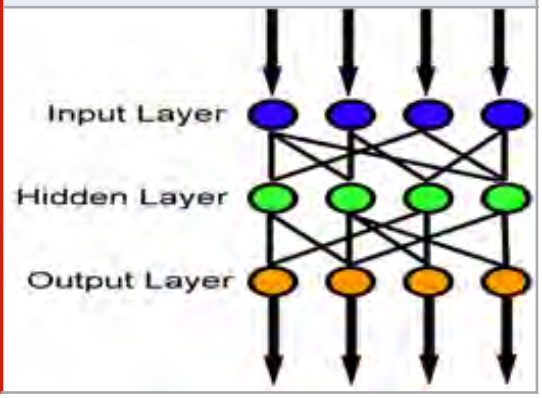


Figure 3.(a)Input image and (b) Hair removal image

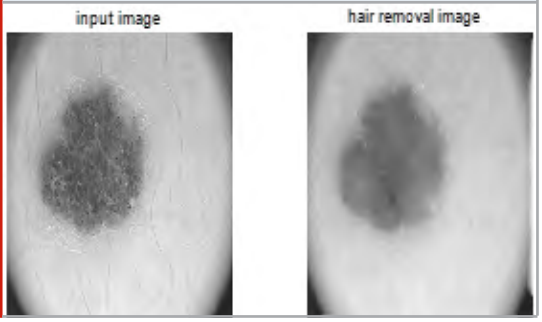
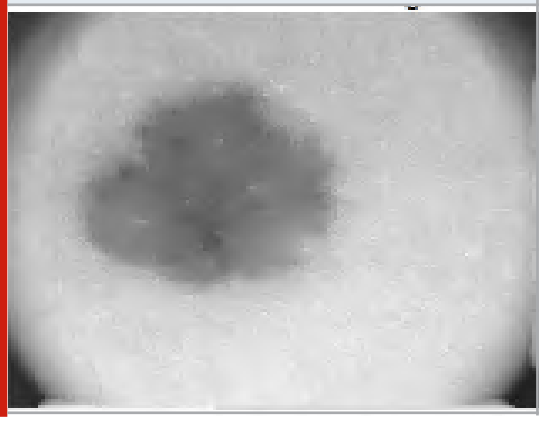


Figure 4. Contrast enhanced image



error rate of the classifier will be reduce from its initial value to find out the optimal feature which can be used for the training the classifier. The reason behind choosing this algorithm is producing the results, which is not depends on the local answers of the problem. The algorithm works on the movement of the moths. In general, the moths are the insects which moves towards the light in the brighter direction called moon. However, it sometimes falsely attracted towards the artificial illumination. This path variation results in the wrong direction and its final destination will not be achieved. This variation also increases the number of moths as well as its steps because of the false attraction. The same process is involved for finding the necessary by moving towards the minimum error rate of the classifier. The algorithms need some initialization parameters like number of moths as 19 , number of iterations as 500, the lower boundary as 1 and upper boundary of the feature is 19 because the total number of features are extracted from the extraction process is 19. The algorithm pseudocode is written below. Based on the above

Figure 5. Thresholded image.

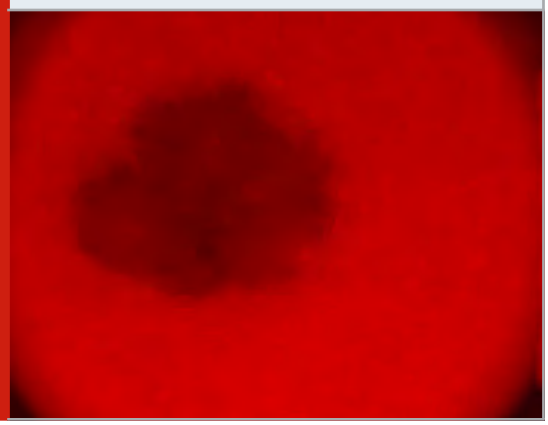


Figure 6. HSV image

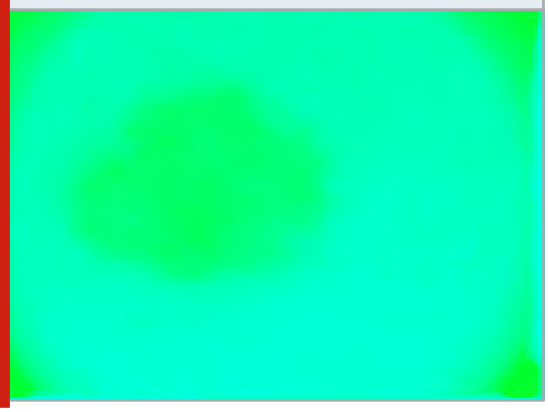


Figure 7. HSV region of the skin

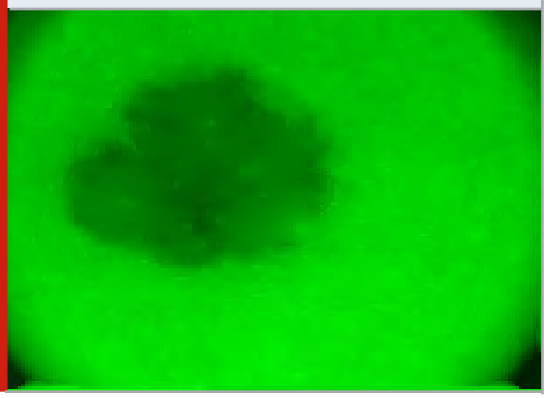


Figure 8. Blurred Image

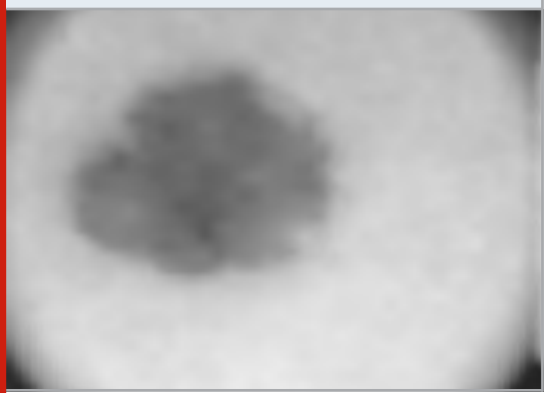


Figure 9. Canny Edge detection

Figure 10. Lesion Image

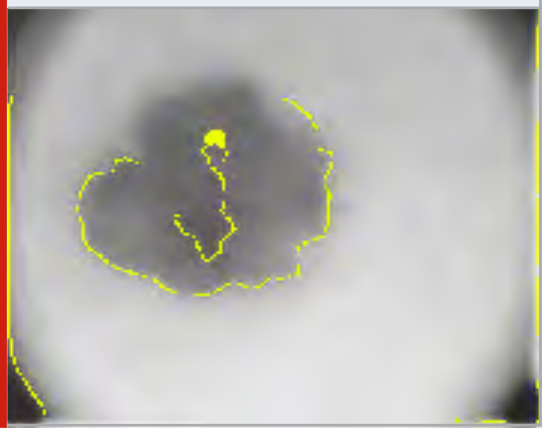


Figure 11. Mask for Skin image

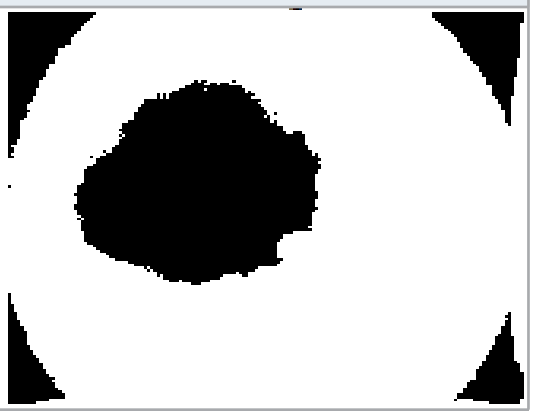


Figure 12. Mask of lesion

Figure 13. Combined Mask region

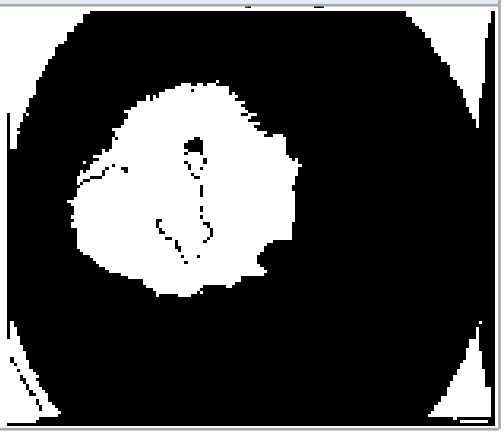


Figure 14. Cancer region.

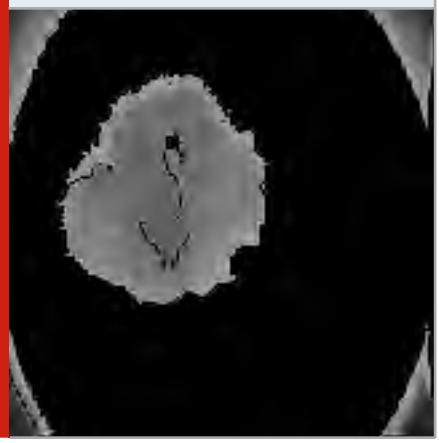


Figure 15. Cropped cancer region for common nevi

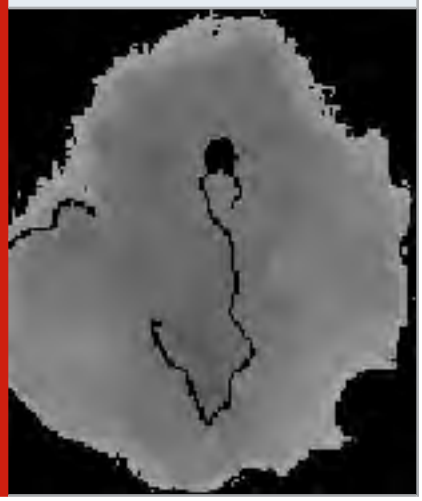


Figure 16. Cropped cancer region for atypical nevi

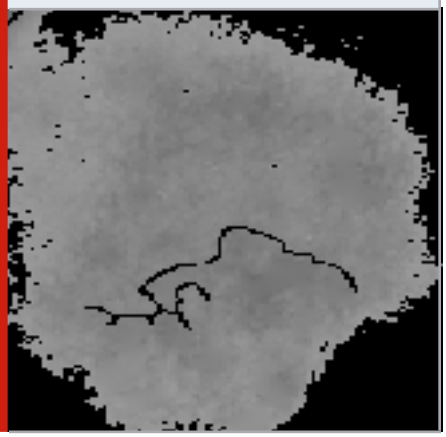


Figure 17. Cropped cancer region for melanoma

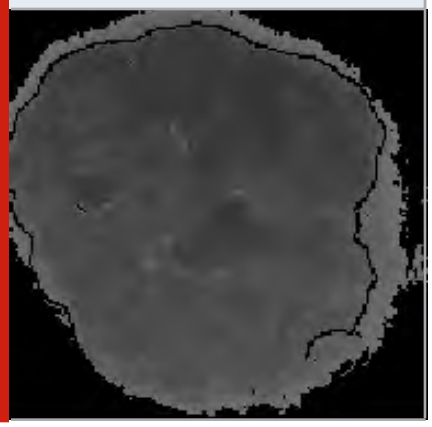


Figure 18. Feature rate table

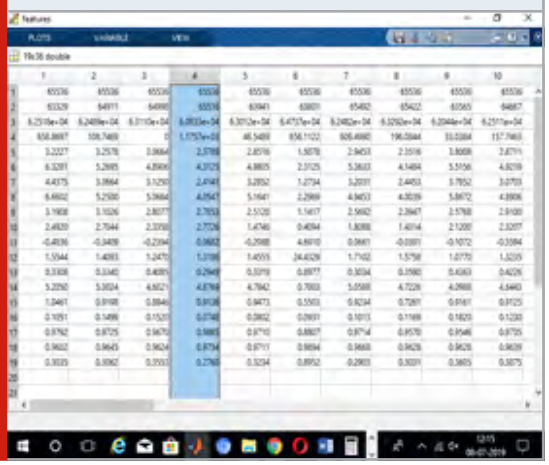


Figure 19. Optimized result using MFO Optimization algorithm

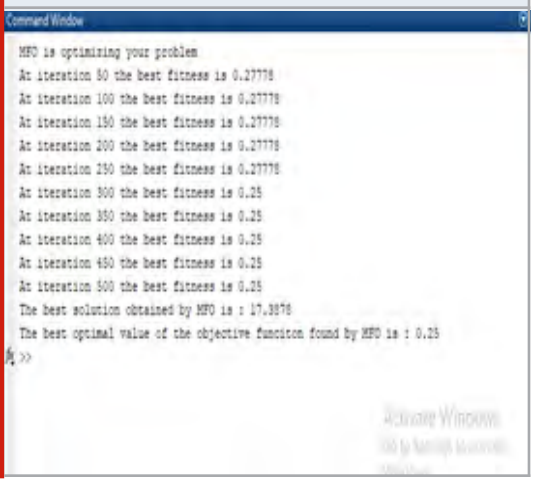


Figure 20. Layers of Feedforward network

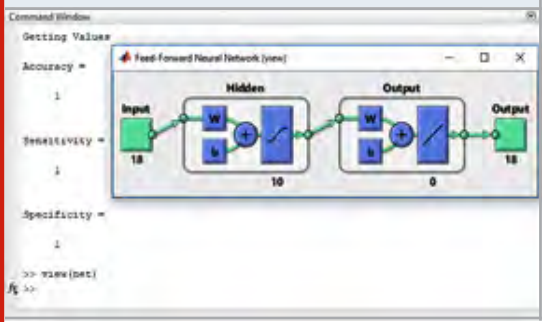


Figure 21. Output Of FFNN

Figure 22. Layers of Radial Basis Neural network

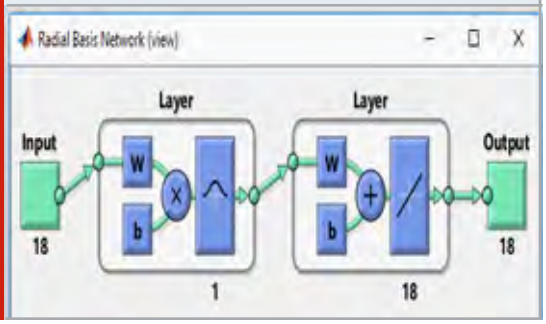


Figure 23. Output Of RBNN

Figure 24. Layers of Pattern Neural network

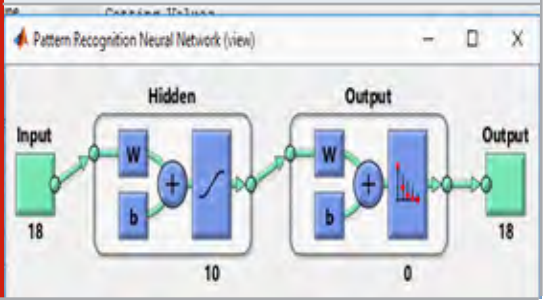


Figure 25. Output Of PNNN

Figure 26. Layers of cascade forward neural network

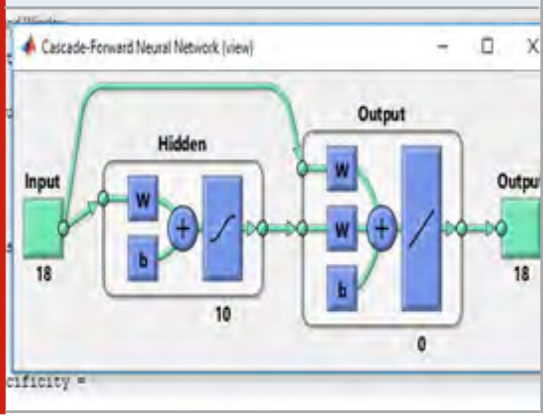


Figure 27. Results of multi class confusion matrix

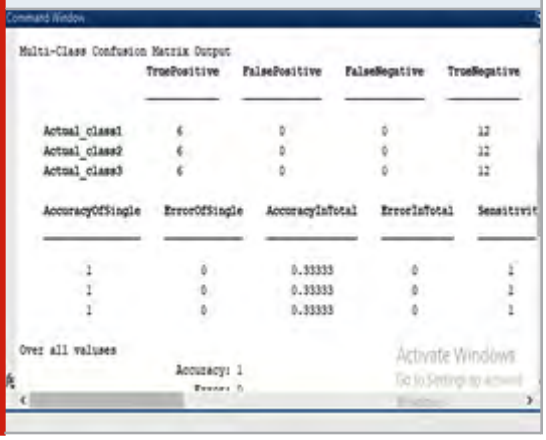
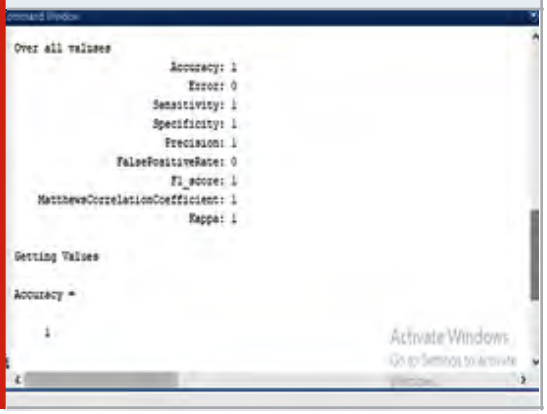


Figure 28. Performance analysis results of Cascade Forward Neural Network



optimization, the optimal feature is selected from these 19 features using moth flame optimization by reducing the error rate of the classifier. The minimum error rate is 0.25, which is obtained for the 17th feature for a simple classifier test.

Cascade Forward Neural Network

The reduced feature namely the homogeneity of the image is used for training and testing the three types of feed forward neural networks single layer, pattern net, cascade forward neural network and radial basis neural network

Feed forward neural networks

Bebis and Georgiopoulos (1990) used the FFN concept for classification. In this type of network, there is no feedback and data will flow from input to output. The single layer FFN is shown below. Single layer FFN is also an open loop network. The layer of cascade forward neural network is shown in figure 1. Here it uses three layers that is input layer, hidden layer, and output layer. Based on the given function optimization it performs the operation.

Cascade forward neural network

The data is flows in one direction but the output of the previous layers is also given as input to the next layer and the input layer is also given as input to the output layer.

Radial Basis Neural network

In this, the input feature is multiplied with the radial basis functions and it is given to the output layer to produce the results. The result will be vary due to its multiplication of the radial basis functions. Hence, in this the classification of the skin cancer is not suitable by the RBN.called Intonation. Ultimatly concatenation is performed to create the synthesized speech. All these neural networks used the homogeneity and its notation as input to the network. The output is 1, 2 or 3 which indicates the types of melanoma namely common nevi, atypical nevi and melanoma. The feed forward neural network produced the best results as compared to the radial basis because the FFN is highly depends on its inputs.

RESULTS AND DISCUSSION

The dataset used in this work is obtained from the publicly available dataset PH2. The dataset comprises of 3 types of melanoma lesions namely common nevi, atypical nevi and melanoma region. The below four images (see figure 4, 5, 6, amd 7) are the output images of the subprocess in skin detection process. The below three images (Figure 8, 9, and 10) are the outputs of the lesion detection process. The lesion image (see Fig 10) identifies the cancer by edge detection method. The below images are the mask of the skin, lesion and cancer region. The final output is the cancer region cropped from the whole image. The mask of skin image is shown in fig11 and it cropped the lesion image (see fig12). By combining two images, we can get the cancer region image (see fig 14). The combined mask region is shown in fig 13. The cropped cancer region is processed for common nevi and atypical nevi, which is shown in figure 15 and 16 respectively. Finally, the cropped cancer region for melanoma is shown in figure 17.Here the 19 features are obtained from the both original and cancer region images. The features are shown below. In the above figure, the rows are the types of features and the column values are the corresponding feature value of the images. The optimal feature is selected (see Fig17) from these 19 features using moth flame optimization by reducing the error rate of the classifier. The minimum error rate is 0.25, which is obtained for the 17th feature for a simple classifier test. The output is shown below. The optimization result using moth flame optimization algorithms result is shown in figure 18.This 17th feature namely homogeneity is used for training the different types of feedforward neural network namely single layer FFN, Pattern net Neural Network, Cascade-forward neural network and radial basis neural network. The below figure The below figure 19 shows the network diagram of cascade-forward network. The trained network is tested with the data and it is evaluated with the help of following metrics like accuracy, sensitivity and specificity. The performance analysis metrics is described below:

Accuracy gives about the correct identification of the skin cancer types.

Figure 29

Figure 30. Comparative analysis graph

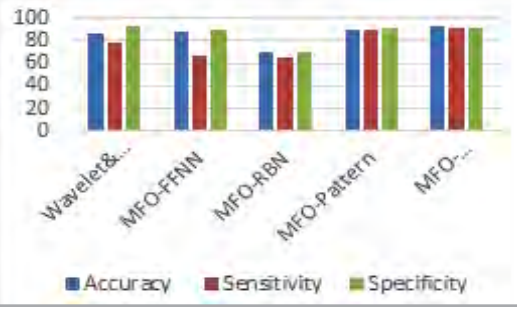


Table 1. Comparative analysis of performance metrics

Method	Accuracy	Sensitivity	Specificity
Wavelet & curvelet [29]	86	78.93	93.25
MFO-FFNN	87.50	66.6	89.66
MFO-RBN	70.2	65.70	70.77
MFO-Pattern	90.05	89.60	91.40
MFO-Cascade-forward	92.66	90.50	97.89

Sensitivity gives about the identification of the other diseases with respect to one disease as positive.
Specificity gives the identification of positive result with respect to the other diseases as negative.

The below screenshots (Fig 27, 28 and 29) are the calculations and results involved in evaluation. In this, the given sample class data provides the actual class labelled data for three different classes. The Figure 28 shows the multi-class confusion matrix form and it predicts the false positive, true positive, false negative and true negative value. Based on these values the accuracy, sensitivity, and specificity are calculated. This results in figure 29. The above figure 26 and 27 describes about the confusion matrix of the classification of skin cancer types.

The true positive and true negative is determined for each category. Based on this the evaluation metrics are calculated. The above figure is the calculation of evaluation metrics based on the confusion matrix for the overall images for the cascade forward network type. The proposed method result achieves the best result as compared to the conventional methods. The comparative result is shown in below table 1.

The improvement between the percentages are calculated using the following formula:

$$\%improvement = \frac{(new\ value - old\ value)}{old\ value} * 100$$

The proposed MFO based cascade network improved the overall accuracy of classification by 7.7% compared to other methods. Similarly for sensitivity and specificity it improved by

14% and 3.9%. Thus, it achieves the better classification and optimization result of given skin cancer image. Various features are analysed. The accuracy of skin cancer image gives the best result.

CONCLUSION

The development of machine learning techniques is improving day by day with different variations in it. This learning process helps us for prediction, classification and segmentation. From the above analysis, it is observed that the feed forward neural network is suitable for the skin cancer classification based on the texture feature analysis. Moreover, it is observed that the radial basis function is not suitable for the classification. Hence, the feedforward neural network family is suitable for the skin cancer classification. In the future, the research can be improved by the segmentation procedure to improve the results as well as suitable for all types of machine learning methods.

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A Dynamic Virtual Interaction Technique for Real Time Applications

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ABSTRACT

Mixed Reality blurs line between what's real and what's computer generated data. This system provides the detailed characteristics of the Reality-Virtuality continuum. The main objective of this system is to develop applications using Mixed Reality which is used for real life and extend the applications with Virtual Interaction and Augmented Virtuality. Virtual Reality is ideal for replacing the real world, whereas Augmented Reality is ideal for enhancing the real world. The system is based on natural feature tracking algorithms that can be easily exploited for AR applications. Speeded-Up Robust Feature (SURF) is a better feature tracking algorithm used here to track features of the image. The computer graphics concepts used here have faster updates. It enhances tracking with more accuracy with respect to the real world. The Interaction used here helps to control virtual data from the real field and helps to develop real-time applications using Unity-3D engine that can be applied in the field of museum, civil architecture, military, healthcare, and education. The system provides mixed reality experience by combining Augmented Reality (AR) and Virtual Reality (VR). Future directions areas requiring further research are discussed.

KEY WORDS: AUGMENTED REALITY, INTERACTION, VIRTUAL REALITY.

INTRODUCTION

In 1994, Milgram and Fumio defined mixed reality concept as "anywhere between the extrema of the Reality-Virtuality continuum (Cheng Xiao et.al 2014) (fig no.1)", where the Virtuality continuum extends from virtual data with Augmented reality (AR) and Augmented Virtuality (AV) ranging between. The mixed reality can be achieved by Head-mounted display, Tablet PC, Cave Automatic Virtual Environment, Mobile phones, Handheld PC. In this concept, we develop mixed reality experience in every extreme by

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combining augmented reality and virtual reality and we control the virtual data from the real field. Augmented Reality is a new technology in computer vision, which seamlessly integrates real world information and virtual world information. It enhances a person's view of the real world with computer generated graphics.

There are two methods to match the virtual objects and real objects in AR technology: marker-based systems (Paul Milgram 1994) and markerless-based systems (Hamidia 20114). The former takes LED, identification plate etc., as the camera tracking target. In marker-based only black and white images are used as real content, which are very similar to bar code matching. The later takes edge, plane, corners and features as the camera tracking target. In marker-less approaches, viewing region of the scene are defined by its corresponding neighboring regions. Here, features of the scene can be defined in feature space where the corresponding features can be tracked between the frames. The association of these regions to the corresponding camera movements can be used to define the spatial location of the features with respect to the camera frame. Using such information, a graphical object can be mapped to the location of the region using the corresponding movements of the camera. We can control the virtual world data utilizing virtual catches. In the last area we upgrade the Augmented Virtuality (AV) encounters by consolidating Virtual Reality (VR) .VR is the fake condition which uses a PC to recreate three dimensional world. It invigorates the client's faculties so that a PC created world is experienced as genuine. So as to get a genuine figment of the real world, it is basic for the client to have impact on this virtual condition. Every one of that must be done so as to raise the deception of being in or following up on a virtual world or virtual condition, is giving a reenactment of the collaboration between individual and this genuine condition. This reenactment is in any event incompletely accomplished by methods for Virtual Reality interfaces associated with a PC. Essentially, a VR interface animates one of the human detects. This has not really got the chance to be as perplexing as it sounds, for example a PC-screen invigorates the visual sense; an earphone animates the sound-related sense. Subsequently, these two sorts of interfaces are generally utilized as Virtual Reality interfaces.

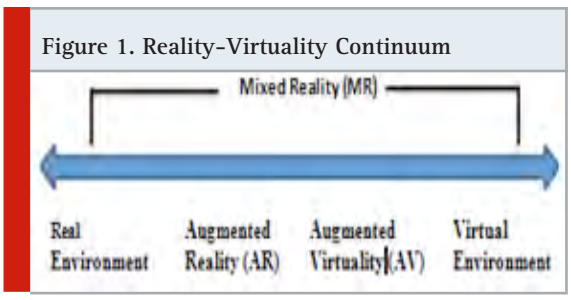


Figure 1. Reality-Virtuality Continuum

Outline of the Project

Expanded Reality gives communication between genuine world and virtual world items. Expanded Reality is like Virtual Reality with the exception of it tries to upgrade your impression of this present reality and isn't a dream place. Nobody truly knows whether it will satisfy its hopes, or precisely what the maximum capacity of having it in our regular day to day existences will be, yet one thing that is without a doubt is that it is an "advertisers' fantasy". The open doors are unending; you can leave messages for companions, shops can show offers and you can voice your feeling on specific spots. Computer generated reality gives just a simple like physical methodology. Subsequently to deliver greater reality and physical we utilize Virtuality Continuum idea. The idea utilizes SURF discovery calculation that identifies and acquires keypoint descriptors. Virtuality-Reality continuum supportive in making a vivid Mixed Reality experience, likewise with any stimulation, instruction, or preparing situation, the experience originator is hoping to use the crowd's creative mind to give the most convincing, individual, and transformative experience.

Application of the Project

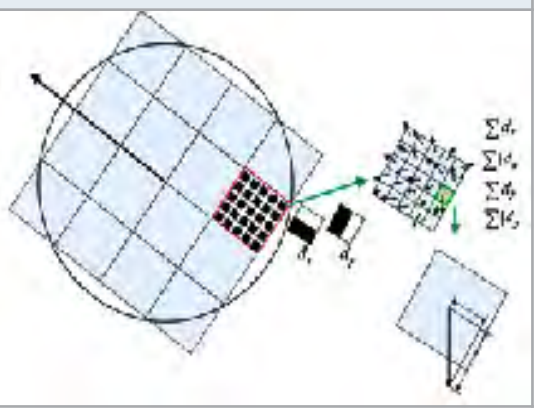
The Interaction used here helps to control virtual data from the real field and helps to develop real-time applications using Unity-3D engine that can be applied in the field of museum, civil architecture, military, healthcare, and education. The system provides mixed reality experience by combining Augmented Reality (AR) and Virtual Reality (VR). The interaction is not only applicable in education and training but also for cinematic fields also. The interaction can be used

in Civil Architectural Demonstration for defining a well prepared 3D building on place. The model created can be used to view the virtual internal structure. The interaction applicable to Wireless Control without any Embedded System that can be used for changing a channel using an image as a remote. The interaction can be applied for Zoos in a Museum Effect that develops the 3D models for skeletons. This is affine example for providing a detailed description on Virtual data. The interaction can be also used for Virtual Dressing Room that provides for applying/ changing the virtual dressing for any models. The Virtuality-Reality continuum applied in this system concerns with user's imagination as one of the input that can be used to combine theatrical and cinematic worlds.

Literature Survey

(Cheng Xiao, Zhang Lifeng 2014) . Has introduced the improvement of advanced cell innovation, expanded reality innovation is applied to a more extensive territory. Intend to use of portable increased reality, an execution venture dependent on Vuforia and Rawajali is structured. The Vuforia uses picture acknowledgment to follow and enroll picture marker, the Rawajali oversees and utilizes 3D model deftly. This framework proposes an application structure, the capacity of framework center class and application work process. The test outcome demonstrates that the undertaking has the solid accessibility and materialness, simultaneously, it claims great application frontal area. Enlarged Reality (AR) is another innovation which flawlessly coordinates genuine data and virtual world data. It incorporates mixed media, hree-measurement demonstrating, continuous video show and control, multi-sensor combination, ongoing following and enrollment, scenes combination and so on.. This framework executes Mobile Augmented Reality dependent on Vuforia and Rawajali. By Vuforia stage, it tracks and registers the objects of this present reality and matches them with the objects of the virtual world, at that point controls the 3D model through Rawajali. Portable Augmented Reality can be actualized in two methods. One is Optical transparent and another is Video transparent. In the Optical transparent framework, client sees a genuine world and PC produced items are straightforwardly included into an equivalent view. It is normally shown by semi-straightforward framework. Google glasses are the most delegate results of this sort. In Video transparent framework, client sees virtual articles which are covered in the picture of genuine world. It is generally shown by camera-show. There are two techniques to coordinate the virtual items and genuine articles in AR innovation: marker frameworks tack and markerless frameworks. In Marker AR we can expand just dark and square examples. In markerless AR we can expand any pictures of a particular highlights. Vuforia contains two acknowledgment strategies in Vuforia SDK: picture acknowledgment and content acknowledgment. Picture acknowledgment is utilized in this framework.

Figure 2. Feature descriptor of SURF



(Paul Milgram 1994) .has introduced a class of displays on the reality-virtuality continuum. This framework examine about Augmented Reality (AR) shows in a general sense inside the setting of a Reality-Virtuality (RV) continuum which envelops an enormous class of "Blended Reality" shows, which additionally incorporates Augmented Virtuality (AV). Blended Reality presentations are characterized by methods for seven instances of existing showcase ideas in which genuine articles and virtual items are compared. Fundamental components which recognize distinctive Mixed Reality show frameworks from one another are introduced by methods for a table in which the idea of the hidden scene, how it is seen, and the onlooker's reference to it are thought about and by methods for a three dimensional ordered system,

containing: Extent of World Knowledge (EWK), Reproduction Fidelity (RF) and Extent of Presence Metaphor (EPM). The fundamental target of this framework is to survey a few ramifications of the term Augmented Reality at that point order their connections among AR and between a bigger class of advances which is alluded to as Mixed Reality. The Reality-Virtuality Continuum can be applied utilizing two procedures one is See-through Augmented reality show and other is Monitor based Augmented Reality show the See-through showcase. This class of presentations is described by the capacity to see through the showcase medium legitimately to the world encompassing the spectator, subsequently accomplishing both the maximal conceivable degree of essence and a definitive level of "realspace imaging".3 Most regularly show enlargement is accomplished by utilizing mirrors to superimpose PC produced designs optically onto straightforwardly saw true scenes. Such shows are as of now a full grown innovation in a few (generally military) flying frameworks, as either board mounted or head-mounted presentations (HMD) yet are at present discovering new applications as a Virtual Reality related innovation particularly in assembling and upkeep situations. This presentation utilize the term screen based (non-vivid), or "window-on-the-world" (WoW), AR to allude to show frameworks where PC created pictures are either analogically or carefully overlaid onto live or put away video pictures.

(Camba J.D 2015) has present a technique to quickly make custom marker-based AR substance utilizing 3D information from genuine items and a writing instrument created in-house. We present a twostep procedure, where 3D geometry is created naturally by catching and preparing a progression of photos of a genuine item and hence changed over to an AR component that can be connected to a special marker and utilized with a marker-based AR framework. This framework gives a chance to educators to rapidly and easily make their own AR substance to help their creative educating rehearses. The expression "increased reality" alludes to the live immediate or backhanded perspective on a physical domain whose components are enlarged by PC created (content, pictures, recordings, 3D models, activitys, and so forth.). Enlarged universes are produced progressively and commonly experienced by means of PC screens, projectors, or head mounted presentations (HMD). This framework present a quick way to deal with Augmented Reality content improvement that requires no 3D demonstrating aptitudes and no ability with CAD bundles. Our methodology involves the utilization of a basic picture based demonstrating apparatus and a uniquely Augmented Reality composing application, which enables content creators to set up Augmented Reality encounters. The way toward building up a three dimensional PC portrayal of an item utilizing illustrations programming is known as 3D demonstrating.

The Image-based demonstrating arrangement includes three phases 1. picture catching, 2. point cloud, 4. 3D work. The picture catching uses Digital photogrammetry methods require the client to give a gathering of pictures of an item gained from various perspectives (ordinarily, at little augmentations around the article). The manner by which photos are gained is a basic part of the procedure, as it enormously decides the nature of the last reproduction. The subsequent advance is computationally escalated, as it includes the age of point cloud information from the source pictures. In this progression, specific calculations distinguish focal points in the picture set and ascertain the 3D directions of the outside of the item utilizing the collinearity condition that characterizes the connection among article and picture organizes. At last, a 3D work model is produced starting here cloud.

Contingent upon the quality, the subsequent work may contain holes, so extra cleanup is here and there important. This framework utilizes Marker

Figure 3. Virtual Civil Prototype.

Augmented Reality that is high contrast one of a kind square examples. This framework utilize a custom writing device called Aumentaty Author to create AR content from 3D models produced through picture based demonstrating procedures that makes 3D displaying simpler and speedier for the clients. (Tai-Wei Kao 2013) developes a markerless increased reality (AR) applying for the image books. It utilizes the scaleinvariant highlight change (SIFT) to understand the markerless enlarged reality application. As of late, the image books have been broadly presented and performed with voice, unique material, and paper-based 3D object. Be that as it may, it is humiliated by the presentation field because of the page constraints. The significant assignment of this framework plans to apply AR innovation for the image books. It permits watcher an elective understanding situation, giving the presentation style all the more differently, and intuitively with the virtual 3D objects. Increased Reality (AR) procedure is a strategy to superimpose virtual articles onto the genuine condition and show on the screen. Enlarged Reality empowers the framework interface to make a cooperating situation among genuine and virtual articles with agreeably exist together. Increased Reality has been applied in craftsmanship to arrive at the paradigmatic capability of Augmented Reality as another imaginative medium. This framework select picture books as the exploratory material to acknowledge markerless Augmented Reality since the image books contain numerous fake pictures that are all the more effectively to apply for article acknowledgment. AR toolkit to limit and distinguish the items. Be that as it may, the ARtoolkit can just give marker-based AR to free form. So as to arrive at the markerless instrument, the picture recognize shapes utilizing the point-coordinating calculation: scale-invariant component change (SIFT) to manage the dark rectangular encircling.

The AR toolkit is utilized to perceive the object from database and bring the activitys of the comparing 3D objects. Pictures gather from web to fabricate the database and concentrate the SIFT includes ahead of time. The proposed technique is separated into two sections: 1) SIFT-based AR-labeling and 2) object restriction and acknowledgment. A large portion of the AR applications apply a marker to treat as the AR-tag (for example QR-Code). Not the same as it, SIFT build AR-label marker naturally. It empowers the intelligent situation all the more instinctively. In this framework, the SIFT calculation is apply for coordinating the component focuses. The SIFT descriptor finds the key-point combines between the testing picture and the pictures of the database. The coordinating focuses from the SIFT are utilized in the preparation procedure. In light of our perception, the scale-space outrageous location delivers an excessive number of repetitive key-focuses. Subsequently, the SIFT calculation plays out the exact fitting the article with precise area, scale, and proportion of head ebbs and flows. To perceive the coordinated 2D object, the arrangement of highlights is then used to discover the comparing object from database. At the point when an item is perceived by SIFT calculation, a dark rectangular fringe will be appended and applied for the ARtoolkit. Customary mean-move following calculation can't alter the following windows as indicated by the scale and direction change of the article during following and get precise limitation (Zhiheng Zhout et.al 2013). This framework consolidates SURF highlight identification with the Mean-move following, which matches the SURF include in objective of present and past edges, compute their direction and extent of scale to understand a scale and direction changing following calculation. The calculation fabricates a model to depict the movement of objective and estimate the area of focus, which will show signs of improvement beginning point and decrease cycles. Target following procedure dependent on video recurrence, particularly vehicle following, is generally utilized in rush hour gridlock observing and the security system of smart vehicle. Mean-move was advanced by an article about the estimation of the inclination of a thickness work. For taking the shading histogram of the objective as likelihood thickness highlight, and compute their closeness by Bhattacharry coefficient, target following will be an improvement issue that can be unraveled by Mean-move calculation.

In any case, conventional Mean-move following calculation can't get an exact area when the

scale or direction of the objective is changing, in light of the fact that it utilizes a perpetual data transmission. In the single transmission capacity is supplanted by a data transmission network before emphasis in the mean time, the data of scale and direction will be determined. Moreover, the conventional Mean-move following calculation disregards the revolution of objective. Along these lines the conventional Mean-move following calculation can't accomplish great execution In request to tackle this issue, This framework use SURF highlight location and coordinating to get a self-versatile size of the objective. Hessian lattice is the center of SURF include extraction. Right off the bat, we ascertain the image of Hessian grid to get the extremum point. SURF highlight point are to characterized, in the event that they are the maximal worth or least estimation of nearby focuses. Simultaneously, the scale and direction will be recorded. At the point when SURF highlight focuses are separated, we can get the relating direction, scale and direction through coordinating SURF include among objective and competitor zone. This framework consolidates SURF and Mean-move following calculation to conquer the restriction of conventional mean-move following calculation. We get a self-versatile transfer speed dependent on SURF highlight coordinating. The scale factor is determined from the coordinated SURF sets, which is solid due to the precision and dependability of SURF. Furthermore, the movement expectation model decreases the cycles of mean-move calculation in each casing, which can address the issue of ongoing following. The outcome demonstrates the proposed calculation has a decent presentation. (Christopher Stapleton 2011) Study of the creative mind have basic jobs in characterizing convincing Mixed Reality (MR) encounters. This system place that the group of spectators part's own creative mind is a basic third sort of contribution to characterizing the full Virtuality continuum for MR. It is generally acknowledged that there are two experiential contributions to MR consolidating a mix of upgrades of this present reality just as from virtual antiques (ordinarily from PCs). Utilizing a contextual analysis of a MemoryScape Prototype for the Maitland Holocaust Museum investigate how notwithstanding reality and enlarged/ augmented simulation, creative mind masterfully and deductively fills in as a significant third reality to the Virtuality continuum to accomplish the experience planner's goal for the group of spectators' impression of MR encounters.

Figure 4. Control Virtual contents using Virtual Buttons.

As Mixed Reality is developing from a mechanical capacity into an expressive medium, completely captivating the creative mind can accomplish another degree of effect for crowds. The term creative mind can be characterized as the personnel or activity of shaping new thoughts, or pictures, or ideas of outer articles not present to the faculties that is "a distinctive creative mind". In the plan of experiential excitement, for example, amusement parks, when the truth is the canvas of the story's creator, the planner can set up the group of spectators' desire just before tossing them into complete obscurity so they envision the most exceedingly terrible, best, or most convincing individual involvement with no extra media. From the contextual analysis it uncovers that The Vision Committee of the Maitland Holocaust Museum was searching out new chances to rethink their little historical center into an encounter that would make the subject of the Holocaust applicable in the lives of a different network. Any medium has the test of doing equity to the account of the Holocaust. The story is so huge, assorted, complex, and individual, the more the media attempts to analyze the differing subtleties, the less it will accomplish in recounting to the bigger story. The story is hard to approach without over-rearrangements or winding up unreasonably upsetting for youthful points of view. A MemoryScape establishment places the group of spectators into the shoes of a principle

character by blending the theatical arranging and artistic stages. It is displayed as a deciphered craftsmanship establishment using amusement park systems introducing authentic antiquities and setting. A MemoryScape establishment consolidates the utilization of customary media (writing, sound, video and reenactment) installed inside a physical dramatic condition. The latent media take on another an experiential nearness like an amusement park. The member's inclination of closeness to the occasion in a live situation expands the force of the experience of the user's. The framework manages the issue of item following in Augmented Reality (AR) applications. In the ongoing years AR has been of expanding interest. It comprises of embeddings a virtual item into a genuine scene. The transient rationality among genuine and virtual articles is perhaps the hardest test of the AR framework acknowledgment. A markerless following dependent on the intrigue focuses coordinating utilizing SURF (Speed Up Robust Features) is for the most part utilized, yet it experiences high computational unpredictability (M.Hamidia2014). Thus, this framework propose a strategy utilizing an intrigue window around of the article to be followed. In addition, a connection between the article size and the metric limit of SURF is examined. The exploratory outcomes demonstrate an improvement of the proposed item following strategy execution contrasted with a standard technique dependent on SURF intrigue focuses coordinating. PC vision is a potential wellspring of many propelled human-machine cooperation.

One of its applications is expanded reality (AR). The primary idea driving AR is to incorporate extra noticeable components, for example, sound, illustrations, picture, video, power criticism, and so on., into a client's certifiable condition, with the end goal of improved comprehension and communication. What's more, the virtual items show data that the client can't legitimately recognize with his down faculties. The data passed on by the virtual items enables a client to perform true assignments. With the goal for AR to be successful, the genuine and PC created protests in 3D must be precisely situated comparative with one another. So as to make a virtual item into this present reality, a virtual camera must be set in a similar position and direction as the genuine camera, which requires a hearty constant following technique one of the bottlenecks of AR applications. Along these lines, two methodologies of AR are recognized: marker AR and markerless AR. In the primary methodology, various markers have been intended for AR applications utilizing either roundabout or planar markers. One famous and furthermore freely accessible marker based following programming is the ARToolkit created. ARTag finds potential marker in a picture by first finding the four sided fringe form, and utilizing the corner focuses to make an example network to extricate an appearance vector. In this manner, markerless following methodologies utilizing common highlights of the earth to be enlarged for following is a significantly more encouraging methodology. It is typically founded on the understanding of a video info stream .Visual markerless posture trackers essentially hand-off on normal element focuses. Item following is a significant errand inside the field of PC vision. Three classifications dependent on the utilization of article portrayal of following calculations are isolated by: strategies setting up point correspondence, techniques utilizing crude geometric models and strategies utilizing form development. Intrigue point based item following is to discover noteworthy focuses in all pictures of an arrangement. SURF is a scale-invariant and revolution invariant component finder. It is flawless in its high calculation speed and strength. The principle workhorse of SURF calculation is the utilization of the indispensable picture for significant accelerate. A fundamental picture is characterized as far as an info picture. The indispensable picture is utilized to figure box channel and Haar channel reactions at subjective scales in consistent time per pixel. The SURF finder depends on the determinant of the Hessian network. In the component coordinating stage, intrigue point descriptors have been looked at. Numerous methodologies of coordinating between two pictures are proposed. Subsequent to advancing the coordinating procedure by RANSAC calculation, homography framework is determined to gauge homography between two pictures (reference and constant picture) utilizing four. In the following procedure dependent on intrigue focuses, nearby highlights of reference

picture that speak to the item to be followed are removed first, where the intrigue focuses are distinguished and the descriptor vectors are created by the SURF technique. In the other hand, for each edge that speaks to the ongoing picture of video stream caught by the genuine camera, similar procedures are performed to extricate the neighborhood highlights. From that point forward, the coordinating between the pictures is dictated by the association of relating focuses utilizing a closeness measure between the descriptor vectors. Additionally, RANSAC calculation is utilized to take out the exceptions that caused blunders in the homography grid estimation. The proposed methodology depends on utilizing Interest Window (IW) around the article to be followed. This window is characterized as an extended bouncing box. The current framework depends on marker based tracker. It can enlarge dark advertisement white 2D shading models. The component following system, for example, SIFT , SURF are utilized to change over to recognize trackers in the picture. SURF gives the less highlights of the picture with more exactness.

MATERIAL AND METHODS

Existing System

The existing system based on marker-based augmented reality which are black and white 2D images. Ivan Sutherland makes the primary expanded reality framework, which is additionally the principal computer generated reality framework. It utilizes an optical transparent head-mounted showcase that is followed by one of two distinctive 6DOF trackers: a mechanical tracker and a ultrasonic tracker. Because of the constrained preparing intensity of PCs around then, truth be told, extremely basic wireframe drawings could be shown continuously. Most of the AR system are not platform independent. The marker-based AR system are similar to bar code template matching system.

Proposed System

The proposed system of AR system can augment the marless-based image. The system can augment any high definition image using natural feature tracking algorithm. It can also detect basic 3D objects such as cube, cuboid, cylinder,etc., The system is designed with Multi-platform development using c# language. Videos can be augmented in the proposed sytem as the virtual content. The user interfaces on the real side is implemented. The system can interact from the physical world. Finally the system is extended to Augmented Virtuality which is the combination of augmented reality and virtual reality. The proposed system consist of four different modules such as, Augmented Reality, Virtual Interaction and Augmented Virtuality.

Augmented Reality

In Video transparent enlarged reality framework, the client can see virtual items which are covered in the picture of this present reality. It is shown by the camera - show. Advanced mobile phones are normal results of this sort at present. It is finished by common component following procedure. In highlight based visual following strategies, the objective locale is spoken to and followed in the component space. A discriminative and repeatable component depiction (for example Filter, SURF, FAST, FREAK, and so on.) is required to delineate nearby structures as indicated by the data from the spatial neighborhood. The element portrayal is invariant to changes in review conditions, for example, scale, direction and complexity. By coordinating the element descriptors from various pictures, a similar area can be identified by its correspondences.

Surf Descriptor

To get invariant to picture pivot, Haar wavelet reactions are determined in and heading inside a round neighborhood of span 6 around the component point, is the scale at which the element point was recognized. At that point, develops a square locale adjusted to the chose direction and concentrates the SURF descriptor from it. The Haar wavelets can be immediately processed by essential pictures. The window is partitioned into 4×4 sub-areas when the overwhelming direction is assessed and incorporated into the intrigue focuses each sub-district is framed a 4-dimensional vector characterized as in fig. no.2. where , are the Haar wavelet responses in horizontal direction and vertical respectively. dx , are the absolute values of these responses.

Surf Feature Matching

In the element coordinating stage, intrigue point descriptors have been looked at. Numerous methodologies of coordinating between two pictures are proposed. Lowe proposed the utilizing of the proportion between the Euclidean separation to the closest and the second closest neighbors. In any case, the strategy just matches highlight focuses from a solitary bearing. The mistake pace of coordinating is to stay high. A methodology of coordinating proposed in utilizing coordinating element focuses from bidirectional headings, which improves the precision of coordinating and diminishes the computational proficiency. In the following assignment, the element coordinating is done between the reference picture and the ongoing picture. All descriptors can be separated from reference picture and continuous picture and after that harsh coordinating is actualized by the closest neighbor coordinating technique. The precision of the coordinating directly affects the legitimacy of the explained change network. RANSAC (arbitrary example agreement) calculation is utilized to dispense with coordinating mistakes and to get the ideal change grid between pictures. It is a compelling technique for approximating model parameters, is embraced to wipe out exceptions.

Camera Calibration

The objective of a picture based article adjustment/ enlistment is to begin with an aligned camera and process the item to-camera change of a solitary article for which there is a known geometric model and milestone focuses. The situation of an article is resolved "through the perspective" of the camera. The camera is normally a similar camera used to catch the video signal that is joined with the designs. The adjustment starts by catching a picture of this present reality article and finding the arrangement of milestone focuses in the picture. There is a lot of work in the territory of programmed present assurance in the PC vision writing, yet all in all these methods apply to just restricted classes of models and scenes. In our work, the areas of milestone focuses in the picture are recognized intuitively by the client. We expect that the focuses are mapped from known areas in 3-space to the picture through an unbending 3D change and a projection. Since the camera is as of now adjusted, its facilitate framework is known. Finding the situation of the item in camera arranges is indistinguishable from the camera alignment issue, then again, actually we expect the inner parameters are known. Since this is a non-direct enhancement issue, it is imperative to choose the beginning stage appropriately. This is finished by utilizing the arrangement as the underlying theory. This underlying estimate is frequently adequately near the right arrangement that the enhancement technique combines to the last arrangement inside few cycles.

Virtual Interaction

Practically all Mobile Augmented Reality applications consider clients to associate with the 3D enlarged world through touch occasions on the gadget's screen, yet we propose another connection strategy, that we characterize as Virtual Buttons, and which will enable clients to communicate straightforwardly with the increased data. The fundamental thought is simple. Notwithstanding the effectively outstanding articles set in reality to do a picture or item following, where a video or a 3D object typically is layered, we recommend to add catches to the scene which the client will have the option to for all intents and purposes press those catches. As can be found in certain scenes of the accompanying video, these "virtual catches" are layered in certain spots of this present reality and enable the client to associate with the product just by squeezing them. This better approach for cooperation is called virtual collaboration, which is a significant region for future research. The connection should be possible by setting virtual catches. Virtual catches are the exceptional key focuses which can be put on the increased reality tracker. The size and arrangement of Virtual

Figure 5. Museum and Zoo Effect

catches must be viewed as when planning an encounter that utilizations them. In this section, we accessed the videos from the real world using virtual buttons. Using augmented reality virtual interaction we control any virtual environment. In this feature Virtual Buttons are entitled with numbers 1 to 5. Whenever the user hides the button, the local rules will trigger. These rules can formulate in pause, play, change the video content.

Augmented Virtuality

The last module in this paper proposes the augmentation of expanded reality with the Virtual Reality (VR). Therefore we can get the Augmented Virtuality experience which is the other extraordinary of Milgram's blended reality. It is about the making of a virtual world, which ought to be structured so that clients would think that its hard to differentiate based on what is genuine and what isn't. Besides, VR is normally accomplished by the wearing of a VR head protector or goggles like the Oculus Rift. Both computer generated simulation and enlarged the truth are comparative in the objective of drenching the client, however the two frameworks to this in various manners. With AR, clients keep on being in contact with this present reality while communicating with virtual items around them. With VR, the client is secluded from this present reality while drenched in a world that is totally manufactured. The way things are, VR may work better for computer games and long range informal communication in a virtual domain, for example, Second Life, or even PlayStation Home. In this framework we joined Augmented Reality and Virtual Reality by Google Cardboard. It ought to be coordinated with cell phone and it works by putting the cell phone at the ideal good ways from the curved focal points. At that point, by utilizing good expanded reality applications, the focal points make a 3D impact when held up to your eyes. Anybody can even move your head around, and the pictures will react as though you're in a similar spot as what's shown on your screen.

Experimental Setup and Results

The setup integrates .Net Frameworks and java plugins to develop the application in multiplatform. It uses Unity3D engine to control the virtual content. Visual basic C# and Visual basic .NET with OpenCV plugins for analyzing features in the image

Net Framework

.NET Framework is a product structure created by Microsoft that runs primarily on Microsoft Windows. It includes a large class library known as Framework Class Library (FCL) and gives language interoperability(each language can utilize code written in different dialects) over a few programming dialects. Projects written for .NET Framework execute in a product situation (as differentiated to equipment condition), known as Common Language Runtime (CLR), an application virtual machine that gives administrations, for example, security, memory the board, and special case taking care of. FCL and CLR together establish .NET Framework.

Unity 3d Engine

Solidarity is a cross-stage game motor created by Unity Technologies and used to create computer games for PC, consoles, portable and sites. First declared uniquely for OS X, at Apple's Worldwide Developers Conference in 2005, it has since been stretched out to target in excess of fifteen stages.

OpenCV

OpenCV (Open Source Computer Vision Library) is an open source PC vision and AI programming library. OpenCV was worked to give a typical framework to PC vision applications and to quicken the utilization of machine discernment in the business items. Being a BSD-authorized

Figure 6. Google Cardboard

item, OpenCV makes it simple for organizations to use and adjust the code.

Experimental Result

Several applications are creating using mixed reality systems which can be used for civil, medical, military, education and many other fields. Using this system virtual civil prototype, wireless control mechanism without embedded system, museum and zoo effect applications are implemented in this paper.

Virtual Civil Prototype

In reality civil engineers apply lots of CAD designing techniques to develop their architectural plan and developing 3D prototype. However the users lack of knowledge about CAD and civil modeling unable to view their dream home. In this system we are applying the concepts of virtual content to create 3D-modeling. Through this users can view their home as required in their imagination view. In additional to this system also enables to visualize the interior decorations of their home. The users can use this system to realize, construct, modify and built their home. This system serves a good communication between user's and civil engineers and restores conflicts. Figure 3. involves augmenting a 3D virtual house on the 2D prototype plan. 2D prototype images can be tracked using SURF mechanism and virtual houses are loaded using camera calibration. Transformation for virtual content should be applied for virtual content based on the real image. Several interior 3D objects can place on the virtual house. This provides the users to view the interior decorations using extended tracking.

Wireless Control Mechanism Without Embedded System

In this system, user interaction can be developed on the real object. Features are tracked on the real side. Virtual buttons are the placed on the real side features. Local rules are loaded on virtual buttons. When the virtual buttons (fig 4) are pressed , the local rules will triggered. The rules can be set as close the video, change the video, scale the video.

Museum and Zoo Effect

This application is extended with virtual reality using google cardboard (fig 6). Thus augmented virtuality application is created. 2D Dinosaur skeleton images (fig.5) are augmented with 3D virtual Dinosaur models. This produces the realistic view of 3D dinosaurs.

CONCLUSION

With the developing true utilization of Mixed Reality (MR) inside transformational applications, for example, preparing, training, and showcasing, there should be an accord about how the study of the cerebrum draws in with the specialty of the media to investigate the genuine effect of MR on the human experience and its presentation. In Module I Augmented Reality ideas are actualized and created application utilized for common structural plan. It shows the virtual development of the structure. The client can envision the inward piece of the structure in three measurement. In Module II Virtual Interaction is executed. The client can control the virtual information from the genuine world.The client can control recordings as the virtual information. In Module III Augmented Reality idea is stretched out with Virtual Reality. It is the other extraordinary of Milligram's Reality-Virtuality continuum. We created Zoo in the Museum experience utilizing google cardboard. At the point when we place the cardboard on skeletons of dinosaurs, 3D dinosaur virtual articles can be found in genuine experience. In spite of the fact that it's as of now in its early stages, MR innovation will change how we work. Our capacity to incorporate AR applications into our regular business circumstances is driving another work environment, yet another worker outlook. It is totally upsetting how we team up and get to the information.

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A Review of Pulse Diagnosis System

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ABSTRACT

The Palpation of the pulse reflected over the radial artery is considered as the vital source of physiological information to determine the health status of the individual. The traditional ayurvedic and Chinese medicine measures the wrist pulse signals under three different positions. The automated pulse diagnostic system acts as a non-invasive system to assist the clinician for taking decisive decision over the disparity in health status. In order to acquire the exact pulse signals various methods and technologies have been proposed by the researchers. This research article provides a comprehensive survey on the state of art present in the pulse diagnosis system. A survey of literatures were made from the scientific databases such as Research Gate, Academia, Google Scholar, Science direct, PubMed, IEEE xplore and other scholarly sources. A total of 160 articles were taken from which 110 research articles were selected for review based on the analytic methodologies of the pulse. This review mainly points the merits and demerits of data acquisition system, reliability on pulse quantification using time and frequency domain analysis and suitable classifier for prediction. Additionally, the persisting issues were pointed out and its corresponding recommendations were made for future development.

KEY WORDS: PULSE DIAGNOSIS SYSTEM, WRIST PULSE, ORIENTAL PULSE SYSTEM, TRADITIONAL CHINESE MEDICINE, TRADITIONAL AYURVEDIC MEDICINE, WRIST PULSE ACQUISITION, AUTOMATED SYSTEM for PULSE ACQUISITION, DATA PROCESSING, CLASSIFICATION SYSTEM, SENSOR BASED PULSE ACQUISITION, DEVELOPMENT KIT FOR PULSE RETRIEVAL

INTRODUCTION

Traditional ayurvedic and traditional Chinese medicine consider the pulse signals recorded from three positions of the wrist as a major source of information for identifying the health status of the human. In India, Ayurveda is considered as a conventional medical system originated during the Vedic period. The two main concepts of the ayurvedic system include the prakriti which means the primary formation and vikriti which is the disturbed state of formation[1]. Prakriti is present in every human being with different vikriti mainly because of the variations present in Vata, Pitta and Kapha Pulse leading to several disorders[2]. Vata determines the input and output system of the body. Pitta represents the negativity

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body production of entropy and Kapha indicates the adaptable structure of the body[3]. These three main pulses were reflected in the wrist region along the radial artery [1]. The pulse can be felt on the lateral aspect of the right forearm, 2cm up from the wrist. The index, middle, and ring fingers are used to feel the three pulses in their respective order as shown in the figure 1. This figure is adapted from the article "Repeatability of Pulse Diagnosis and Body Constitution Diagnosis in Traditional Indian Ayurveda Medicine" by Vrinda Kurande, Rasmus Waagepetersen, Egon Toft, Ramjee PrasadLokesh Raturi, BAMS, in GLOBAL ADVANCES IN HEALTH AND MEDICINE, 1(5), PP. 36-42, 2012. Pressure of varying levels was applied with each finger on the artery as shown in the figure 1. Applying variable pressure acts as the main factor for diagnosing the diseases. Based on the dominant pulse and the direction, the expert practitioner will be able to identify over 350 different disease conditions. The relationship between pulse patterns acts as a key to identify the disorders[4]. Healthy Person has the three pulses with amplitude ordered in the ratio of 4:2:1 respectively. On the other hand, this ratio is supposed to track the seasonal variations and changes along with the parameters such as time of the day, temperature and humidity of the skin. The right arm of male and left arm of female is used to read the pulse. These three pulses can be differentiated using position, rate, rhythm, force, gait, tension and volume, temperature, and dimension of blood vessel wall. This skill can be acquired only by regular practice and fine interpretation of the pulse by sensing the pulse rhythm, phase and rate. This means that the even though the pulse is objective, its condition is subjective. This subjective ability of the pulse assessment can be transformed in to a tool to aid the physician for obtaining better results. In the past few decades, several attempts have been taken to build up a standard pulse assessment devices. Furthermore several advanced sensors and control circuitry were developed to make the pulse assessment more precise and viable. Many Physicians are using this pulse diagnosis system as a predictive test for confirmation. The research paper is organized as follows, first section discusses about the various pulse conditions and its relative information, second section deals with the discussion about the pulse diagnosis system, third section elaborates the various pulse acquisition systems and related products, fourth section details with the various feature extraction methods, fifth section explains about the different classifiers used, finally the conclusion is made from the inference from the above sections.

MATERIAL AND METHODS

Pulse conditions and its relative information

In Traditional Pulse diagnosis, it is believed that the signal obtained from the wrist holds valuable information about the health conditions[5]. In case of recent pulse diagnosis it is considered that any loss in arterial elasticity, variations in pulse amplitude, rhythm and pulse shape are correlated with the disorders such as cardiovascular disorders, hypertension, diabetes and so on [6,7,8]. In recent pulse diagnosis, mainly four elements illustrate the pulse conditions they are position, frequency, shape and trend [9]. The 8 conditions namely depth, rate, regularity, width, length, smoothness, strength and stiffness were commonly seen and the researchers also stated that these 8 elements were predominant with different intensities in any of the human [10-13]. The rate that is defined as the number of beats per breath and depth which is defined as the vertical position of the pulse speaks about the nature of diseases present. The width which is defined as the intensity of pulse and the length as the range of pulse occurrence is utilized to illustrate the shape of pulse. In the above section, a qualitative analysis is made on the recent pulse diagnosis in terms of the pulse qualities and states. The inference from the section is that challenges faced in most of the works is that only qualitative way is adapted for pulse diagnosis and it may lead to the lower the inter and intra reliability, as the clinician may fail to consider all conditions to take decision on diseases. To overcome the limitations of qualitative analysis, the quantitative pulse diagnosis can be preferred and is discussed in detail. The block diagram for the quantitative pulse analysis is given below. The main purpose of the quantitative pulse acquisition system is to assist the clinical research by determining the correlation between the pulse patterns and prognosis of the disease related to the variation of the patterns. In order to assist

the researchers and clinicians a development kit was designed to objectify the wrist pulse patterns with corresponding organs [14, 15].

Pulse acquisition systems

Pulse signals can be acquired either by pulse acquiring sensor systems designed as per selective criteria or available acquisition kits or products in market. The sensor should be of better quality, reliable and it should possess the properties that does not affect the pulse acquisition systems [16].Initially Sphygmogram was used to obtain the pulse signal and objectify its conditions, but the obtained sphymograph failed to depict the pulse waveforms interms of position, trend and width [17].In order, to depict the position, trend and width and also to enhance the quality of the signal with the help of signal conditioning circuit several other sensors like Polyvinylidene Di-Fluoride (PVDF) sensor can be preferred [18, 19]. Additionally, it depicts the exact pulse position and helps to obtain the relative information from radial artery. The variable pulse pressure that is exerted on the wrist position can be obtained with the help of piezoelectric sensor [20, 21] and it rejects the static pressure on the wrist. Unlike the piezoelectric sensors piezoresistive type strain gauges can also be used for signal acquisition [22]. To provide a low cost measure for signal acquisition, highly sensitive sound sensors with plastic tubes were used [23]. In order to acquire the wrist pulse signal that contains strong information regarding the health status MEMS system can be used [35]. Tactile sensor array is another source for obtaining three-dimensional wrist pulse signals that delineates the length, width, ascending slope, and descending slope [28]. There are two different modalities to acquire the pulse information. One is by obtaining signal from single probe [24] and other is by obtaining the pulse signals from all three locations using three sensor system [6,26,27]. In such cases, single sensor array is preferred by A.Zhang, et al. [24] whereas seven sensor arrays are used by Jeon, et al [6]. The main reason for using array of sensors is that by reducing the number of signal acquiring channel to one might lead to loss of vital pathological information acquired from persons. Apart from the sensor types, the amount of pressure exerted and the correct position of the sensors in place is also an important factor. The positioning of the sensor system is discussed in some of the articles [30, 31]. To maintain the pressure and acquire exact pulse signals the articles mostly prefer motors, cuffs, screws, weights, control units and fixed prototype [14, 17,19,24,29,32,33,34,35,36]. In addition to the sensor system there are some pulse acquisition devices as shown in the table 1 can be used for acquisition and conditioning of the pulse signal. The pulse acquisition system which usually made up of these different sensors mainly possess the drawback interms of the accuracy, sensitivity ,level of noise present and temperature, etc. So that, the individual sensor system is replaced by Pulse acquisition instruments as shown in table 1. In spite of the Pulse acquisition instruments, there are some contributions made by researchers in the field of pulse diagnosis by considering the wrist pulse signals. They are Nadi tarangini that depicts the pulse signal in time series under variable pressure for normal, diseased and different age group persons [47]. Nadi Yantra provides an automated pressure locking system based on the signal accuracy and it is constrained to noise free environment [48]. Nadi aridhal system and Noi kanipaan quantifies the three pulse signals with respect to time [49, 50]. Nadi pariksha yantra determines both time and frequency domain characteristics of the acquired pulse signal [51].

Figure 1. Pulse reading using three fingers

Pre-Processing of Pulse signal

The pulse signal thus acquired by one of the above mentioned devices posses noises or might

have low amplitude values and low signal to noise ratio. So in order to remove the noise and boost up the obtained signal there is a need for amplification and filtering circuitry [18, 21, 29]. Mostly, the interferences witnessed are power line interferences, random noises and Baseline wanders. This kind of interferences will disturb the obtained pulse signal [59]. Baseline wander is an interference caused by respiration and motion artifacts which leads to the wandering of signal baseline due to low frequency noise components (0.1 Hz to 0.8 Hz). By using wavelet filter 0.4-0.8 Hz freq component can be removed whereas baseline frequency component lies in the range of 0.1- 0.4 Hz [40]. In order to completely remove the low frequency components the filtering includes 2 stages namely Discrete Meyer filtering and cubic spline Estimation. The former filtering removes the low frequency components from 0.4- 0.8 Hz and the later removes the baseline wander of frequency 0.1-0.4 Hz [40]. This type of filtering involves a ratio called Energy ratio. If the Energy Ratio (ER) is greater than the threshold the baseline wander is removed using the cubic spline and if the ER is less than threshold then both Discrete Meyer and Cubic spline can be used [38]. Linear interpolation can also be used for baseline wander removal as it is simple to implement but it suffers from distortion. So, wavelet and adaptive filtering can be used as an alternative. Unlike, the linear interpolation wavelet based filtering suffers from large computation complexity and the process is time consuming [20]. Additionally, in case of wavelet method, curve fitting and other filter design, better the method lower the variance obtained [35]. As a result it removes the baseline wander effectively but this requires the prior knowledge about the baseline drift and reference

Figure 2. Time of extinguishing.

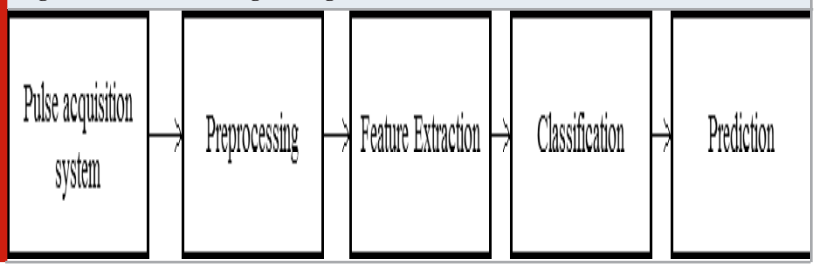

Table 1. Pulse Acquisition system

S.No	Pulse Acquisition system	References
1	Bi-sensing pulse diagnosis instrument (BSPDI) with a tactile capacitive array sensor.	Ref [44,45,46]
2	Multi channel sensor System	Ref [52,54]
3	Acquisition Instrument	Ref [53]
4	Programmable Palpation Robotic Hand (PRH)	Ref [56]
5	FDB-Type Pressure Sensor for Radial Pulse (PSRP)	Ref [55]
6	Pulse Signal Acquisition Device	Ref [57]
7	Data Acquisition (DAQ) Circuit Board	Ref [58]

input [41]. On other hand compared to linear interpolation, cubic spline and morphological filtering Cascaded Adaptive Filtering (CAF) is mostly preferred as it has the characteristics of preserving the diagnostic information of the pulse signal to larger extent and it can also be implemented without any prior knowledge about the pulse and its drift [17]. Similarly, the power line interferences at 50 Hz can be eliminated by wavelet approximation [39]. After noise removal for further processing the signal has to be converted into digital data using 10 bit A/D converter [29]. Once the interferences appearing during pulse signal acquisition are removed, certain preprocessing mechanism such as segmentation can be applied [59, 42, 43]. After the preprocessing of pulse signals, the feature extraction methods can be employed to acquire the features for further classification.

Feature Extraction

The methods applied can be 1).Time based analysis.2). Frequency based analysis. 3). Time-frequency based analysis. 3) Statistical analysis.

Time based analysis

Time domain analysis refers to the variation of the arterial pressure wave with respect to time. The analysis of the pulse signal can be made on either single cycle of the wave or average cycle of pulse that is the average of several segmented pulse cycles [69]. The height, width, depth, length, smoothness can be used as a time domain features and it relates the states of the wrist pulse with contact pressure to find the pathological states of male and female[60]. Similarly, the correlation dimension, Kolmogorov entropy can be used to determine whether the signal is chaotic or not and the strength of the pulse can recognized by decision tree [70, 71]. In addition to the above features, there are patterns namely slippery, stiffness, smoothness, string like and strength that is determined by the ratio of heights of different peaks and width with respect to time [9, 60, 62-68]. Number of peaks, Maximum peak and width of the peaks also comes under time based features [72]. The time domain features are used as it possesses the physiological information of the health status and it seems to interpret 8 common elements seen in recent pulse diagnosis [17, 20]. The main limitation of employing the time domain analysis is that the tidal and dicrotic peaks are weak and hence all the time domain features are difficult to be extracted.

Frequency based analysis

Frequency analysis posses the necessary physiological and the pathological information required for analysis of the health status. Further, the spectral relationship of the pulse can be used

Table 2. Disease diagnosed using classifiers.

S. No	Disease diagnosed	Classifier used	Accuracy	References
1	Hyper Tension	Artificial Neural Networks	80%	Ref [101,102]
2	Coronary arteriosclerosis	PMV's spectral energy ratio	80% and 97% (Specificity and sensitivity)	Ref [87]
3	Dyspepsia and rhinitis	ANOVA test	-	Ref [104]
4	Cirrhosis	k-nearest neighbor (KNN) algorithm	87.09%	Ref [20]
5	Coronary heart disease	Hilbert-Huang transform (HHT) and random forest [92], Recurrence quantification analysis[88], Bayes discriminant analysis [105]	90.21% [92], Roc- 1.000, 0.898, 0.653, 0.673, 0.885, 0.898, 0.986 and 0.99[88], 83.3 % (patients with cardiovascular diseases) , 70.0% (normal) [105].	Ref [92,105, 85,88]
6	Hypertension, sub-health, cirrhosis, coronary heart disease	Linear SVM	75% and 100%	Ref [106]
7	Gastro intestinal disorders	Receiver Operating Characteristics (ROC) analysis	90%	Ref [78]
8	Cholecystitis & Nephritis	ERP-based KNN classifiers	91.74%	Ref [59]
9	Heroin druggers	Kolmongorov entropy	-	Ref [71]
10	Arrhythmia	and Lynapunov exponents Lempel-ziv complexity analysis	97.1%	Ref[100]

for the prognosis of cardiovascular disorders [17, 69, 73, 74]. It determines the energy distribution of arterial waveform for pulse diagnosis. Frequency domain graph consists of plots of amplitude vs. frequency and phase vs. frequency obtained from the transformation of the time domain graph. The most common frequency domain methods are Fast Fourier transform , used for age estimation and power spectra distribution [74], AR spectrum analysis, [17], Hilbert Huang transform used for the prognosis of cholecystitis and nephritis [74, 75] and so on. The frequency based features, Spectral energy and its ratio below 10 Hz can be used to statistically differentiate the gestational age of pregnant woman with non- pregnant [76]. Using pulse power spectrum normal persons can be differentiated with persons having gastrointestinal disorders [77]. Energy density [71], Spectral power ratio and Spectral harmonic ratio [69,79], Peak value, Peak frequency, centre of gravity and gravity frequency of power spectrum can be used for determining the sub health states of a person [80,81], Power and Phase position spectra for classifying the pulse patterns [17,82]. The classification accuracy depends upon the usage of single feature or combination of features.

Time-frequency analysis

Time frequency based analysis is another method for the analysis of wrist pulse signals [17]. The frequency spectrum can be obtained from the wrist pulse signals as a function of time using methods such as short time fourier transform, wavelet transform, image analysis, and so on. In some articles wavelet transform is used to obtain the energy spectrum and wavelet entropy, this can be used for differentiating persons with and without cardiovascular diseases of accuracy 83.3% and 70% respectively [83].

Statistical analysis

The statistical values obtained from the pulse signal can also be used as the feature for classification. Some researchers adapt different algorithms to obtain those values. The statistical features are Kolmongorov Entropy (KE), approximate entropy (ApEn), K-s Entropy, TWED, Coarse grained Entropy, Lyapunov exponent, Correlation, multiscale entropy, and much more. The methods commonly used are Lempel-Ziv analysis, for detecting the arrhythmic pulses that leads to cardiac arrhythmia (irregularity in cardiac pulses) with recognition accuracy of 97.1% [17, 71, 84],Multiscale Entropy Analysis to determine the coronary heart disease (CHD) subjects, hypertension subjects with normal ones [85], recurrence quantification model using non-linear dynamic variables for identifying the Coronary Heart Disease (CHD) with normal ones [86, 88], Pulse morphology variability analysis can be used for differentiating coronary arteriosclerosis with normal ones having specificity 80% and sensitivity of 97% [87]. Feature selection is the next step to featurextraction which means the selection appropriate features for classification discarding the irrelevant features [70]. This feature selection can be done manually or automated systems can also be used. Next to the feature selection the dimensionality reduction comes into play which is the method of reducing the dimension to represent high dimensional signal on low dimensional space [20].

Classification

After the selection of features, the obtained features are classified to determine the normal and unhealthy subjects. Commonly seen pattern recognition algorithms are NN classifiers, SVM, Decision tree, Bayesian approach, Fuzzy systems, Fuzzy Neural Networks, etc. The mostly preferred classifiers are nearest neighbor classifier (PCA & KPCA) [89,90], ERP based K-Nearest Neighbor Classifier [91], ERP induced inner product and Gaussian ERP kernel [91], ERP induced inner product and Gaussian ERP kernel [59], Decision tree [70], Random forest classifier [92], Bayesian approach [93], Support Vector machine [95], Auto regressive model with SVM [94], SVM with Gaussian Time Wrap Edit Distance [96], SVM with Hilbert Haung Transform [59], Fuzzy methods [97], C-means Classifier [98], Artificial Neural Networks [99], Lempel-ziv complexity analysis [100]. Classifiers are mainly used to classify the healthy subjects from unhealthy subject and thereby diagnose the diseases. Other classifiers are used to classify the pulse signals based on its pattern and qualities as on table 3. The diseases mostly classified with the classifiers are shown in table 4.This shows that mostly SVM classifier

holds better accuracy than others. Apart from the classification of the pulse signal, there is a model called dice-model to relate the 8 significant elements with the organs of the body [101, 102, 36].

RESULTS AND DISCUSSION

This research article provides a comprehensive state of art innovations that provide advanced technologies that automate the pulse diagnosis. In this research work, the topics include wrist pulse acquisition, Preprocessing, Feature Extraction and classification. In pulse signal acquisition, rather than the single probe [24], multi channel provides quality pulse signals with better pathological information [6, 26, 27]. Then the obtained pulse signals are preprocessed to remove the base line wander [7, 17, 20, 35, 37, 38], Power line interferences and other noises [35]. The preprocessed signals are used for feature extraction. The features can be time domain, frequency domain, time- frequency domain or statistical features. The major advantage of time domain approach is that they possess larger pathological information to determine the health status. The limitation of using such analysis is that the dicrotic and tidal waves are very feeble which can affect the time domain features. Many researchers prefer frequency based analysis for identifying diseases and relating different organs with pulse pattern. They state that the pulse pattern was found to be decreasing with increase in frequency. The normal frequency range of pulse lies between 1 to 5 Hz. For the quantification of pulse signals time domain analysis shows better results than the frequency domain analysis as the pulse condition and its 8 elements will be directly correlated with the physical parameters. This makes the disease identification easier. By considering the time- frequency domain analysis and by using the Hilbert Huang transform the accuracy levels were 91.43% for differentiating the normal vs. Gastritis, 91.43% for distinguishing healthy vs. cholecystitis and 89.65% for differentiating healthy vs. Nephritis [109]. In such case, by using 2nd order Gaussian model the classification accuracy showed 94.5% for differentiating healthy vs. pancreatitis, 85.9% for differentiating Healthy vs. Duodenal bulb ulcer (DBU), 90.9% for Pancreatitis Vs, DBU and 85.1% for healthy vs. Pancreatitis vs. DBU. The accuracy level raised up to 3% by using 3rd order Gaussian model [4]. Xiaorui Jiang et al. applied six different classifiers to classify the patients of two digestive diseases namely Gastritis and Cholecystitis. The classification accuracy by using SVM classifier reached 100% on both hands for differentiating healthy vs. cholecystitis and 93.10% on left hand alone. 95.24% accuracy was achieved on left hand for distinguishing gastritis vs. Cholecystitis [110]. Even though, the intention of disease diagnosis using wrist pulse signals was same, different researchers obtained different performance for different diseases. In case of classification the SVM shows better results than other classifiers. In case of ANN the size of the sample should be larger to get better results [108]. Even though several methods have been employed for the quantification of pulse signals for automated pulse diagnosis the system lags in standard method. The recommendations made are

- There should be a standard database for wrist Pulse signals with position and trend to bring out the scientific development by comparing two or three methods.
- Having a standard number of subjects for analysis the sensor standardization must be made by applying different sensors to collect the data's from same subjects under same pressure and position.
- The most common wavelet used for feature extraction is daub 4 wavelet and other wavelets can also be comparatively used.
- By using standard database and standard sensor system the pulse quantification

Table 3. Pattern wise classification

S.No	Pattern diagnosed	References
1	Normal, replete and feeble	Ref [57]
2	Slippery and sluggish	Ref [82]
3	Swift,rapid,moderate,slow	Ref [84]
4	String-like and slippery	Ref [69]
5	Smooth,moderate, taut,hollow,unsmooth	Ref [59]
6	Floating & sunken	Ref [107]

seems similar with different methodologies. This in turn increases the prognosis rate of any diseases.

CONCLUSION

This comprehensive review focuses on the standard methods used for pulse diagnosis, its merits and demerits. Even though there are several methods for pulse diagnosis, the number of subjects used for validation varies. In order to acquire higher reliability the large number of subjects with different age groups must be preferred. Automated Pulse Diagnosis System and its correlation with health status is an emerging field of research. Further this research article directs towards the development of standard model for pulse diagnosis. Even though several researchers gave their contributions in pulse diagnosis system, it lags in developing technologically standard method to assist the clinician for diagnosing certain diseases.

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Lung Cancer Diagnosis Using CAD – A Review

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ABSTRACT

In recent decade, more people are suffering from various diseases due to the advanced lifestyles. Among various diseases, cancer especially lung cancer (LC) is considered as the deadly disease which kills a significant number of people annually not only in a single country, but, all over the world. In Indonesia, LC is positioned in the third place between the common cancers, generally, found in the MIoTcentres. The persistence rate is greater if the cancer is analyzed toward the starting stages. The primary disclosure of LC is certifiably not a straightforward task. Computer aided diagnosis tools find useful to identify the presence of any disease with the help of recent technologies like medical imaging, machine learning algorithms and so on. In this paper, we try to make an extensive review of available LC diagnosis models in various aspects.

KEY WORDS: LUNG CANCER; MACHINE LEARNING; DIAGNOSIS MODEL; ARTIFICIAL INTELLIGENCE.

INTRODUCTION

Melanoma is the subsequent main reason for bereavement, next just to nature disease, in both created just as emerging nations. It is evaluated that, amid 2017, around 1,688,780 new cancer instances, and 600,920 mortalities, in the USA (Elhoseny, M., et.al 2018). While the hidden causes and conceivable counteractive action techniques of heart disease are surely knew, the equivalent can't be said for cancer. Thusly a few specialists anticipate that after some time cancer will turn into the absolute most predominant reason for death. A very meaningful "life story" of cancer as a disease can be found (Elhoseny, M., et.al 2018). Regardless of numerous times of exertion, upgrades in cancer treatment have not completely satisfied desires. As a normal model out of the numerous that could be refered to, a multi-nation activity on colorectal melanoma, a type of melanoma with exceptionally underprivileged visualization, brought about an development in 5 year relation endurance rate from 59% to 65%, concluded twelve eons (Shankar, K et.al 2018), an improvement of 0.5% every year!.

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Melanoma is brought about by the unrestrained development of threatening cells that enclose transmutations of an individual's ordinary DNA. After some period, the harmful cubicles overpower the ordinary cubicles. A noteworthy wellspring of trouble in tending to melanoma as a sickness is its dazing assortment at the end of the day; no 2 signs of melanoma are indistinguishable, notwithstanding when they happen in a similar location. Indeed, even inside a solitary cancer tumor, there can be different mutations of the ordinary DNA. One can reword the opening sentence of Leo Tolstoy's Anna Karenina and state: Ordinary cubicles are for the most part similar; each dangerous cell is harmful in its own specific manner. Current strategies for conclusion and treatment handle what may be known as the "dominant" mutations inside a tumor, as those are most effectively distinguished. Regardless of whether treatment were to murder off all the dominant mutant cells, different mutations would end up dominant. This is maybe why in many cases, despite the fact that cancer treatment at first seems to work, with the tumor contracting or maybe notwithstanding getting to be imperceptible, after some time the tumor repeats and demonstrates a crisp burst of development. Also, the repeated tumor is frequently impervious to the recently connected treatment. Since the indications of cancer differ such a great amount starting with one individual then onto the next, cancer is a perfect contender for "customized drug," whereby the treatment is custom-made to every patient. Throughout the years, a genuinely substantial number of melanoma tumors have been gathered and protected at different areas. Amid the previous decade or somewhere in the vicinity, methodical endeavors have been in progress to portray these tumors by estimating a few sub-atomic traits, and consequently make freely open databases. Maybe the best known among these is The Cancer Genome Map book, all the more prominently known by its initials TCGA. Because of the open idea of these databases, it is presently workable for even non-experimenters to think about this information, investigate it, and afterward detail hypotheses on how a specific type of cancer could be dealt with. On a fundamental level these hypotheses should then be tried "tentatively" on another arrangement of patients, so as to be approved. Notwithstanding, it is likewise conceivable to test the hypotheses "reflectively" on at least one autonomous informational indexes. Because of the expense and trouble in doing forthcoming investigations, numerous logical journals would acknowledge approval of hypotheses on free datasets.

Lung Cancer

Helpful picture appraisal has awesome supreme quality in the field of thriving segment, especially in non-nosy treatment and clinical evaluation. The restorative pictures, for example, X-bars, CT, X-shaft, and ultrasound imaging are utilized for unequivocal affirmation (Nakagomi, K. et.al 2013). In restorative imaging, CT is one of the disconnecting part which utilize drawing in fields to catch pictures in movies (Hu, S et.al 2001). LC is one-of-its-sort of threatening development that prompts 1.61 million dead for reliably. In Indonesia, LC is arranged in the third position among the standard threatening developments, generally, found in the MIoTcentres (Sluimer, I. et.al 2006). The perseverance rate is higher if the threatening development is analyzed close to the starting stages. The early revelation of LC is truly not an immediate endeavor. Around 80% of the patients are inspected reasonably precisely at inside or actuated time of harmful development (Korfiatis, P. et.al 2007). LC is masterminded second among people and tenth among females far reaching. The data given in these evaluations is a general depiction of LC locale structure that contains four principal stages. The LC is the third most unremitting infection in ladies, after chest and colorectal tumors (Garcia-Garcia, A. et.al 2017). Highlight extraction method is one of the least problematic and productive dimensionality decline techniques in picture taking care of. One of the striking highlights of CT imaging is its non-undeniable character. The move of edges, which may be seen, is odd when showed up diversely in connection to parallel imaging modalities. The picked or emptied highlights set will expel the appropriate data from the information to the lessening technique. The decreased highlights are doled out to a SVM to plan and testing. The models utilized for LC picture social occasion are NN models with fulfillment picture pre-dealing with. The stream research work for LC solicitation

was performed utilizing a neural system show which gave 80% precision (Schmidhuber, J. 2015). Different appraisals have been guided with respect to LC solicitation and Classifiers, for instance, 'SVM, KNN and ANN'. The SVM is an extensive strong learning procedure dependent on genuine learning speculation. All things considered, these procedures are excessive and perceive LC at its moved stages in light of which the went for perseverance is low. The early region of dangerous development can be useful in restoring the illness totally. Hence, the need of structure up a system to perceive the event of dangerous handle to begin with time is developing. The obligation of the present work thinks about two fundamental stages: First stage is the CT LC strategy structures where the picked highlights are disengaged to LDA decline process and in the consequent stage, immaculate critical learning classifier with MGSA streamlining estimation is utilized to portray the CT LC pictures.

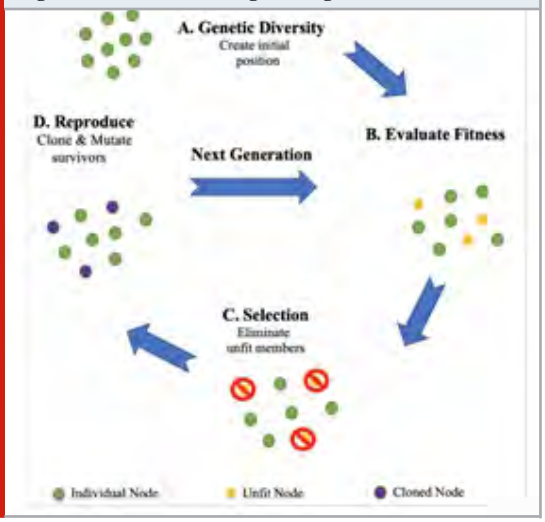
Causes And Detection Of Lung Cancer

- The general portrayal of LC is poor since specialists are unfit to locate the corrupted region until the minute that it comes to moved stage. Five-year endurance is around 54% for beginning time LC which is bound to the lungs, yet just around 4% in the impelled period of inoperable lung malignant growth.
- The threat of LC increases with the measure of cigarettes smoked after some time; masters surmise this hazard the degree that pack-colossal heaps of smoking history. A little portion of lung dangerous developments happens in people with no recognized hazard factors for the sickness. A bit of these may all the more than likely be discretionary events that there may not be an outside clarification.
- To take a gander at LC, patients usually experience X-pillar or CT or X-beam scopes to perceive anomalous progressions in lungs. Notwithstanding, phenomenally sensitive CT can recognize little handles that could be harmful.
- Early area of lung malignant growth: The earlier ID of LC can have progressively vital treatment decisions and a verifiably more prominent likelihood of endurance. In any case, just 16% of the individuals are broke down as a matter of first importance arrange when the infirmity is ordinarily treatable.

Existing Methods For Lc Prediction

Lung contaminations, for example, asthma and COPD are influencing a wide bit of the individuals far and wide. The passing pace of these ailments is outflanking LC and chest malady joined. The World Wellbeing Association (WHO) overviewed in an examination that there are 300 million individuals experiencing asthma causing around 250 thousand passings for reliably all things considered and 210 million individuals have COPD which caused the defeat of more than 300 thousand individuals in 2005 with an expansion of 30% in 2015. Additionally, it is evaluated that by 2030, COPD will rank third worldwide among the rule wellsprings of death. In this paper, we have focussed on two indispensable lung ailment, Perpetual Obstructive Pneumonic sickness (COPD) and Fibrosis. COPD is a get-together of dynamic lung afflictions containing two most conventional areas: emphysema which is the destruction of lung tissue and little aeronautics courses infirmity which causes annoying and impediment of flying courses because of thickening of flying course dividers. It is fundamentally accomplished by smoking, asthma and debasement. COPD causes the constrainment of wind current into and out

Figure 2. Time of extinguishing.



of the lungs that makes breathing maddening. Unfaltering hacking, quickness of breath and ordinary respiratory pollutions are its most generally perceived responses. Pneumonic fibrosis is an other respiratory issue which is depicted by the scarring of lung tissue. The scarring causes an individual's aspiratory ways to deal with thicken and set, making it logically bothersome for oxygen to encounter the lungs' dividers and into the circulatory system. The most remarkable indications include: hacking, deficiency, inadequacy, torment filled joints and weight decline. Both COPD and aspiratory fibrosis are totally genuine respiratory issues that can basically impact an individual's near and dear satisfaction. They cause irreversible harm to the lungs and there is no answer for either condition. In like manner, early distinctive evidence of these ailments is of most crazy significance.

The essential issue in administering such unending contamination is the measure of patients who are erroneously examined. These disorders are regularly misdiagnosed for other respiratory diseases, for example, the ordinary cold, phenomenal bronchitis or pneumonia. The fundamental symptomatic contraption for COPD and fibrosis are aspiratory work tests, which are hard to lead, repetitive and requires an authority. Patients much of the time experience significant standards figured tomography (CT) filtering, which empowers the brief assessment of the lungs with both visual and quantitative techniques. In any case, it has different blocks like, sensitive COPD might be not be perceived on significant standards CT. Moreover, the degree of lung fiendishness might be scarcely thought about in light of the imperceptibility of constrained locales of demolition in patients with over the top emphysema. To address these issues, we built up a compelling PC upheld discovering (PC helped structure) system for lung end. PC bolstered plan is of unfathomable clinical significance and causes radiologists to improve the symptomatic exactness which can develop the patient's likelihood of continuance. The proposed PC bolstered structure system for lung assurance is made out of four chief preparing progresses: Image pre-dealing with, confining picture features of the lungs, incorporate decision utilizing bio-motivated EA and depiction of the conceivable ailment.

Different experts have proposed different works and techniques for lung disease finding and solicitation. In (Hosseini M.P., et.al 2012), endorsed a procedure to perceive and score the truth of COPD by assessing the air getting in the lungs from CT pictures by pondering the separation in 2D region and 3D volume between the motivation and end lungs. (Filho P.P.R., et.al 2017) introduced a component extraction procedure, called Analysis of Human Tissue Densities (AHTD) which uses human tissue thickness in Hounsfield Units and was utilized to perceive and orchestrate COPD, Fibrosis and Solid lung CT pictures. (Hua K.L., et.al 2015) attempted to unwind the standard PC helped arrangement to perceive and depict aspiratory handles utilizing noteworthy learning model. In (RamalhoG.L.B., et.al 2013), Ramalho-Filho-Medeiros-Cortez gave an image incorporate extraction system called as Spatial Interdependence Matrix (SIM) and utilized Extreme Machine Learning Techniques (ELM) to depict COPD and fibrosis lung illness. (Rodrigues M.B., et.al 2018)exhibited a novel component extraction system dependent on helper co-occasion framework (SCM) for the region of LC handles in CT pictures and mentioned the lung handles into hazard levels from 1 to 5. (Filho P.P.R., et.al 2011) proposed a striking picture division system called as 3D Adaptive Crisp Active Contour Method (3D ACACM) to piece lungs from CT pictures. In (Filho P.P.R.,et. al 2011) utilized exchange learning and huge learning methodologies with a blend of various plans of classifier models to arrange lung handle hurt. In (NóbregaR.V.M., et.al 2018) displayed an Expert Diagnostic System (EDS) which looks for after a joined way of thinking of Fake Neural System and Fluffy Rationale checks to separate asthma and COPD, and to conclusively coordinate patients into 3 classes explicitly, Asthma, COPD or Solid. The proposed EDS system accomplished extraordinarily high accuracy and reduced the trick positive rate significantly. Moreover, two or three assessments have been shown in the past to contemplate the specific PC upheld plan strategies made for LC exposure utilizing CT check pictures (Badnjevic A., et.al 2018). In spite of the way that,

all the as of late referenced works are helping in diagnosing and engineering lung diseases somewhat, there is dependably an exchange off among exactness and computational multifaceted nature. To vanquish this issue i.e., broadening the precision and reducing the computational cost, feature decision technique ought to be utilized in the PC upheld structure system which is the real responsibility of this paper. Feature decision is a fundamental improvement that gives the essential features, which are utilized to disconnect between various classes totally. It is a procedure for finding a perfect subset of features from all features chose. On the off chance that a component space with expansive estimation is utilized, there are odds of a diminishing in classifier execution in relationship with execution time and affirmation rate. To develop execution and decrease the measure of false positives, or misclassifications, in the affirmation, a segment decision strategy is normally connected with PC bolstered structure systems. EA are individuals based metaheuristics that are propelled by ordinary progress which incorporates four focal techniques as portrayed underneath. From the start, a masses is made thoughtlessly which tends to a lot of contender answers for a given issue inside reach. Exactly when a masses is made, individuals from the individuals are overviewed by a wellbeing capacity to pick how well they can manage the issue. The fittest individuals are picked for expansion. Utilizing the change and blend, new contenders are made and are studied utilizing wellbeing work.

EA has transformed into a working district of research recently for managing improvement issues and the technique is showed up in Fig. 1. Different estimations, spurred from nature have been proposed in late assessments, including bat computation animated by echolocation practices of bats, honey bees figuring dependent on the sustenance glancing through lead of bumble bee areas, whale upgrade count which copies the air pocket net seeking after system utilized by humpback whales, ACO figuring which depended upon the ants direct of discovering perfect course for glancing through their sustenance. EA approach has been utilized in a wide degree of employments, for example, for ease of use incorporate decision and assessment of SDLC models to reduce improvement time and to pass on fruitful and quality things for the race of gathering head (CH) in the correspondence system of the Mobile Ad hoc Network (MANET), for predicting significant standards protein structure dependent on the physical and substance properties of each structure. Late jobs of EA as a segment decision procedure in the remedial picture assessment are examined underneath. (Sweetlin J.D., 2017) utilized ACO with pair run methodology to examine pneumonic bronchitis from lung CT pictures. (Filho A.O.C., 2014) proposed a GA for the conspicuous confirmation of singular lung handles in this manner. (Woźniak M., et.al 2018) proposed a method for utilizing bio-pushed computations in a robotized choice really relentless framework to perceive tissues influenced from pneumonic sickness in x-pillar pictures. (Alickovic E., et.al 2017) utilized GA as feature decision technique and data mining frameworks in fundamental position experience for the distinctive verification of chest threat contamination. Some improved ways of thinking dependent on crow search figuring and cuttlefish computation were proposed for before timetable and careful finish of Parkinson's affliction. (Shrivastava P., et.al 2017) familiar a review with research particular EA utilized as feature decision technique to see Parkinson's infirmity. (Arabasadi Z. et.al 2017) gave a cross breed methodology for utilizing acquired computation to improve stacks in NN for the assurance of Coronary stock course affliction. Likewise, different computations spurred from quantum hypothesis have been proposed beginning late for parallel and multi-class request to improve the precision of the adequacy of the present game plan models.

Recently Proposed Lc Prediction Models

PC Aided Diagnosis (CAD) system is a fit helpful assurance instrument and an essential for the present therapeutic imaging common sense. The pro uses the CAD structure to permit an additional subsequent supposition so as to get a definite end. It is usually helpful to improve the plausibility of the treatment. For Some CAD structures, a precise division method of the objective organ is constantly required. It is a fundamental starting advancement for an effective quantitative lung

CT picture assessment. Regardless, sorting out a powerful lung division method is an irksome issue, particularly for amazing lung parenchyma tissue, where the handles and veins should be fragmented with the lung parenchyma. Besides, the lung parenchyma should be isolated from the bronchus areas that are every now and again confused with the lung tissue.An wide number of therapeutic picture examination strategies have been proposed for consequently separate the lung parenchyma district in CT pictures. The greater part of the systems are pennant thresholding techniques and they depend upon the separation data as referenced in the survey introduced (Sluimer, I. et.al 2006). The way wherein that the lung locales have lower densities differentiated and the other body territories makes the lung area has all the earmarks of being dull encompassed by a denser district (for example the aorta and the body wretchedness). The based game plan of these strategies is immediate and persuading for common lung division, yet they outstandingly come up short when we expand the explanation "lung" to address the customary lung tissues similarly as unusual tissues and veins. (Hu, S.et. al 2001) proposed a stepwise division technique. Starting, an iterative thresholding is utilized to verify a shrouded separated district. Second, the domain is refined by an opening-shutting morphological chief. Another division strategy is to utilize wavelet change and a perfect thresholding to get the essential division. By then refine the picked up divided utilizing numerical morphology works out. Significant learning is a specific sort of AI that is made out of various preparing layers to accomplish a ton of discussion as for learning delineations of data. In various spaces, for example, talk affirmation and visual article affirmation. CNN, which is customarily known as a bit of AI approach and a class of significant adjusting, nowadays uproots many picture division moves close (for phenomenal survey of Deep Learning methodology related with semantic division). It depends upon different layers preparing to exhibit strange state and complex counsels in data. Nowadays, the use of significant learning strategies for helpful picture division got a remarkable excitement in perspective on their capacity to learn and process a lot of data in smart and careful penchants. In (Havaei, M. et al 2017) demonstrated a changed cerebrum tumor division dependent on significant learning frameworks that improves over the beginning at now dispersed top level. In (Akkus, Z et.al 2017) flowed an audit of significant learning approachs that intends to exhibit a graph of significant learning-based division procedures for cerebrum X-pillar. SegNet is an able novel method of a Deep absolutely CNN plan for semantic pixel-wise division proposed by (Badrinarayanan, V. et.al 2015). This middle trainable division motor contains an encoder arrange, a contrasting decoder framework looked for after by a pixel-wise portrayal layer. We can see the utilization of this structure in (Kalinovsky A. et.al 2016) for X-Beam lung (coronal see) division.

CONCLUSION

Lung diseases, for example, asthma and COPD are influencing an extensive part of the populace around the world. The death rate of these diseases is surpassing LC and bosom cancer joined. The significant difficulty in overseeing such ceaseless disease is the quantity of patients who are incorrectly analyzed. These diseases are often misdiagnosed for other respiratory diseases, for example, the common cold, intense bronchitis or pneumonia.Computer aided diagnosis tools find useful to identify the presence of any disease with the help of recent technologies like medical imaging, machine learning algorithms and so on. In this paper, we made an extensive review of available LC diagnosis models in various aspects.

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Personal Authentication Using Keystroke Dynamics Using Deep Learning

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ABSTRACT

Individual keystroke (Ks) mode is hard to copy and can in this way be utilized for character validation. As per the Ks data when an individual information sources free content, the Ks propensity for the individual can be scholarly. Recognizing a client's Ks propensities as the client enters content can ceaselessly confirm the client's character without influencing client input. This research proposes to parcel the customer Ks information into a stable length Ks gathering, and change the Ks progression interested in a Ks vector plan as showed when feature of the k Ks. A model of an Instances-based profound exchange learning is used to get acquainted with a progression of individual Ks vectors to get particular Ks features for character affirmation. The model was had a go at by an exposed informational index and the best False Rejection Rate (FRR) was 1.85%, False Acceptance Rate (FAR) was 4.02% and Equal Error Rate (EER) was 2.94%.

KEY WORDS: DEEP LEARNING; KEYSTROKE; AUTHENTICATION; INSTANCE BASED.

INTRODUCTION

The client confirmation for PC frameworks can be seen wherever in day by day life. Most frameworks use customary one-time verification technique, for example, passwords, thumb print and facemask recognition dependent on biometrics. Be that as it may, these strategies have a few weaknesses. For instance, passwords might be broken or overlooked by clients. Thumbprint and facial scrub recognition require explicit equipment gadgets. The Ks dynamics (KSD) appreciation is an organic conduct highlight recognition, which can accomplish the reason for verification by breaking down individual composing beat on the console (Karthikeyan, K. et.al 2018). The composing mood emphatically relies upon the person's composing propensities and the experience of console task. It has a specific level of soundness and won't change

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quickly in a present moment (Elhoseny, M. et.al 2018). As indicated by the transient qualities of individual keystroke, the individual composing mood can be preoccupied. Recognizing a client's Ks propensities as the client enters content can constantly confirm the client's character without influencing client input. The greater part of the examinations on KSD validation are a one-time authentication instrument dependent on permanent writings, (for example, login keys), concentrating on the handling of period attributes and the determination and improvement of calculations (Alshanketi et.al 2016),(Ali. et.al 2016) and (Yadav. et.al 2017). Once verification system gets an incomplete information mode by contributing a permanent content. It is hard to speak to singular Ks mood and can't be connected to another fixed content. At current, a few analysts start to examine the persistent validation instrument dependent on free-content. Far reaching individual Ks standards of conduct can be gotten by learning a lot of individual Ks's. At the point when a client utilizes a console to enter words, the foundation programming can confirm the client persistently (P.Bours. 2012). This paper utilizes a model of an Instances-based deep transfer learning is utilized to adapt free-content Ks data. The model methodically thinks about the free-content dataset and acquires by novel Ks input type. The ANN can consequently remove highlights for learning. The prepared typical can completely mirror the individual Ks standard of conduct.

Related Work

(Sun. et.al 2016) gathered the Buffalo Ks database, and utilized the Gaussian blend show bunching technique. The error rate of their investigation is 0.01%. (Vural. et.al 2016) acquired another database and utilized the (Gunetti, D. Picardi. C. 2005) to decide if the 2 examples have a place with a similar individual. The affirmation testing on the database got an ideal false rejection of 3.93% and a false acceptance of 0.75%. Murphy et al. gathered one of the biggest freetext Ks database (Murphy et.al 2017), which documented the facts of all console activities, mouse tasks, and programming programs amid 2.5 years. They utilized the Gunetti and Picardi system on the database and acquired the best error rate of 10.36%. Jiaju Huang et al. has introduced a bit thickness estimation method (Huang. et.al 2010) to compute the separation among the preparation tests and the tests complete the likelihood thickness between the preparation database and

Figure 1. Descending window verification.

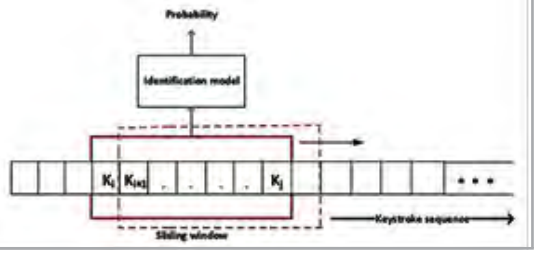


Figure 2. Ks time characteristics.

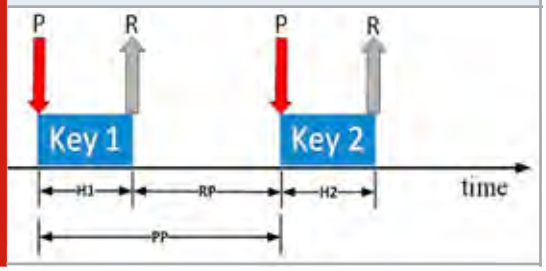


Figure 3. Instances-based deep transfer learning.

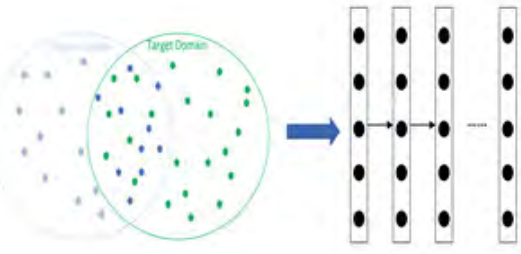
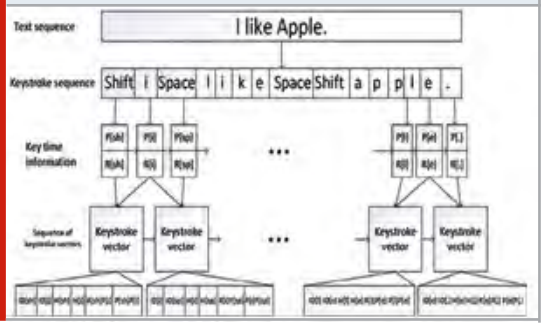


Figure 4. Ks sequence vectorization process.



the test database, and after that to decide the personality genuineness of the individual. The system was tried on different distributed database and got 1.95% of error rate. (Shimshon. et.al 2010) examined the impact of the window size for consistent check and got 3.47% false acceptance. (Ahmed A. A. and Traore I. 2014) built up a MLP to consequently gain proficiency with the element blends of keystrokes and learn singular Ks conduct representations. In their examination, error rate achieved 2.46%.

Uninterrupted Authentication Method Based On Free-Text

Uninterrupted authentication

Individual personality verification is really a double grouping. At the point when a Ks arrangement effectively coordinates a client's information design, it demonstrates that the client is genuine, else he/she is an interloper or forger. Constant verification looks at client's conduct over some stretch of period without exasperating the client. It has a descending window is appeared in Fig. 1. Single Ks data in a Ks arrangement. The prepared Ks information in the sliding window is contribution to the prepared confirmation. The model yields the likelihood of being perceived as a genuine client. At the point when the client recently enters a key, the sliding window goes in reverse by one stage and the model delivers another yield. As the window slides with the info words, the confirmation framework can continue checking, accomplishing the motivation behind ceaseless character verification. Henceforth, it is important to build up a free neural system for every client and get their one of a kind Ks modes. The individual validation model should be prepared ahead of time, and the model is legitimately utilized for distinguishing proof when confirming the client. In our examination, every validation model involves 301KB, and a model expectation takes 0.4ms.

Record Ks data and indicate Ks feature

The principal information is molded by those recorded time of tapping or releasing keys. The time characteristics of the key in current examinations are showed up in Fig. 2. H(the hold time of the key) demonstrates the delay time between the keys; RP shows the break between the appearance of the fundamental key and the tap of the subsequent key; PP exhibits the interval between the press of the chief key and the subsequent key. P is the timestamp of a tapped key, and R is the timestamp of a released key.

Learning personal Ks model

Occurrences based deep exchange learning alludes to utilize a particular weight modification system, select halfway occasions from the source domain as enhancements to the preparation set in the objective domain by appointing suitable weight esteems to these chose cases. It depends on the supposition that "In spite of the fact that there are distinctive between two domains, incomplete cases in the source domain can be used by the objective domain with suitable loads.". The sketch guide of cases based deep exchange learning is appeared in Fig. 3. TrAdaBoost use AdaBoost-based development to filter through models that are not in any manner like the target area in source spaces. Re-weighted in source area to

Table 1. Different sequence lengths

structure length	FRR (%)	FAR (%)	EER (%)
10	15.02	3.38	9.65
30	1.85	4.02	2.94
50	2.16	5.54	3.85
70	1.8	5.81	3.85
100	2.57	7.47	5.02

Figure 5. Ks vector specific data format

ID[1]	ID[2]	H[1]	H[2]	R[1]P[2]	P[1]P[2]

Table 2. Time of extinguishing.

Ks structures	FRR (%)	FAR (%)	EER (%)
H	11.39	5.86	9.07
RP	4.10	7.68	5.84
RP+PP	1.95	4.45	3.20
H+RP+PP	1.85	4.02	2.94

frame a movement like objective space. Finally, getting ready model by using the re-weighted models from source area and beginning stage cases from objective space. It can diminish the weighted getting ready mix-up on different spread areas that sparing the properties of AdaBoost. TaskTrAdaBoost proposed is a speedy calculation advance quick retraining over new targets. Not in the slightest degree like TrAdaBoost is expected for grouping issues, ExpBoost.R2 and TrAdaBoost. R2 were proposed to cover the backslide issue. Bi-weighting area alteration (BIW) proposed can changes the component spaces of two areas into the ordinary organize structure, and a while later dole out a reasonable heap of the events from source area. (Murphy. et.al 2017) propose an overhauled TrAdaBoost to manage the issue of interregional sandstone infinitesimal picture order. An estimation trade learning structure to learn model burdens and a detachment of two unmistakable spaces in a parallel framework to make data trade across over areas progressively convincing. A social affair trade learning with profound neural system that can utilize events from source space.

Vectored Ks sequence

TrAdaBoost use AdaBoost-based advancement to filter through models that are not in the slightest degree like the target area in source spaces. Re-weighted in source space to frame a movement like objective area. Finally, getting ready model by using the re-weighted models from source area and beginning stage cases from objective space. It can reduce the weighted getting ready misstep on different spread areas that sparing the properties of AdaBoost. TaskTrAdaBoost proposed is a snappy calculation advance quick retraining over new targets. Not in any manner like TrAdaBoost is planned for order issues, ExpBoost.R2 and TrAdaBoost.R2 were proposed to cover the backslide issue. Bi-weighting area alteration (BIW) proposed can alters the component spaces of two areas into the typical orchestrate structure, and a short time later dole out a reasonable heap of the events from source space. (Murphy. et.al 2017) propose a redesigned TrAdaBoost to manage the issue of interregional sandstone infinitesimal picture characterization. An estimation trade learning structure to learn model burdens and a division of two particular areas in a parallel framework to make data trade across over spaces progressively convincing. A social affair trade learning with profound neural system that can utilize events from source space. The specific information course of action of the Ks vector is as showed up in Fig. 5, in which "1" addresses the principle key and "2" addresses the subsequent key. ID addresses key name; H addresses range of the key; R[1]P[2] addresses the RP traits of the two keys; P[1]P[2] addresses the PP characteristics of the two keys,

RESULTS AND DISCUSSION

As the model's failure = 0.5, the customer's Ks information is secluded into stable length Ks groupings in order to energize system preparing. In this paper, the length of L=(10,30,50,70,100) is used to look at the greatest optimizable length of the typical. Meanwhile, it sets an assessment attempt: a model wherein information has not been set up by CNN before contributing GRU organize.

Dataset

The Buffalo database is gathered through analysts of SUNY Buffalo. This database covers 157 members' for some time fixed content and free content Ks data, and each one of those members can utilize the console skilfully. Through the contribution of stable content and open-finished inquiries, members' Ks data has been gathered. The members finished contributing through 3 gatherings, and every member has a normal of 5,700 Ks in every session. The normal of absolute 3 sessions have surpassed 17,000 KS's.

Experimental Results

Execution probes altogether the 75 clients, Ks successions of various sizes are contribution to the typical for preparing and challenging. Test outcomes are appeared Tab. 1. At the point when the arrangement size is 10, the Ks succession covers moreover minute data, with which the model can't gain proficiency with the client's info design totally and prompts high blunder rate and unfortunate acknowledgement. The arrangement size keeps on expanding, the commotion facts in the grouping motivation increment just as FAR ,FRR and EER. At the point when the stable

Ks succession size gotten by the exploratory outcomes in this paper. Fixed grouping size to 30, the test outcomes are appeared Tab.2. The model's acknowledgement impact is unfortunate if just utilizing the span include H. In the event that the interim time include RP is utilized the mistake amount of the typical abatements. On the off chance that the interim time highlights RP and PP are joined to frame a Ks vector, the blunder rate is additionally decreased.

CONCLUSION

This paper utilizes the instance based deep transfer learning model to gain proficiency with the Ks facts of free memos. The ideal gets a progressively total individual Ks contribution mode to transfer on consistent verification. The Ks facts is vectored as per Ks time highlight blends and after that partitioned into fixed-length Ks include arrangements. It can accomplish the greatest character acknowledgement impact with a grouping size of 30, and it accomplishes great common sense.

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Gesture Controlled Music Player for Physically Challenged People

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ABSTRACT

In this paper, a novel technique is proposed on motion acknowledgment which is an upgrading quickly developing innovation, used to recognize human motions with the assistance of scientific calculations. This proposed procedure motion acknowledgment perceives shaded article set on the hand, tracks the hand developments and additionally gives data about pointer direction. The mechanization framework has been created to consequently accomplish a few exercises performed as often as possible in day by day life to acquire increasingly agreeable and simpler life condition. The framework depends on the Raspberry Pi which works with Linux Raspbian OS. The Raspberry Pi uses web camera module to capture image stills. Camera is interfaced to the CSI port on the Raspberry Pi. The visual information captured by the digital camera is processed by the Raspberry Pi using OpenCV in Python language and the colored object's position is stored when the desired color is detected. The stored position values of the colored object are used to identify in which direction the colored object moves. The basic music player operations such as next, previous, volume up and volume down is operated to be performed based on the directions identified and the audio output is obtained via headphone/ speaker which is connected to the audio port of Raspberry Pi. The results are encouraging.

KEY WORDS: GESTURE RECOGNITION, HEADPHONE,MUSIC PLAYER,OPENCV, PYTHON, RASPBERRY PI, RASPBIAN OS, SPEAKER.

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INTRODUCTION

Gesture Recognition is recent evolving technology which interprets human actions via various mathematical algorithms, physical touching is avoided when interacting with a device. It also enables human to effectively communicate with machines and interact naturally without any devices. The camera projector and the music player developed plays a dominant role in the gesture recognition. These devices influence the effectiveness of the quality and working of

the developed music player. Gesture movement recognition based on the visual color detection makes the advantage of using the technology to be used for physically challenged people that helps them to avoid the remote based switching system which is a tough task for them. This work helps them to operate the music player from their comfortable place without the use of remote control. Just a colored object placed on their hand makes it easier for them. And also our work helps to recognize the movement of the color object at night time which other mechanisms require high end cameras for processing. Using a radium color bands, it will be easier to find the color at the night times. Initially, song to be played is selected from directory and web camera is used to capture the current frame which recognizes the gesture of the human hand.It also removes some noise present in the image frame after resizing the frames using imutils. The colored object is detected using, lower and upper values of respective colors which is known to be the most crucial and computationally intensive process in recognition and successively followed by the process of erosion and dilution. The detection of object in particular direction is calculated by the

Figure 1. Raspberry Pi 3 Model B.

Figure 2. Schematic diagram of proposed technique The brief description of the proposed work is discussed below,

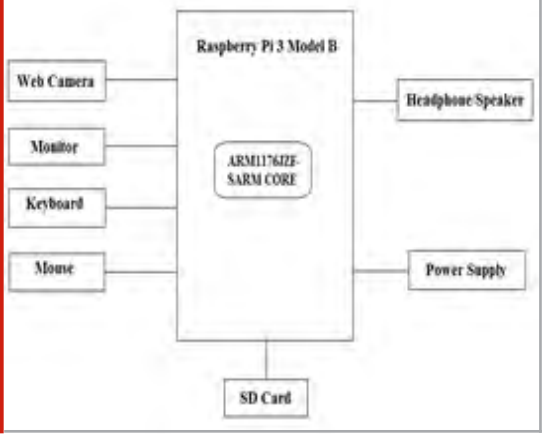


Figure 3. Block diagram of proposed technique

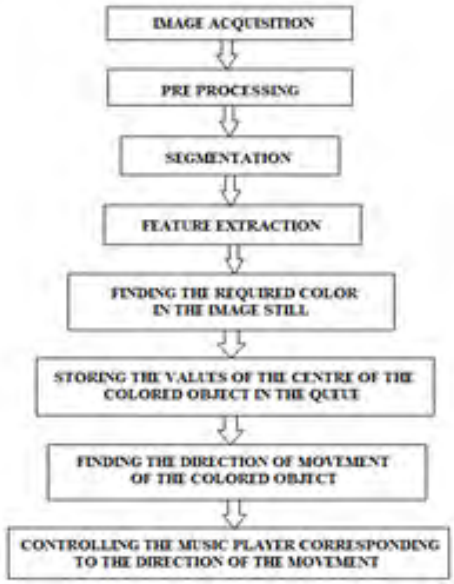
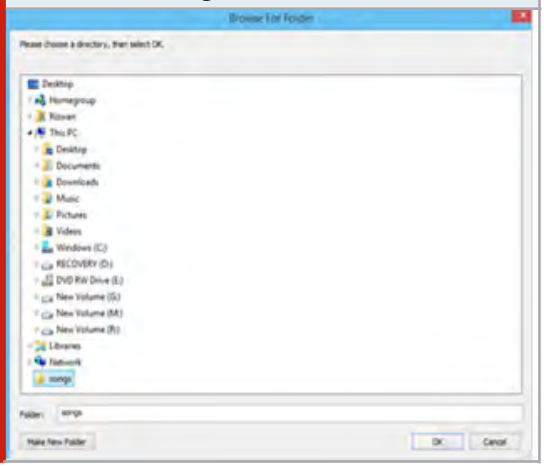


Figure 3a. Request to select the folder which contains MP3 songs



x and y coordinates and operations on music player is performed.

Theory behind Image Processing

Advanced image processing is essentially used for the utilization of PC calculations to perform picture handling on computerized pictures. It allows much progressively broad extent of computations to be applied to the data and can avoid issues, for instance, the improvement of racket and sign mutilation during getting ready. Since pictures are portrayed multiple estimations, propelled picture getting ready might be utilized as multidimensional frameworks. In 2002 RaananFattel presented Gradient area picture preparing, another approach to process pictures where the contrasts between pixels are controlled as opposed to the pixel esteems themselves. A few strategies which are utilized in advanced picture handling incorporates the accompanying:

Figure 4. GUI with list of songs and play, pause and stop buttons

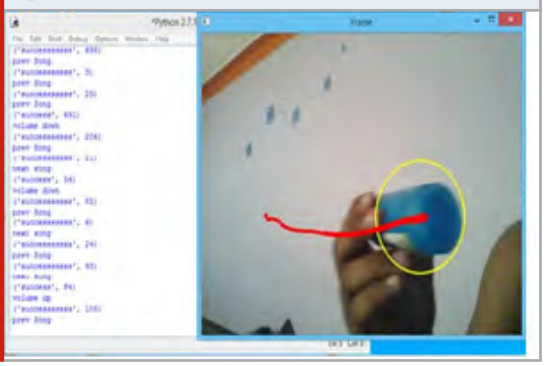
Figure 5. Hardware setup for proposed work

Pixilation, Linear sifting, Image altering, Image reclamation, Principal segments investigation, Independent segment examination, Hidden Markov models, Anisotropic dissemination, Partial differential conditions, Self-sorting out maps, Neural systems and Wavelets. Relevant literature on the existing gesture recognition techniques and their algorithms are presented in the next section.

Related Work

Image processing is a hot research subject for quite a while and has scope for some advancements in mechanical applications. Picture preparing is required in all the significant creating and propelled parts of society like restorative, security, building, diversion, media and considerably more. Diverse picture pre-preparing systems important to accomplish higher exactness utilizing techniques like RGB to dark, obscuring, thresholding and molding is significant. In specific territories huge number of pictures are required to get to certain data. Literature review or the related work part has been divided into 3 sections which talk about 3 tasks such as, detecting colored object, gesture recognition and music player controlling. Literature review on 3 tasks is discussed in below paragraphs, As a fundamental problem in vision, visual tracking has been drawing research attention for decades. An exhaustive audit of the subject will be found. Since our attention is on joining shading information in interest, we tend to survey exclusively past shading trackers due to house constraint. A striking early work on shading interest is that the shading molecule channel presented, that computes the likelihood of each

Figure 6. Result 1 to perform the previous song operation



molecule by examination its shading bar graph from the HSV shading house with the reference shading model (Pritpal Singh et.al 2015). Inside the objective model and target up-and-comers square measure portrayed by smoothened shading histograms measure from the RGB shading house, and mean move is utilized to decrease the hole between the unmistakable circulations of the objective model and target applicants. In RGB shading appropriation was acclimated depict the objective model and up-and-comers, and furthermore the objective item was set by limiting the KullbackLeibler separation between the shading dispersions of the objective model and competitors with the help of a trust-locale technique (Michel Owayjan et.al 2015). Motion acknowledgment utilizing the hypothesis of Random projection (RP) and by defining the entire acknowledgment issue as a ℓ1-minimization issue. The motion acknowledgment framework works basically on information from a solitary 3-pivot accelerometer and involves two primary stages: a preparation organize and a testing stage. For preparing, the framework utilizes dynamic time traveling just as fondness engendering to make models for each motion while for testing, the framework extends all up-and-comer follows and furthermore the obscure follow onto a similar lower dimensional subspace for recognition(Feng C, and Valaee S.et. al 2011). The usage of a hand signal location utilizing a stereo camera framework decides the hand position in a space portrayed by two meeting planes and the finger position by deciding the fingertips, which prompts the order of the hand picture saw from above into six unique sorts. The hand development is mimicked utilizing a 3D model executed in MATLAB programming (CasianMiron et.al 2017) Proposed a new approach based on skin color detection. Tried to reduce as much as possible the constraints and limitations of the existing approaches. New strategy for hand division distinguishes the client's hand(s) regardless of whether the client's face or different people groups are seen by the camera, and can know whether the client is doing a signal utilizing one hand or two hands. The strategy is vigorous to the scene's hues and light conditions, as it amends the video's hues and luminance before playing out the hand segmentation (Rayane El Sibai et.al 2017) All the gesture recognition techniques mentioned above are convenience only for the people with good abilities and also applicable only in bright light but these techniques fails for physically challenged people and at dark places or at night time.

The proposed framework (Tejashree P et.al 2017). Takes the info information from the convenient webcam comprising of four hand motions. The picture caught from the info information is then handled and afterward histogram of arranged inclinations highlights is separated from it. The handled picture is then contrasted and the database of motion pictures. Picture is analysed and perceived utilizing K-closest neighbour calculation. The perceived picture is then used to control the Slide-Show Presentation (Trish Ghosh et.al 2017). A solitary remote controlled gadget can control various gadgets with various application. The analysis performed by us demonstrates the recreation of zig bee inside the scope of up to 75 meters. The remote controller utilizes zig bee to control gadgets like forced air system, lights, programmed window ornaments, carport shades, music-player, and so on (Mengzhe et.al 2013). Huang Biomedical sign based control procedure has the application importance for human-machine interface. Inside the biomedical sign, sEMG (surface Electromyography) mirrors the muscle action which incorporates the intension of development. In this examination, the normal for sEMG during the wrist turning signals was explored. A definitive intention is to understand a programmed online MP3 player control framework dependent on the separated sEMG highlights. Some of the existing techniques to control the MP3 player is reviewed in this subsection. First technique finds hand gesture like recognizing only the shape of the hand and making some operations but it will not work at dark hours and second one uses remote controlled device to control the music player at larger distances but visually impaired people cannot be able use this technique.

Softwares Used

Image processing is a software focused domain. The image needs to be processed using OpenCV tool with Python for better results for the

proposed work. The software's used are all open source and easy for implementation.

Open CV

OpenCV (Open Source Computer vision) is free for both scholastic and business use. It is a library of programming capacities for the most part went for continuous PC vision.OpenCV's application has wide regions which incorporates 2D and 3D include toolboxes, Ego motion estimation, Facial acknowledgment framework, Gesture acknowledgment, Motion understanding, Object distinguishing proof Segmentation and acknowledgment and Motion tracking. OpenCV is written in C++ and its essential interface is in C++, yet despite everything it holds a less thorough however broad more seasoned C interface. OpenCV contains libraries of pre-characterized capacities accommodating in picture handling. Since it is open source, it was picked as the stage to test the undertaking. Utilizing OpenCV libraries we have executed picture preparing components like RGB to grayscale change, disintegration, and enlargement.

Python

Python is a broadly utilized significant level, universally useful, translated, dynamic programming language. Its structure reasoning accentuates code lucidness, and its grammar allows programmers to express ideas in less lines of code than would be conceivable in dialects, for example, C++ or Java. The language gives develops planned to empower clear projects on both a little and enormous scale. Python underpins different programming ideal models, including object-arranged, goal and practical programming or procedural styles. It includes a unique kind framework and programmed memory the executives and has a huge and exhaustive standard library.

Hardwares Used

Hardware's are utilized for this work to make the software application into a complete hardware product. Hardware part used are discussed in below subsections.

Raspberry Pi

Raspberry Pi® is an ARM based charge card measured SBC (Single Board Computer) made by Raspberry Pi Foundation. Raspberry Pi runs Debian based GNU/Linux working framework Raspbian and ports of numerous different OS exist for this SBC. Raspberry Pi 3 model B has on-board Wi-Fi/Bluetooth support and a 64bit improved Processor, Raspberry Pi v3 will be an energizing board for Makers, Engineers and Students. A few centuries of Raspberry Pi's have been discharged. All models include a Broadcom framework on a chip (SoC) with a coordinated ARM perfect focal handling unit (CPU) and on-chip getting ready unit (GPU). Processor speed ranges from 700 MHz to 1.4 GHz for the Pi 3; on-board memory ranges from 256 MB to 1 GB RAM. Secure Digital (SD) cards are used to store the working structure and program memory in either SDHC or Micro SDHC sizes. The sheets have one to four USB ports. For video yield, HDMI and composite video are maintained, with a standard 3.5 mm telephone jack for sound yield. Lower-level yield is given by different GPIO pins which reinforce fundamental shows like I^2C. The B-models have an 8P8C Ethernet port and the Pi 3 and Pi Zero W have on-board Wi-Fi 802.11n and Bluetooth. Figure 1 shows the pictorial view of Raspberry Pi 3 Model B.

Proposed Technique

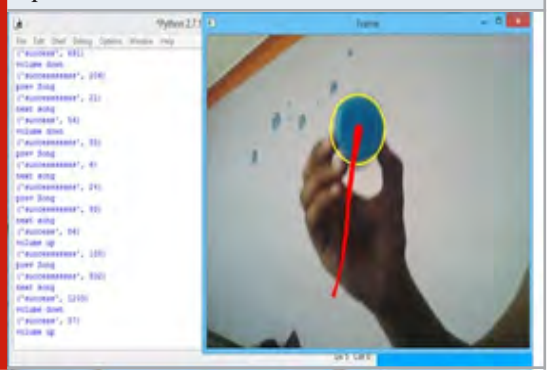
In this section, the block diagram of the proposed Gesture recognition technique in media player scheme is presented in figure 3.

This technique uses different image processing techniques for feature extraction for recognizing the gesture in real time by detecting the colored object and tracking their movement gives the great advantage of using technology in night time or at dark places. And corresponding operation in music player is developed using pygame mixer module. The schematic diagram of the proposed work is represented in figure 2. Detect the presence of the reference color, which has been placed in the fingertip/hand, using computer vision techniques. Track the colored object as it moves around in the video frames, tracking the direction in which it moves and perform the basic four operations such as, next, previous, volume up and volume down operations in an MP3 player. We'll be utilizing deque, a rundown like information structure with super-quick affixes

and flies to keep up a rundown of the past N (x, y)- areas of the reference shading in our video stream. Keeping up such a line enables us to follow the movement of the reference shading. Contention, cushion is the greatest size of our deque, which keeps up a rundown of the past (x, y) - directions of the shading we are following. The lower and upper limits of the reference shading are characterized in the HSV shading space (which was resolved utilizing the range-indicator content in the imutils library). These shading limits will enable us to recognize the reference shading in our gained information. At that point introduce our deque utilizing the provided most extreme support size. At that point a call is made to peruse the strategy for our camera pointer which returns a 2-tuple to discover whether the casing was effectively perused or not.

At that point, we resize the casing to have a width of 600px. Scaling down the casing enables us to process the casing quicker, prompting an expansion in FPS (since we have less picture information to process). We'll at that point obscure the edge to lessen high recurrence commotion and enable us to concentrate on the auxiliary items inside the casing, for example, the reference shading. At long last, we'll convert the casing to the HSV shading space. And then we handle the actual localization of the reference color in the frame by using the upper and lower color range that we have defined early. A series of erosions and dilations needs to be done to remove any small blobs that might be left on the mask then we append the centroid of the color to the deque. The coordinates of x and y are also stored in separate deques. Now the maximum, minimum and average of these coordinates are found. If average of a coordinate lies in a particular defined range then that coordinate is said to be a constant and change in length of the other coordinate is found, and then the directions are found. Based on the directions in which the color is being tracked the specified function of the music player is controlled accordingly. Each stage of the process in the proposed scheme is described in the following subsections

Figure 7. Result 2 to perform the volume up operation



Music Player Execution

The proposed system creates a graphical user interface (GUI) to show the list of songs in the directory using tkinter with play, pause and stop button. When the player is initiated user is requested to select a song from the directory which is implemented using pygame mixer module.

Data Acquisition, Processing

Any inbuilt web camera can capture the hand gesture, for real time capture of the human gesture. The next step in data Acquisition is grabbing the current frame from the camera. The current frame obtained from the above mentioned method preprocessed and music player is operated, which is presented below,

i. Resize the frame using imutils
ii. Convert the color model of the frame grabbed from BGR to HSV model
iii. Detect the colored object in the frame using lower and upper values (HSV) of the respective color on the tip of the hand.
iv. Erosion and dilution of the model is performed by the inbuilt functions present in OpenCV.
v. The contours in the frames are found out and the center position of the object is calculated.
vi. The x and y coordinates are calculated for the above located position
vii. Create deque variable points of the center for both coordinates which determines the movement of the object in the direction such as (right, left, upwards and downwards).
viii. The direction determined above is mapped

with the operations of the music player as below:

1. Right : Next song
2. Left : Pre song
3. Upwards : Volume increase
4. Downwards : Volume decrease

The loop continues till the player is paused / stopped.

Hardware Interfacing

Hardware interfacing a major part in developing a complete a product. The complete software processes discussed in the previous subsections are made to run on a Raspberry Pi processor by performing following setups,

i. Install the Raspbian OS to Raspberry Pi by copying the image file of OS to the SD Card.
ii. Insert the SD Card to the SD Card slot of Pi.
iii. Connect keyboard, mouse and power cable to the Pi.
iv. Connect the monitor to the Pi using HDMI cable.
v. Configure and update the Pi packages.
vi. Basic setup for Pi is over and now is the connections for proposed work.
vii. Connect 8MP Web Camera to the CSI port and Headphone/Speaker to the audio port of Pi.
viii. Now install all the supported packages required for the python program to run on the Raspberry Pi.
ix. After all the supported packages have been installed, proceed to execute the program in Python 2 IDLE.
x. Program executes and results will be obtained.

Main idea of this approach is to make advantageous of being computationally more efficient in gesture recognition.

Complete Setup

The complete setup of the proposed work which includes all the hardware parts which are interfaced together are shown in the figure 5 below.

RESULTS

After performing all the steps for interfacing hardware parts as discussed in the previous section, the program is executed. At the time of execution, it request to select the folder in which the MP3 songs are present (figure 3) and then it displays and play the first songs in the list (figure 4). Then the web camera is activated and it checks for the colored (blue color is kept reference in this project) object and it tracks. Depending on the on the direction of the movement of the colored object the music player performs its operations such as next, previous, volume up and volume down. Figure 6 gives the picture of which detects the movement of blue color object from left to right and it prints "prev song" in idle module and switches the music player to perform previous song operation. Figure 7 gives the picture of which detects the movement of blue color object from bottom to top and it prints "volume up" in Python Shell and switches the music player to increase the volume of the music player.

CONCLUSION AND FUTURE WORK

Gesture Recognition is one of the enhancing and fast growing field for real time applications. In this proposed work the gesture recognition is applied to most frequently used applications which is music player. This work also increases the use of music player as there is no need of any physical touch. It helps people with inabilities to perform the basic operations on a music player with higher convenience. It also helps the people to control the music player during night time or in dark places by using a radium band instead of using normal colored objects. This method not only applicable for music player but also can be used in radio switching purposes in vehicles. It also reduces the complexity when compared to conventional methods. Also, this work provides future scope for performing gesture recognition in PowerPoint, video player etc.

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Efficient Brain Image Segmentation Technique Based on Entropy with Genetic Algorithm

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ABSTRACT

Segmentation is one of the medicinal picture preparations in the system and it has been helpful in numerous applications which are been including injury measurement, medical procedure reproductions, careful arranging, different sclerosis, and practical mapping, computer helped analysis, image enlistment and coordinating, and so forth. Presently days, different imaging methods are accessible like, Computer Tomography (CT), Magnetic Resonance Imaging (MRI), Ultrasound channel (UC), etc. In this work, the picture division issue is seen as a general combinatorial streamlining practice separated from the traditional thresholding task. In this research, genuine implied hereditary calculation with Simulated Binary Crossover (SBX) constructed staggered thresholding is utilized for the division of restorative cerebrum representations.

KEY WORDS: DEEP LEARNING; KEYSTROKE; AUTHENTICATION; INSTANCE BASED.

INTRODUCTION

Segmentation is one of the medicinal picture preparations in the system and it has been helpful in numerous applications which are been including injury measurement, medical procedure reproductions, careful arranging, different sclerosis, and practical mapping, computer helped analysis, image enlistment and coordinating, and so forth. Be that as it would be, there is nobody standard division strategy that can convey good modern office results for a wide scope of imaging applications. Legitimately days, particular imaging strategies are open like, CT, MRI, and, UC and so on. The imaging procedure pictures interior organ and tissue of the human body without making the opening it. PC Tomography is utilized for hard tissue appraisals. A large portion of the 0 used to explore the delicate tissues by acoustics signal. Human frame of mind of imaging was upheld in the assessment of the different tissues through

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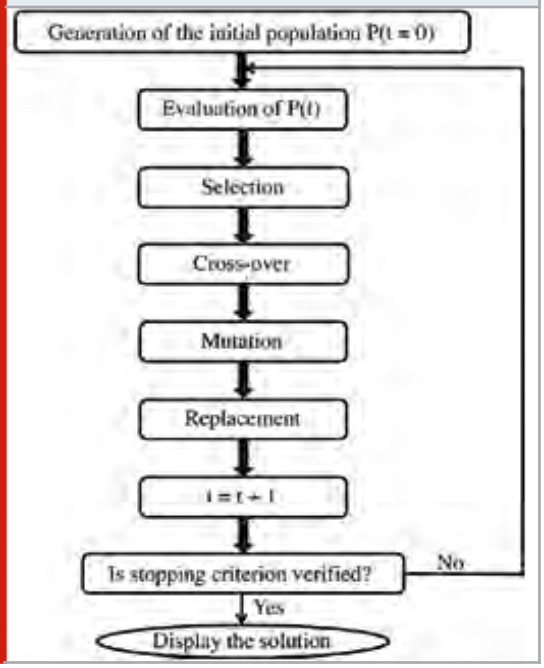
MR imaging. Commonly, they are taking into the idea of the MRI pictures that are been tended to three sorts of tissue like White Matter (WM), Gray Matter (GM) and Cerebrospinal fluid (CSF).

The 3D assessment and portrayal of the cerebrum picture incorporate package of difficulties in manual division. The exactness of the division depends on the ensured pros (P.D. Sathya and R. Kayalvizhi 2011). The blunders happen because of low tissue differentiate, misty limit, poor hand to eye coordination and translation of the administrator in manual division. The programmed division procedure is to defeat the trouble in the manual division. They increments in immaculate division is required for the evaluation of strange tissues like injuries, and the unrest expecting any, can be characterized in small scale level. The quick parallel Fuzzy C-Means strategy incorporates less calculation on account of the parallel handling of segment of informational collection (S. Murugavalli and V. Raja Mani 2006). The framework contains the two stages unequivocally, bunch estimation and parallel fleecy C suggests. The fleecy model division is in context on a blend of an arrangement of cushioned data secured from different kinds of MR picture.

Figure 1. Structure of Genetic Algorithm



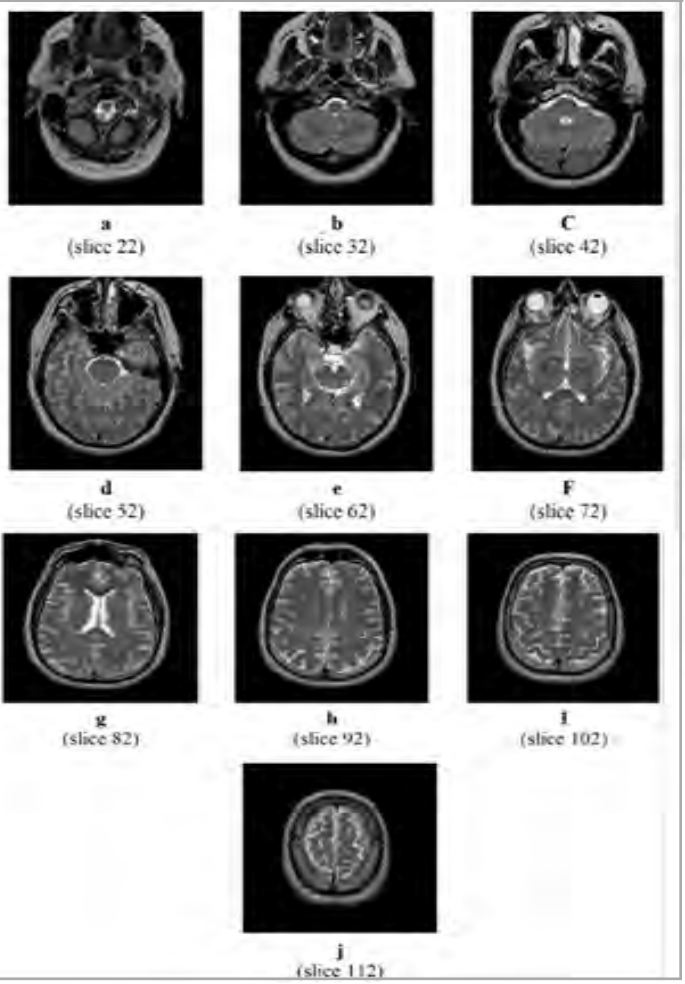
Sifting are been apparent among the most viably utilized division techniques, which is reasonable for the photographs with indisputable diminish parts of articles and back ground (B. Chandra and, D. Dutta Majumder2006), For this circumstance, a point of confinement respect that is in the valley interfacing two pinnacles of the histogram must be found. It is for the most part called bi-level thresholding. Everything considered, the dull estimation histograms of the photographs are required in the shocked sifting as indicated by the measure of purposes of repression. Thusly, it is hard to pick the unmistakable regions of specific valleys in stunned histograms, which can portion the picture capably reliably, different sifting strategies have been proposed for different applications, for example, biomedical picture evaluation (Madhubanti Maitra and Amative Chatterjee 2008). What's more, thing perceiving proof (A.L. Barbieri et.al 2011).Among them, a hero among the best methods for picture division is entropy-based improvement approaches for example, increase of entropy and minimization of cross entropy framework (S. Kullback 1969) The best entropy rule strategy proposed by (Kapur et .al 2006). Is utilized to discover beyond what many would consider possible respects dependent on the increase of the entropy from the histogram for assessing the homogeneity of isolated classes.

Related Work

The Otsu's system (Nobuyuki 1979) finds the perfect edges by increasing the interfacing class fluctuation of dark measurements. The Kapur's and Otsu's can be viably contacted amazed thresholding issues however they are muddled in choosing the perfect edges due to the exponential improvement in estimation time. In case the amount of edges manufactures, getting ready time is high. To propel the count capability, various systems have been proposed for the stunned thresholding issue (P.D. Sathya and R. Kayalvizhi 2001 and Akhilesh Chander et.al 2011).The strategies exhibited that the recursive computation (P.S. Liao et.al 2001) phenomenally directs the computational trouble of deciding the stunned edges by getting to an explore table regarding standard Kapur and Otsu frameworks. Before long, the Kapur and

Otsu frameworks are widely utilized for picture division. The Evolutionary Algorithm (EAs) for example, Particle Swarm Optimization figuring (PSO), Bacterial Foraging estimation (BF), which are probabilistic heuristic computations, have been related in shocked thresholding (H. Gao, X. Wenbo et.al 2010 and K. Tang et.al 2010) issues turns out through the count multifaceted nature and time. At the point when all is said in done, EAs are amazing technique which are moreover, improvement frameworks, which can adjust up with not all around portrayed issue zones, for instance, multimodality, discontinuity, time-fluctuation, assertion and noise. Maitra what's more, Chatterjee projected a strategy for stunned thresholding subject to the Bacterial Foraging (BF) calculation for MR cerebrum picture. Sathya and Kayalvizhi showed a flexible BF calculation which is so as to improve both the examination, likewise, maltreatment to the limit of the BF and it is associated with the augmentation of entropy. (Gao et.al 2011).proposed the enhanced quantum-carried on PSO Algorithm for stunned thresholding for picture division to lessen the count time for standard Otsu procedure. (Chander et .al 2015). shown a flexible PSO calculation which are been balanced through the social and vitality portions of the speed condition for molecule move updates and beginning edges gotten by cycle intend to diminish the count time.(Barbieri et .al 2011) made modified picture division to perceive various zones in satellite pictures using square window entropy calculation through directed arrangement approach. (P.D.

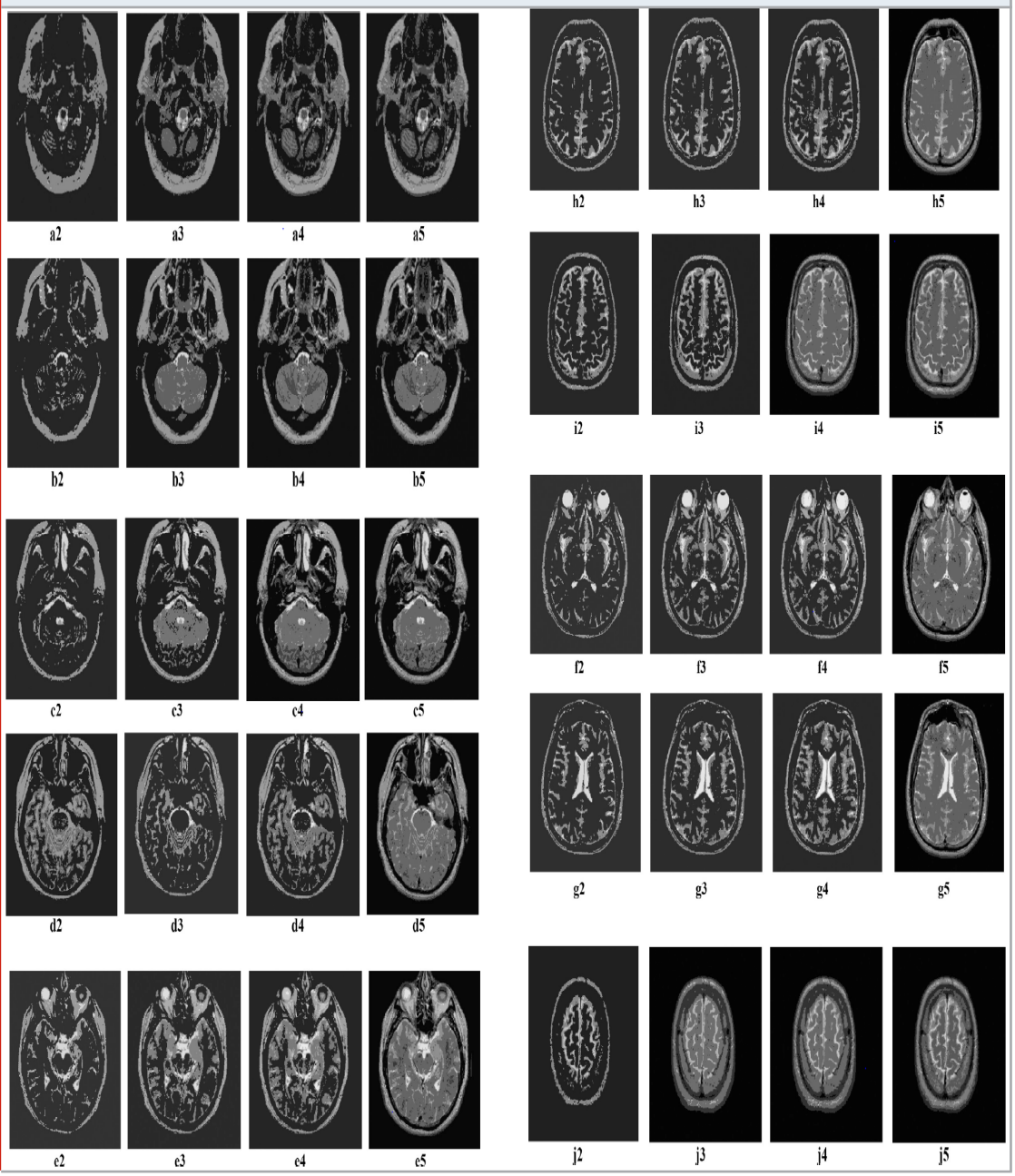
Figure 2. Time of extinguishing.



Sathya and R. Kayalvizhi et.al 2011) projected the Bacterial Foraging and the Modified Bacterial Foraging computation based amazed thresholding for seat imprint pictures division which are used in Kapur and Otsu techniques.

From the composition, it is discovered that, the target limit of the most extraordinary entropy strategy was used to recognize the parameters (edges). The entropy procedure is the thresholding framework which is an exhibited technique for obtaining their better shape and consistency

Figure 3. Segmented images with various threshold levels obtained Kapur – RGA with SBX method, (a2)–(j2) two-level thresholding, (a3)–(j3) three-level thresholding, (a4)–(j4) four-level thresholding and (a5)–(j5) five-level thresholding.



measure Real coded Genetic calculation (RGA) is a stochastic streamlining calculation that was at first impelled by frameworks of typical assurance and formative hereditary qualities with genuine number encoding which is commonly used for the down to earth improvement issues (Mitsuo et.al 2000). A couple of changes are finished in hybrid and transformation instruments of RGA, for instance, SBX hybrid, PCX hybrid and non-uniform polynomial change to progress the introduction of RGA. Self-versatile SBX based RGA was adequately associated with various planning improvement issues (K. Deb 2001 and K. Deb 2009 and M. Willjuice 2009 and P. Subbaraj et.al 2011).SBX hybrid is self-versatile in nature which makes kids courses of action in degree to the differentiation in parent plans. The nearby parent courses of action are will undoubtedly be picked as successors plans rather than game plans expelled from gatekeepers.

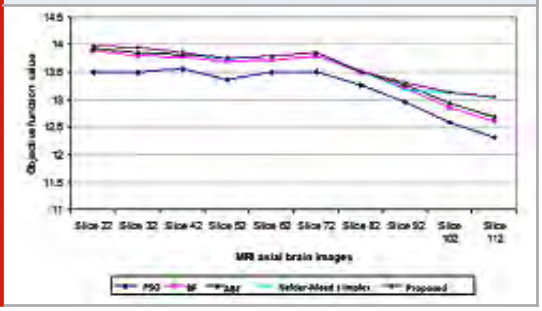
MATERIAL AND METHODS

Proposed System

In this work, the picture division issue is viewed as a general combinatorial headway practice isolated from the conventional thresholding task. As purpose behind this, they are been consider the diminish estimation picture histogram as a likelihood scattering and we be appropriate to the Tsallis and the Renyi entropies as general data hypothesis entropy formalism. Our standard objective is to refresh the entropy extension which is showed up in Fig.1 which may be need to improve the picture division quality. To do this, we want to segregate the pixels into two social gatherings more profitably than thresholding works. Theoretically, our stress includes by finding an ideal or an adequate imperfect thing from a compelled strategy of potential approaches. In such issues broad pursue is un-thinkable, and it is a little while later expected to depend upon a computational learning procedures. In this paper, we utilize the Genetic Algorithm to deal with our combinatorial progression issue. The father of the essential Genetic Algorithm (GA) was John Holland who made it in the mid-1960s. Innate computations have a spot with the more prominent class of Evolutionary Algorithms (EA), which produce answers for improvement issues. A GA starts from the man-made brainpower field and they are been versatile by methods for the heuristic hunt calculation which are been mimics a segment of the methodology in ordinary choice. A use of a GA begins with a populace of chromosomes (commonly subjective). One of the surveys focuses the structures and assigns by regenerative open entryways with the goal that those chromosomes which partner to a better arrangement than the target issue are giving more chances to "rehash" those chromosomes which are less blessed arrangements. The "integrity" of an answer is consistently portrayed with respect to the present populace. In the computational sense, the major heads of a GA are assurance, hybrid and change. In this paper, the utilization of RGA with SBX half and half relies upon thresholding in lurched for the usage of therapeutic cerebrum picture is been discussed. The entropy enhancement is been proposed by Kapur strategy and besides they are been considered as an objective work. In order to compose them and besides to find the introduction of the figuring for perfect stunned thresholding, the T2-weighted MRI center point mind pictures with a collection of cuts are measured as test pictures. The consistency measure is in like manner measured to quantitatively choose the capability of the division count. Likewise, it is been given a clearly portrayed issue to be unraveled and a piece string delineation for up-and-comer courses of action, the immediate GA fills in as seeks after:

1. Start with a self-assertively created populace of N L-bit chromosomes (competitor answers for an issue).
2. Process the wellbeing f(x) of each

Figure 4. MRI slice images using different algorithms



chromosome x in the populace.

3. Repeat the going with advances (a) – (c) until N posterity have been made:

(a) Select two or three parent chromosomes from the present populace, which are likelihood on account of decision being of expanding capacity of health. Decision is done "with substitution," inferring that a comparable chromosome can be picked more than once to transform into a parent.

(b) With likelihood pc (the hybrid likelihood), cross the pair at a subjectively picked point (picked with uni-structure likelihood) to outline two posterity. If no hybrid occurs, structure two posterity that are exact of their particular guardians.

(c) Mutate the two posterity at each locus with likelihood pm (the change likelihood), and recognize the ensuing chromosomes in the new populace.

4. Substitute the present general population with the novel general population.

5. Go to organize 2.

The flowchart of the utilized GA is given in Fig.1. The principle points of interest of GA are as follows:

- It is scans subsidiary performance.
- It can be utilized for both ceaseless and isolated optimization problems.
- It utilizes stochastic administrators rather than deterministic standards to look for an ideal arrangement. It considers numerous focuses in the look space all the while, not a solitary point. In this way, there is a diminished shot of uniting to local minima.
- It works direct with parallel arrangement of characters addressing the parameter set (populace, game plan set), anyway not simply the parameters.

In our stream picture the division issue is been detaching the pixels into two social events that intensifies the Tsallis and Renyi entropies which are used as health limits. Contrary to the old style thresholding system, this will be done without requesting the dark dimensions forces ahead of time. The objective is to boost the measure of data estimated by the entropy from the picture. And, the resultant is shown to be expose the presentation of RGA with SBX is making a decidable crossover is additional consistent since it is been done on the standard deviation to obtain a best target worth is lesser than the extra strategies. The wide scopes of limits are utilized to section the cerebrum picture. The fragmented pictures with the get hold of the staggered ideal thresholding for different levels are appeared as shown in Fig. 3. From Fig.3, it is reasonable that they are having the better representation when the quantity of edge level increments.

A. RCG Algorithm with SBX crossover

In general the RCG hereditary calculation consider of the five segments. They are as per the following:

i. The introductory advance of hereditary calculation is been spoken to by the answers for the issue.

ii. A way is made as an underlying populace of arrangements

iii. A work which are been utilized for the assessment and after that the rating arrangement as far as its wellness.

iv. Parent determination technique and hereditary administrators that change the hereditary piece of kids during impersonation.

v. Values for the parameter of hereditary calculation.

Genuine number encoding is having a biggest capacity to enhancement which faces the trouble. It has been broadly affirmed that genuine number encoding performs improved than twofold or dim encoding for obliged streamlining. Inferable from the versatile capacity, SBX hybrid and polynomial change administrators are been utilized for the work. Competition determination is utilized as choice system, so as to sort out to keep away from untimely intermingling.

RESULTS AND DISCUSSION

The performance of the proposed systems are compared with the existing methods which are of PSO, BF, ABF, Nelder-Mead S implex. By comparing this to our proposed work it shows that the objective function value increases when

compare to the existing methods. In fig. 4, it is seen the difficult slice of the MRI image for the better performance of the proposed system. The graphical interpretation of the best target esteems got utilizing various calculations for 4 level thresholding are likewise appeared. Practically every one of the calculations give equivalent execution to the 2 level multi thresholding since the main issue it faces here is it is one of the basic and advancement calculations that are been need to discover just two ideal edge levels. Yet, for this situation of extra levels, for example, 3, 4 and 5 staggered thresholding, RGA with SBX hybrid shows preferred execution over different techniques because of their efficient worldwide looking through capacity. The propelled target esteems are gotten when the limit level growths.

CONCLUSION

Segmentation is one of the medicinal picture preparations in the system and it has been helpful in numerous applications which are been including injury measurement, medical procedure reproductions, careful arranging, different sclerosis, and practical mapping, computer helped analysis, image enlistment and coordinating, and so forth. Presently days, different imaging methods are accessible like, CT, MRI, UC, etc. In this work, the image division issue is viewed as a general combinatorial streamlining practice isolated from the old style thresholding task. In this paper, certified coded innate computation with SBX based stunned thresholding is used for the division of helpful cerebrum pictures.

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Wearable Exoskeleton Assisted Rehabilitation in Multiple Sclerosis by Control of Sliding Mode Procedure

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ABSTRACT

This paper depicts the nonlinear hearty reference show versatile impedance controller for a functioning trans femoral prosthetic leg for amputees. We utilize a Sliding mode control [SMC] term to consider the questionable parameters of the framework and a strong control term so the framework directions merge to a sliding mode limit layer display heartiness to varieties of ground reaction force [GRF]. The underlying model is a pneumatically activated controlled fastened gadget, which is expected to fill in as a lab proving ground for a resulting self-fuelled rendition. We use particle swarm optimization [PSO] to upgrade the plan parameters of the controller and the adjustment law. The amputee subject with direct control of knee torque utilizing surface electromyogram [EMG] estimations of muscles in the remaining thigh. Hip vertical uprooting and thigh point movement profiles are connected to a trans femoral prosthesis joined to the robot. This methodology permits to constantly switch and interject among impedance and permission control. An improvement issue is defined and fathomed to adjust impedance decrease against clamour enhancement in picking the channel addition and transmission capacity. Procedures for control of controller conduct are introduced which result in a bound together way to deal with the kinematic ally obliged movement. The following and worldwide security are demonstrated utilizing Lyapunov dependability hypothesis. SMC reaction is superior to PIDSMC reaction to various unsettling influences. In view of the recreations and tests on a three-DOF robot, the adequacy of the proposed controllers is explored. We accomplish great following of joint removals and speeds for both ostensible and irritated estimations of the framework parameters.

KEY WORDS: HUMANOID-ROBOT, NON-LINEAR CONTROL, TRACKING AND DISTURBANCE REJECTION.

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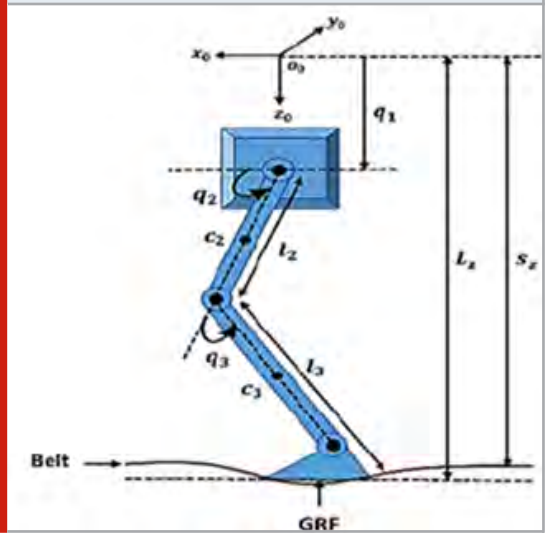
INTRODUCTION

The quantity of individuals with appendage misfortune in the United States is assessed at two million. Removal has a few causes, including mishaps, malignancy, diabetes, vascular ailment, birth deformities, and loss of motion [Avid Azimi et. al]. Removal incorporates transtibial (beneath the knee), trans femoral (over the knee), foot removals, and hip and knee disarticulations (removal through the joint). By this strategy, one

may evaluate, for any year past or present, the extent of living people of some random age who have encountered appendage misfortune [Ziegler-Graham et. al]. This procedure is connected to future years utilizing anticipated mortality information. We created elective arrangements of appraisals of appendage misfortune identified with dysvascular conditions dependent on suspicions of a 10% or half increment or lessening in the occurrence of removals for these conditions. Lower appendage prosthesis has customarily been inactive gadgets coming up short on the capacity to produce net power at the joints. Late advances in battery, engine, and microelectronics advances have empowered the likelihood of controlled (I. e., dynamic) lower appendage prosthesis, which can possibly deliver net power at the joints and effectively adjust to fluctuating landscape conditions [Sup.F et. al]. Level surfaces are the least requesting conditions for most prosthetic gadgets. As examined along these lines, one would anticipate the level of lop-sidedness in the lower appendage (especially trans femoral) amputees to be essentially more prominent in other territory conditions, for example, inclined surfaces [Lawson et. al]. The cutting edge in industrially accessible lower appendage prosthetics as of now comprises of vitality putting away lower leg foot buildings and chip controlled dampers at the knee. The business accomplishment of latent microcontroller knees has moderated the requirement for and advancement of effectively fuelled lower appendage frameworks. Detached prosthetic knee joints, regardless of whether constrained by mechanical connection or microcontroller, are successful at approximating the mechanics of the knee amid moderate exercises, for example, level strolling and stair/incline plunge [Hoover et. al].

Figure 1. Rigid ankle for Prosthetic leg model



In this control approach, the altered knee direction from the sound leg was utilized as an ideal knee joint edge direction on the contralateral side [Sup, F et. al]. Discovery of ground contact at the heel is given by a power detecting resistor (Interlink Electronics) and sensor encourages changes of stride control among position and swing, as talked about in the following area [Fite, K et. al]. The improved models accessible for the human body and the fragmented information about its conduct have made the use of open-circle controllers fruitless in recovery [Popovich et. al]. The impedance-based walk control methodology was actualized on the fastened dynamic prosthesis model utilizing a physically fit testing connector. The assistive gadget collaborates with the human unpredictably at the dimension of power, power and control [Popovich et. al]. It is basic to perceive that human step can be decreased to a cyclic movement. A standout amongst the hugest difficulties in the improvement of a fuelled lower-appendage prosthesis is giving self-controlled activation abilities similar to organic frameworks [Sup et. al]. In this manner, it is imperative to deduce the client's goal naturally while progressing starting with one strolling mode then onto the next one, and to thusly actuate the reasonable controller or control gains [Khademi et. al]. The structure and advancement of lower-appendage prostheses has gotten significant consideration because of the quickly developing number of individuals with appendage misfortune. The sliding mode controller(SMC) utilizing the distinctive unsettling influences varieties of vital square error(ISE). SMC utilize the increase and distinctive unsettling influences to include a few cases for virtual diagrams (1% t0 50%). Looking at the PIDSMC for the distinctive additions utilizing the unsettling influences has happened and results are out

for the misfortunes (1% to 50%). The addition misfortunes for the SMC and PIDSMC are too shifted the all-out number of unsettling influences to best reactions is SMC. The distinctions about diagrams were to better for PIDSMC to SMC.

This inexorably perplexing prosthesis is constrained by the need to physically tune various control models for every client and errand, and their time-shifting procedures are not really powerful to outside annoyances that push joint kinematics (for example edges and speeds) forward or in reverse in the stride cycle [Gregg et. al]. The system and control idea can likewise be stretched out to frameworks other than mechanical where bi-directional power stream might be controlled, similar to vehicles and savvy structures with piezoelectric transducers [Richter et. al]. These mechanical transmissions and electric engines are connected to all joints. The example test methodology utilized in the test segment of this paper is to follow hip relocations and thigh point information assembled from healthy subjects strolling ordinarily. Since an aloof knee was utilized, knee edge and ground drive profile are watched factors that can be thought about against healthy information coordinating ordinary walk information [Richter et. al]. This examination gives a sign of the prosthesis' step devotion. This undeniable mind-boggling prosthesis is constrained by the need to physically tune various Robotic frameworks with Impedance Control and Admittance Control have corresponding focal points and impediments. It is conceivable to improve the execution of both control calculations through explicit equipment adjustments yet such alterations result in an inclination to impedance control or induction control [Ott et. al]. To have no inclination and rather have total adaptability in picking the best controller for some random assignment, we propose a control and permission control dependent on a crossbreed frameworks structure. They are increasingly appropriate for the rendering of free movement and delicate contacts because of their low mechanical impedance. Such gadgets are regularly controlled with impedance-type conspires in which the interface position and speed are utilized to figure the power/torque connected by the actuators [Abdossalami et. al]. The permission type interfaces, then again, are generally very adapted robots with high yield constrain, expansive latency, and low back drivability. They have great execution in rendering inflexible contacts, however, can be off guard in reproducing free movement and delicate item collaborations.

By any sensible definition, control on a very basic level requires mechanical connection with the item being controlled, and helpful order of manipulator assignments is by the extent of the mechanical work traded between the controller and its condition [Hogan et. al]. Sometimes, the communication powers are unimportant, the prompt mechanical work done by the controller is immaterial, and for control purposes, the controller might be treated as a disconnected framework, with its yield position or speed as the controlled variable. The particulars of the ideal impedance vary from the one recently utilized in that the ideal connection drive direction is incorporated into the ideal impedance so that compel the following control is made accessible with some extraordinary condition requirements [Chan et. al]. In spite of the fact that robot-condition communication happens in assignment space, the controller has been created in the joint space. This keeps away from troubles, for example, the need to register nonlinear changes and transform Jacobeans [Mohammadi et. al]. The controller is intended to accomplish reference following for all joints when association powers are zero. At the point when powers emerge because of collaboration, a subset of joints named movement controlled(MC) ought to keep up an exact following, while the following blunders of outstanding joints. The robot conduct can be made more objection if the patient has a less serious neurological disability with the goal that the patient can contribute more exertion to the automated walk preparing process. Comparability, robot conduct can be made firm if the patient can't accomplish the required level of movement amid the stride preparing process [Hussain et. al]. The mechanical orthosis is fit for giving help at a low consistency level to seriously weakened subjects and can adjust the consistency to an expanded dimension for subjects with less extreme hindrances.

Whenever impedance/induction control is connected in a physical human-robot communication situation, it is vital to decide if the ideal impedance should be acknowledged in the joint space or assignment space (Cartesian directions) [Sharif et. al]. The joint space may be increasingly reasonable for exoskeleton robots while in an end-effector setup, an assignment space (Cartesian directions) approach is favoured. The operational space control can be utilized when the control objective is presented in the Cartesian directions and the engine directions are given in the joint space. For this situation, the changes between the two spaces must be utilized proposed a versatile controller for following in the Cartesian directions which utilize the expectation and following blunders in its adjustment law, and thus needs the joint increasing speed data in the control law [Park et. al]. The administrator may feel the input power just as the power of grating, inactivity, and gravity in the meantime, which makes it troublesome for the administrator to recognize the contact compel that the slave robot feels amid the assignment executions. Accordingly, to reflect fine powers, for example, the contact and sliding power of tele surgery, the elements of the ace robot ought to be made up for legitimately. Three DOF haptic interface has been utilized for the ace robot, and another versatile impedance control calculation has been created to mirror the criticism drive as for the elements of the haptic interface. Most biped robots established in reality are made out of plenty of interconnected joints, and the dynamic parity and stance should be considered at the same time [Park et. al]. All things considered, non-straight biped frameworks are a standout amongst the most troublesome control issues in the classification. Inferable from the unpredictability of the three degrees of opportunity (DOF) system of humanoid robots, an instinctive and productive technique for entire body control is required. In any case, how to improve the following execution of biped robots through planned controls is as yet a testing research theme that pulls in extraordinary consideration from the mechanical autonomy network. We present a hearty versatile following controller which ensures subjective weakening on the position and speed following blunders of the impacts of limited aggravations [Tomei et. al]. In the previously mentioned work, mechanical consistency is acquainted with increment the security dimension of robot arms, and the connection inactivity is appeared to be decoupled from the actuator's rotor dormancy at whatever point an effect happens [Huh et. al]. Since agreeable transmission can adversely influence execution as far as expanded motions and long settling time; be that as it may, precision in situating and firmness tuning ought to be more than once guaranteed by appropriate control strategies.

Prosthetic Leg Model

We present a model for the prosthetic leg with three unbending connections and three degrees of opportunity. The prosthetic segment is demonstrated as a functioning trans femoral (above-knee) prosthesis. The joint torque particulars expected of the knee and lower leg depended on a portion of the weight for the client waking rhythm of stair climbing. The dynamic prosthesis was intended to fit a wide scope of various measured people, going from two standard deviations beneath the female standard long dependent on information from Gordon et al.

The three degree-of-freedom model can be written as follows.

$$Mq^{11} + Cq^{1} + g + R = \mu - T_e \quad (1)$$

$$L_x = q_1 + L_2 \sin(q_2) + L_3 \sin(q_2 + q_3) \quad (2)$$

$$F_z = \begin{cases} 0 & , \quad L_2 < S_2 \\ K_B(S_2 - L_2) & , \quad L_2 > S_2 \end{cases} \quad (3)$$

$$F_X = \beta F_Z \quad (4)$$

$$T_e = \begin{bmatrix} F_z(L_2\cos(q_2) + L_3\cos(q_2+q_3)) - F_x(L_2\sin(q_2) + L_3\sin(q_2+q_3)) \\ F_z(L_3\cos(q_2+q_3)) - F_x(L_3\sin^{\wedge}iq_2+q_3)) \end{bmatrix} \quad (5)$$

The states and control inputs are portrayed as

$$X^T = [q_1 \;\; q_2 \;\; q_3 \;\; q_1^1 \;\; q_2^1 \;\; q_3^1]$$

$$\mu^T = [f_{hip} \;\; \tau_{thigh} \;\; \tau_{knee}] \quad (6)$$

"We convert the left-hand side condition [1] into the going with a parameterized structure"

$$Mq^{11} + Cq^{1} + g + R = Y^{1}(q_1\ q_1^{1}\ q_1^{11})p^{1} \tag{7}$$

Where $Y^{1}(q_1\ q_1^{1}\ q_1^{1}) \in R^{n\lambda r}$ is a regressive matrix that is a function of joint displacements links (n is equal to 3 in our case; see Eq. (6)); and $p^{1} \in R^{r}$ is a parameter vector. The initial step is to acquire the exploratory exchange capacity of the lower leg actuator utilizing a sliding mode controller (SMC) procedures. For our situation, it is given by

$$M(s) = \frac{55.03S^2 + 5439S + 2.73*10^6}{S^3 + 111.2S^2 + 5.14*10^4 S + 2.73*10^6} \tag{7.1}$$

The exchange work is the equivalent for two actuators in the lower leg, one in the sagittal plane, and another in the frontal plane (two indistinguishable pendulum frameworks), and will be utilized as the reference display in our control system.

Robust Adaptive Impedence Control

$$M_r(q_r^{11} - q_d^{11}) + B_r(q_r^{1} - q_d^{1}) + K_r(q_r - q_d)) = -T_e \tag{8}$$

M_r = *desired mass*, B_r = *damping coefcient* , K_r = *spring stiffness*

$q_r \in R^n$ *and* $q_d \in R^n$ are the state vectors of the exhibiting reference and the heading exclusively for ease, we surmise these matrices the slanting.

In the model in Equation (7), the regress or structure depends upon the joint accelerating

So $Y^{1}(q, q^{1}, q^{1})$ probably won't be ordinary for constant usage. We characterize blunder and flag vectors s and r individually dependent on opening and li's methodology.

$$s = e^{1} + \lambda e \tag{9}$$

$$v = q_r^{1} - \lambda_e \tag{10}$$

$$e = q - q_r \tag{11}$$

$$\lambda = diag(\lambda_1, \lambda_2, \ldots, \lambda_n), \lambda_i > 0 \tag{12}$$

Instead of the regress or model of condition (7), we characterize a speeding up free regressor display as pursues.

$$Mq^{11} + Cq^{1} + g + R = Y^{1}(q, q^{1}, v, v^{1})P \tag{13}$$

Where "$Y(q.q^{1}, v, v^{1})$" is linear combination of $q, q^{1}, vandv^{1}$.

The regress or framework "$Y(q.q^{1}, v, v^{1})$" and the related vector parameter p have numerous acknowledge; one such acknowledgement is given as pursues

$$P = \begin{bmatrix} m_1 + m_2 + m_3 \\ m_3 l_2 + m_2 l_2 + m_2 c_2 \\ m_3 c_3 \\ I_{2z} + I_{3z} + m_2 c_2^2 + m_3 c_3^2 + m_2 l_2^2 + m_3 l_2^2 + 2m_2 c_2 l_2 \\ m_3 c_3 l_2 \\ m_3 c_3^2 + I_{3z} \\ b \\ f \end{bmatrix} \tag{14}$$

$$Y(q, q^{1}, v, v^{1}) = \begin{bmatrix} v_1 - g & Y_{12} & Y_{13} & 0 & 0 & 0 & 0 & \mathrm{sgn}(q_1^{1}) \\ 0 & Y_{22} & Y_{23} & v_2^{1} & Y_{25} & v_3^{1} & q_2^{1} & 0 \\ 0 & 0 & Y_{33} & 0 & Y_{35} & v_2^{1} + v_3^{1} & 0 & 0 \end{bmatrix}$$

$$Y_{12} = v_2^{1}\cos(q_2) - v_2 q_2^{1}\sin(q_2)$$

$$Y_{13} = (v_2^{1} + v_3^{1})\cos(q_3 + q_2) - (v_2 q_2^{1} + v_2 q_2^{1} + v_3 q_2^{1} + v_3 q_3^{1})\sin(q_3 + q_2)$$

$$Y_{22} = (v_1^{1} - g)\cos(q_2)$$

$$Y_{23} = y_{33} = (v_1^{1} - g)\cos(q_3 + q_2)$$

$$Y_{35} = (2v_2^{1} + v_3^{1})\cos(q_3) - (v_3 q_2^{1} + v_3 q_3^{1})\sin(q_3) \tag{15}$$

"By substituting Equation (9) (10) (11) and (12) in Equation (1). we modify the model in the accompanying structure"

$$Ms^{1} + Cs + g + R + Mv^{1} + Cv = \mu - T_e \tag{16}$$

"Since the framework condition (1) is a second request dynamic framework, the mistake vector of condition (9) is gotten from the accompanying first-request sliding surface";

$$S = (\frac{d}{dt} + \lambda)C \tag{17}$$

"Where S is n-element vector. Impeccable following "$q = q_r (e = 0)$" is proportional to S=0 . so as to achieve the sliding complex S=0 is limited

time, the accompanying achieving condition must be accomplished".

$$\text{sgn}(s)s^{1} \leq -\gamma \tag{19}$$

Where the disparity is deciphered component – savvy and Y is an n-components vector to such an extent that

$$\gamma = [\gamma_1 \ \gamma_2 \ \ldots\ldots \gamma_n]^T \ \text{and} \ \gamma_1 > 0.$$

From equation (18) we see that in the worst case, " $"\text{sgn}(s)s^{1} = -\gamma."$ so" we can calculate the worst-case reaching time s=0 of the tracking error trajectories as follows" :

$$\int_{0}^{s(0)} \text{sgn}(s)ds = -\gamma \int_{0}^{T} dt \rightarrow |s(0)|\text{sgn}(s) = \gamma T$$

$$T = \frac{s(0)}{\gamma} \tag{19.1}$$

Which speaks to n diverse achieving times, where s (0) is the underlying blunder, and the divisions is $\frac{s(0)}{\gamma}$ deciphered component savvy It is seen from Equation (19) that extending Y results in a tinier accomplishing time T. Since the parameters of the system are dark, we use a control law [31] to consider parameter vulnerabilities just as to satisfy the accomplishing condition of condition (18):

$$u = \hat{M}v^{1} + \hat{C}v + \hat{g} + \hat{R} + \hat{T}_e - K_d \,\text{sgn}(s) \tag{20}$$

Where $"\hat{M}, \hat{C}, \hat{g}, \hat{R}, \text{and } \hat{T}_e"$ are evaluations of " M ,C, g, R, and T_e" separately; K_d is a is a hearty control plan framework with

$"K_d = diag\,(K_{d_1}, K_{d_2}, \ldots\ldots, K_{d_n}, \text{ and } K_{d_1} > 0."$ Since the capacity sgn(s) is ended and causes control prattling, the immersion work " sat(s/diag(φ) " (see fig. 2 guarantees to give preferred execution over the sign capacity. so we alter the control law of Equation (20) as pursues:

$$u = \hat{M}v^{1} + \hat{C}v + \hat{g} + \hat{R} + \hat{T}_e - K_d sat(s/diag(\varphi)) \tag{21}$$

Where the corner to corner components of are the widths of the immersion work. The control law of Equation (21) includes two unique parts. The first , $\hat{M}v^{1} + \hat{C}v + \hat{g} + \hat{R}$, is a versatile control term that is in charge of dealing with the dubious parameters. The second part, $"\hat{T}_e - K_d sat(s/diag(\varphi))"$, is a powerful control term that is in charge of fulfilling the state of Eq. (18) and the varieties of the router info T_e. Substituting Eq. (21) into Eq. (16) and characterizing $"\tilde{M} = M - \hat{M}, C = C, \tilde{g} = g - \hat{g}, \tilde{R} = R - \hat{R}, \text{and } \tilde{p} = p - \hat{p}"$, we determine the shut circle framework as pursues:

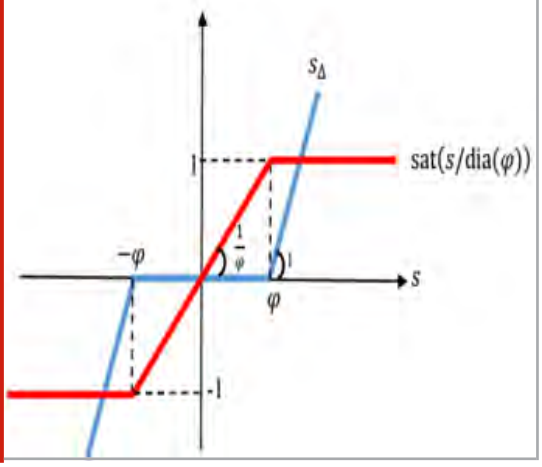
$$Ms^{1} + Cs + K_d sat(s/diag(\varphi)) + (\hat{T}_e - T_e) = -(\tilde{M}v^{1} + \tilde{C}v + \tilde{g} + \tilde{R}) \tag{22}$$

We can disconnect the right-hand side of Eq. (22) into two particular parts: the regress or system $"Y(q.q^{1}, v.v^{1})"$ and the parameter estimation mistake vector $\tilde{p}$. Thusly, we can exhibit Eq. (22) in the accompanying regress or (straight parametric) structure:

$$Ms^{1} + Cs + K_d sat(s/diag(\varphi)) + (\hat{T}_e - T_e) = -Y(q, q^{1}, v, v^{1})\tilde{p} \tag{23}$$

Next, to exchange off control jabbering and following precision, and to make an adjustment no man's land to avoid horrible parameter float, we characterize a direction as pursues

Figure 2. : saturation function and trajectory s_Δ for a single link



$$s_{\Delta} = \begin{cases} 0 & , \ |s| \leq diag\ (\varphi) \\ s - \varphi sat\ (diag\ (\varphi)) & , \ |s| > diag\ (\varphi) \end{cases} \quad (24)$$

Where s_{Δ} is an n-element vector, the region "$|s| \leq diag\ (\varphi)$" is the boundary layer and inequality is interpreted element-wise; and the diagonal φ elements of are the boundary layer thicknesses and the width of the saturation function so that "$\varphi = diag(\varphi_1, \varphi_2, ..., \varphi_n)\ and\ \varphi_i > 0$." we depict s_{Δ} and the function "$sat(s/diag(\varphi)$" for a single link in fig. 2. To drive stable adjustment law, we present a scalar positive distinct Lyapunov work as pursues:

$$V(s_{\Delta}, \tilde{p}) = \frac{1}{2}(s_{\Delta}^{T} M s_{\Delta}) + \frac{1}{2}(\tilde{p}^{T} \mu \tilde{p}) \quad (25)$$

Table 1. PIDSMC and SMC TUNING parameters with 1% disturbances.

	PID CONTROLLER					SMC CONTROLLER	
S.	K_p	K_I	K_d	ISE	LMD	K	ISE
1	1	0.5	0.6	1.089	15	5	0.02373
2	0.8	0.6	0.8	1.292	30	10	0.002882
3	2	0.5	0.6	0.4991	50	4	0.004304
4	2	0.1	0.2	0.524	60	7	0.001777
5	2	0.3	0.4	0.50950	70	9	0.00197
6	2.5	1.7	2	0.3282	80	11	0.002678

Table 2. PIDSMC and SMC TUNING parameters with 2% disturbances.

	PID CONTROLLER					SMC CONTROLLER	
S.No	K_p	K_I	K_d	ISE	LMD	K	ISE
1	1	0.1	0.6	1.095	5	5	0.4411
2	3	0.6	0.7	0.2872	12	12	0.01265
3	3	1.5	1.7	0.2672	25	15	0.003975
4	5	3	2	0.1143	40	19	0.005867
5	8	0.9	0.5	0.05831	55	28	0.01473
6	9	0.9	0.5	0.04741	65	34	0.02324

Table 3. PIDSMC and SMC TUNING parameters with 3% disturbances.

	PID CONTROLLER					SMC CONTROLLER	
S.NO	K_p	K_I	K_d	ISE	LMD	K	ISE
1	1.5	0.5	0.7	0.7214	7.5	3	0.2361
2	3	0.8	0.9	0.2873	15	6	0.01526
3	3	0.5	0.9	0.2892	22.5	9	0.004143
4	4	0.2	0.4	0.1943	30	12	0.003018
5	2.5	0.2	0.4	0.3901	37.5	15	0.00383
6	7	0.4	0.7	0.07592	45	18	0.005745

Table 4. PIDSMC and SMC TUNING parameters with 4% disturbances.

	PID CONTROLLER					SMC CONTROLLER	
S.N	K_p	K_I	K_d	ISE	LMD	K	ISE
1	5	2.3	4	0.1146	12.5	4	0.05061
2	5	3.3	6	0.101	25	8	0.00384
3	7	4.3	5.5	0.06417	37.5	12	0.002892
4	9	4.5	5.7	0.0428	50	16	0.004926
5	11	5	7	0.0297	62.5	20	0.008266
6	13.5	6.5	7.8	0.02055	75	24	0.01261

Table 5. PIDSMC and SMC TUNING parameters with 5% disturbances.

	PID CONTROLLER					SMC CONTROLLER	
S.No	K_p	K_I	K_d	ISE	LMD	K	ISE
1	0.1	0.5	1	2.932	9	6	0.03798
2	1	0.5	2	0.7838	18	12	0.01682
3	1.3	1	1.7	0.7547	27	18	0.005214
4	2.5	0.4	0.9	0.3838	34	27	0.01095
5	3.5	0.7	0.9	0.2366	41	34	0.01967
6	4.5	0.1	0.3	0.1681	48	39	0.02833

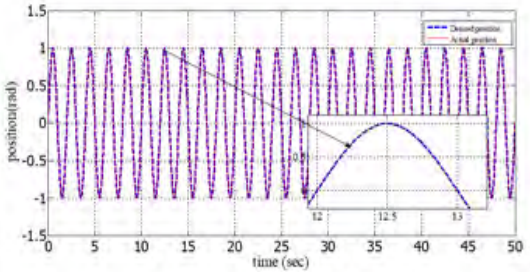
Table 6. PIDSMC and SMC TUNING parameters with 10% disturbances.

	PID CONTROLLER					SMC CONTROLLER	
S.No	K_p	K_I	K_d	ISE	LMD	K	ISE
1	0.3	1	1.2	2.055	20	12	0.003647
2	0.5	0.1	0.3	1.985	30	18	0.004789
3	2	0.2	0.8	0.4852	35	14	0.003238
4	4	0.3	0.6	0.1832	38	13	0.003015
5	5	0.1	0.4	0.1305	25	8	0.004157
6	12	0.7	1	0.02737	16	11	0.005041

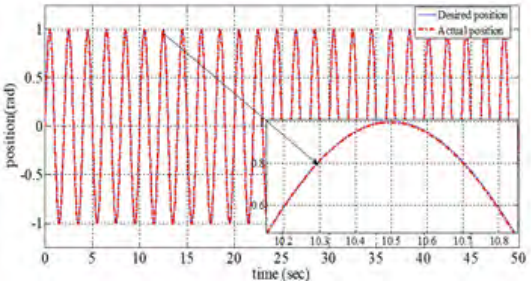
Table 7. PIDSMC and SMC TUNING parameters with 20% disturbances.

	PID CONTROLLER				SMC CONTROLLER		
S.NO	K_p	K_I	K_d	ISE	LMD	K	ISE
1	0.1	0.5	0.3	3.34	25	4.5	0.01184
2	3	0.1	0.3	0.2923	30	9	0.002413
3	12	0.5	0.8	0.02762	33	13	0.003027
4	15	1	0.8	0.0181	35	8	0.002192
5	23	4	2	0.00778	22	5	0.01142
6	30	5	7	0.00461	27.5	6.5	0.003743

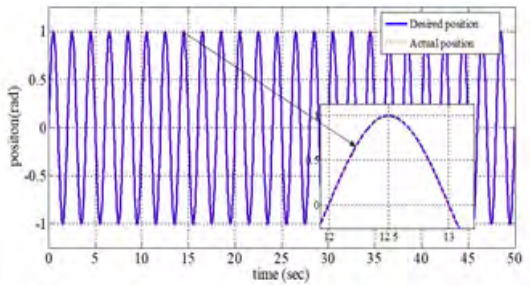
Figure 3. Tracking Positions of SMC for various disturbances



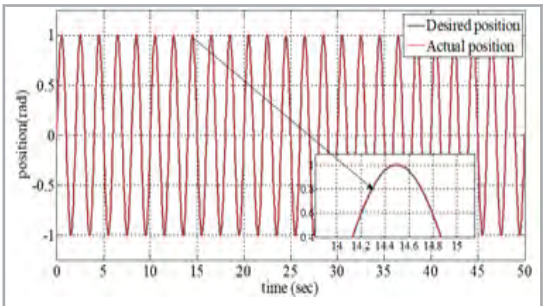
a).Position tracking for 1% disturbance.



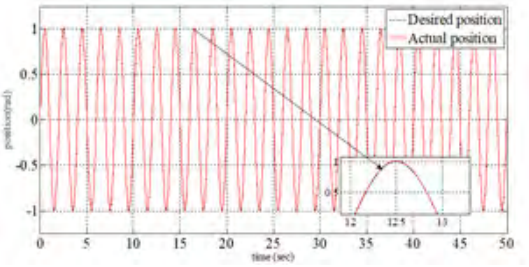
b). Position tracking for 2% disturbance.



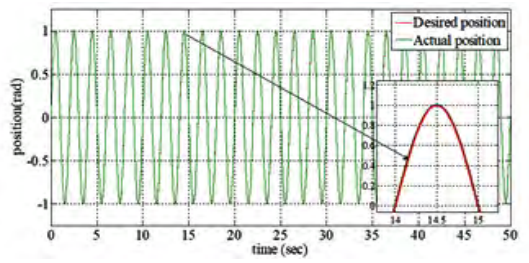
c). Position tracking for 3% disturbance



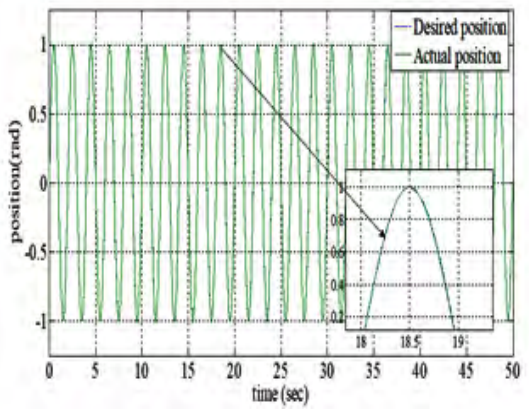
d). Position tracking for 4% disturbance



e). Position tracking for 5% disturbance

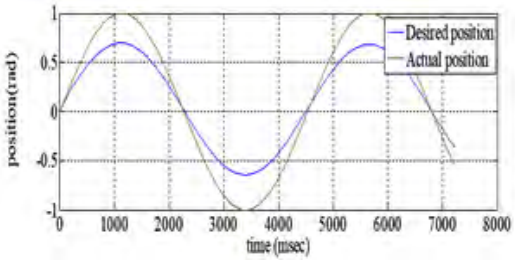


f). Position tracking for 10% disturbance.

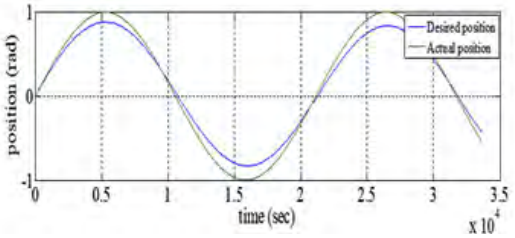


g). Position tracking for 20% disturbance

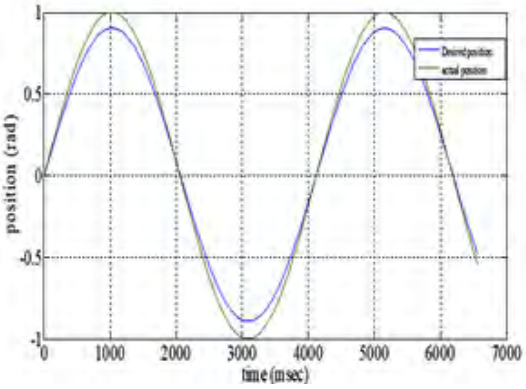
Figure 4. Tracking Positions of PIDSMC for various disturbances.



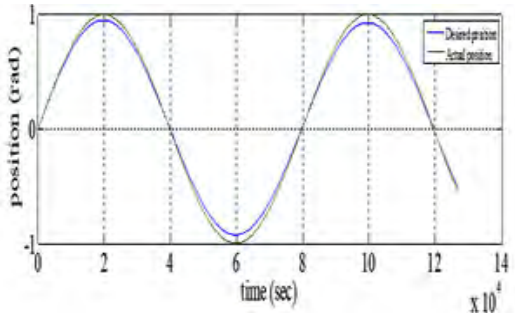
a). Position tracking for 1% disturbance



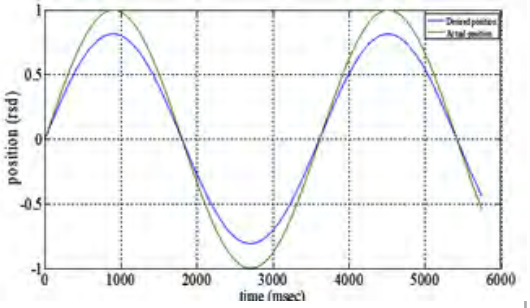
b). Position tracking for 2% disturbance



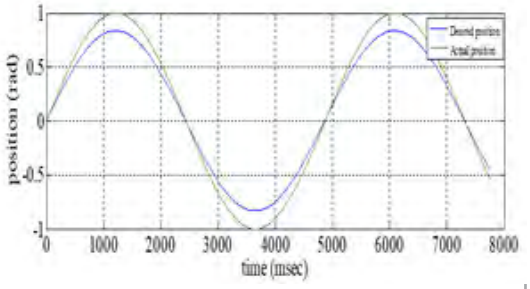
c). Position tracking for 3% disturbance



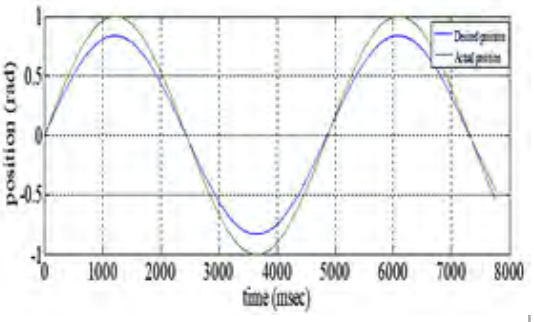
d). Position tracking for 4% disturbance



e). Position tracking for 5% disturbance



f). Position tracking for 10% disturbance



f). Position tracking for 20% disturbance.

Where μ is a planning "$\mu = diag(\mu_1, \mu_2, ..., \mu_n)$, *with* $\mu_i > 0$." parameter such that Note that despite the fact that isn't constantly differentiable, v is reliably differentiable in light of the way that it is a quadratic limit of s_Δ. We locate the subsidiary of the Lyapunov work as pursues:

Inside the boundary layer "$s_\Delta{}^1 = 0$", and outside of it so "$s_\Delta{}^1 = s^1$",
So as to have an adjustment system, we will oblige the term $\tilde{p}^T \mu \tilde{p} - s_\Delta{}^T Y(q, q^1, v, v^1) \tilde{p}$ to be equivalent to zero and it turns we can determine the refreshed law as

$$\hat{p} = -\mu^{-1} Y^T(q, q^1, v, v^1) s_\Delta \quad (26)$$

Therefore, $v^1(s_\Delta, \tilde{p})$ can be rewritten as follows

$$V^1(s_\Delta, \tilde{p}) = -s_\Delta^T C s + \frac{1}{2}(s_\Delta^T M s_\Delta) - s_\Delta^T K_2 sat(s/diag(p)) + s_\Delta^T(\hat{T}_e - T_e) \quad (27)$$

CONCLUSION AND FUTURE WORK

We organized a repressor-based nonlinear lively model reference sliding mode controller for a prosthesis robot show. We initially characterized an objective impedance demonstrate with two genuine posts for every level of opportunity (3-DOF). The structured a vigorous model reference sliding mode controller, for evaluating the unsure parameters of the framework. The prosthesis configuration has been streamlined to give the essential joint torque/edge prerequisites with least volume actuator design. The methodology was approved against typical stride information and through test testing with a capable connector. The framework directions to a limit layer while making up for the varieties of GRF. We used PSO to find the perfect control and estimator structure parameters to confine the accompanying slip-up and control banner degree. We performed reproductions with 1% to half pick up aggravation parameter deviations, and we saw that following execution stayed exact. It is seen from the reproduction results that following of robot controller by thinking about a sliding mode controller (SMC) procedure gives the least target work an incentive in the examination with PIDSMC. SMC gives least following mistake and great aggravation dismissal contrasted with PIDSMC tuning parameters. The directions stayed inside their limit layers after the adjustment time frame, which brought about great strength and following execution. For future work, we will have thought about the vital parts of the proposed controller, including the accompanying: the effect of the utmost layer thickness on system execution: and the intensity of the structure to assortments in the effect of GRFs. We will similarly look for after changed plans of solid sliding mode controllers to achieve definite parameter estimation and better after execution. We will likewise include the rotating and direct actuators models to the framework to acquire the required voltages for DC engines. We will stretch out the controller to a 6-DOF display that incorporates a functioning lower leg joint. At last, we will utilize multi-target enhancement to accomplish better exchange offs of the following blunder and the control flag extents. We will in like manner structure a steady time extended to assess the states and GRFs of a 6-DOF prosthetic leg appear and consider security examination of this channel.

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Optimal Location and Sizing of DG's in RDS by Using L-SHADE Algorithm

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ABSTRACT

Thisresearch work definesan optimal position and measuring of DG's (Distributed Generation) in RDS .However, appropriate arrangement and estimating of DGs in the scatteringorganization is an indispensable topic, as any inappropriate area and dimension of DGs could build the general framework misfortune. In this examination, an L-SHADE algorithm is proposed to discover the ideal area and extents of genuine power DGs in an outspread circulation framework (RDS) allowing for steady weightsimulations. This DG sitting and measuring issue is related with genuine power misfortune minimization and voltage dependability enhancement targets. The viability of the planned calculation is tried on standard benchmark test works just as on 33 and 69 bus RDS. The replicationoutcomes acquired by the offered L-SHADE system are related and the outcomes offered by the fundamental SOS and other nature motivated calculations to build up the predominance of the offered CSOS calculation done the others as far as nature of arrangement and union portability.

KEY WORDS: DISTRIBUTED GENERATION (DG),RADIAL DISTRIBUTION SYSTEM (RDS), DIFFERENTIAL EVOLUTION (DE) , L-SHADE ALGORITHM.

INTRODUCTION

General perspective

With present creativities on smooth lattice and defendable vitality, circulated ages (DG'S) were going to assume imperative job in the rising electric power frameworks. DG units are ordinarily joined into the appropriation organize framework to help improve and bolster the power voltage profile just as the exhibition of framework parts through power misfortune moderation.In DG development it hang onenvironmental, economic and technical factors. In accord with the Kyoto protocol agreement on weathervariation, which commits to decrease the carbon emissions (V.V.K. Satyakar et. al).

Distributed Generation (DG) refers to small electricity generation facilities ranging from few kWs to 50 MW (Ackermann,T, et al), placed within the distribution system close to where the most power is consumed. The infiltration of Distributed

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Generation into the dissemination framework has been caused some accommodating just as awful impacts on power streams and voltage states of the current power agenda. The impacts depend on not just the qualities and states of dispersion framework its placement, sizing and type.

Literature survey

The writing survey in this study looks at the significant work done by other researchers on radial distribution networks that lead to the accomplishment of the development of this research. There are diverse studies that have been done on power loss challenges in distribution networks and the power system engineers are creating different techniques for moderating generally losses to improve the power system stability and make it more efficient by limiting the cost.Additionally, the lines used for DGs will as a rule have a higher resistance to impedance proportion (R/X) than the lines in transmission systems (Chakravorty, M.et. al,). The cutting edge control distribution system is continually being looked with a quick creating burden request, this expanding burden is coming about into expanded burden request and diminished voltage additionally cause on the activity, arranging, technical and security issues of distribution systems (A.Alarcon-Rodriguez et.al, P.S. Georgilakis et.al, Y. A. Katsigiannis, et al). These power misfortunes in appropriation frameworks have transformed into the most upset issue in influence misfortunes investigation in any influence systems. In the action of decreasing power control misfortunes inside distribution systems, reactive power remuneration has turned out be continuously essential as it impacts the operational, conservative and nature of administration for electric influence frameworks (P. S. Georgilakis et.al, Y. A. Katsigiannis et al,). The planning ought to be to such an extent that the arranged structure ought to financially and constantly manage spatial and temporal burden development, and administration area expansion in the arranging horizon (J. A. Pecas Lopes et.al, R. Jabr et al,).In (J. A. Pecas Lopes et.al,), different distribution systems arranging models introduced. The offered models are assembled in a three-level grouping structure beginning with two general classifications, i.e., arranging without and with unwavering quality contemplations. Planning of a distribution system relies upon the load stream study. The heap stream will be essential for the assessment of dissemination systems, to ask about the issues identified with arranging, plot and the activity and control.The customary load flow methods used in transmission frameworks, for example Newton - Raphson and Gauss - Seidel methods, neglected to meet the prerequisites in both convergence and robustness aspects for the distribution framework applications. DG distribution in distribution system is essentially a difficult combinational optimization issue which requires simultaneous optimization of different objects(A.Alarcon-Rodriguez et.al,) for example minimizations of real and receptive power misfortunes, pivot voltage deviation, carbon feast, line load stacking, and impede and augmentation of system unwavering quality and so on. By and by, a far reaching number of research papers are open with respect to the matter of the DG distribution for power misfortune, voltage improvement, and so on.(V.Sekhar et.al, P. S. Georgilakis et al, Y. A. Katsigiannis et.al, J. B. V. Subrahmanyam et al,)sensitivity investigation had been utilized for finding the optimal location of DG. In(C.L.T.Borges et al,), Loss sensitivity factor had been utilized for finding the optimal location of DGs. The generators are should have been associated in distributed systems in such a way that it maintains a strategic distance from corruption of power quality and reliability.

In DG assignment issue, DG areas and sizes must be advance so that it give most affordable, effective, in certainty sound distribution framework. When all is said in done distribution framework have numerous hubs and it is subtle out the ideal DG area and size by hand. There are different improvement strategies used in the writing. Among the diverse arrangement methodologies deterministic calculation, for example, dynamic programming, mixed integer programming, nonlinear programming have been utilized in (Borghetti, A.et al,). Khalesi, N., Rezaei, N., Haghifam, M.R (Khalesi.N et al,)dynamic writing computer programs is used for ideal arrangement of DG's in RDS system and progress the voltage profile and framework unwavering quality to minimization of misfortunes . Rueda-Medina,

A.C., Franco, J.F., Rider, M.J(Rueda-Medina,A.C et al,) Mixed whole number direct writing computer programs is comprise of a consistent state activity of the RDS, taking into account diverse burden levels is demonstrated through straight phrasings and unique sorts of DGs are implied by their capacity bends . In (D.Q. Hung et al,) an expository strategy to determine the ideal situation of DG is displayed.

Problem Identificaion

The target of the present work is so as to discover the misfortune affectability factor for arrangement of DG is clarified as, the genuine influence misfortune in the framework is given by

$$P_L = \sum_{i=1}^{n_b} \sum_{j=1}^{n_b} [\alpha_{ij}(P_i P_j + Q_i Q_j) + \beta_{ij}(Q_i P_j + P_i Q_j)] \quad (1)$$

Where

$$\alpha_{ij} = \frac{\gamma_{ij}}{V_i V_j} \cos(\delta_i - \delta_j) \quad (2)$$

$$\beta_{ij} = \frac{\gamma_{ij}}{V_i V_j} (\delta_i - \delta_j) \quad (3)$$

The target capacity can be separated into 3parts as appeared in the beneath three segments.

Power loss minimization

The goal of the DG situating and estimating issue is to limit the genuine power misfortunes however much as could reasonably be expected. The following equation is

OF=minimize (PL) (4)

Where P_L=real power loss of the radial distribution system;

Voltage improvement

The bus voltage of a distribution framework as often as possible encounters vacillations and even voltage breakdown happen under certain critical loading conditions with expanding burden request. The setting of DGs are associated closer to the load focuses to stay away from voltage breakdown and improve voltage profile of the circulation network. The target capacity of voltage improvement is

$$OF_2 = \sum_{i=1}^{n_b} (V_i - V_{rated})^2 \quad (5)$$

Voltage stability index

VSI of the i^th bus in an RDS is denoted by (6) (Chakravorty, M)

$$[VSI]_i = |V_j|^4 - 4[P_i x_{ij} - Q_i r_{ij}^2] - 4[P_i r_{ij} - Q_{ij}]^2 |V_j|^2 \quad (6)$$

OF3 = maximize (VSI) = minimize (1/VSI) (7)

A multi-objective problem is formed by combining the single objectives whose fitness function (FF) is given by (8).

FF= minimize ($OF_1 + PF_1 \times OF_2 + PF_2 \times OF_3$) *(8)*

Where PF_1_1 and PF_2 are the penality factors taking the values of 0.6 and 0.35 respectively (V.V.K. Satyakar et al,) .

Equality constraints

The equality constraints are as shown below

$$P_i - P_i^d - V_i \sum_{j=1}^{N} V_j Y_{ij} \cos(\delta_i - \delta_j - \theta_{ij}) = 0 \quad (9)$$

$$Q_i - Q_i^d - V_i \sum_{j=1}^{N} V_j Y_{ij} \sin(\delta_i - \delta_j - \theta_{ij}) = 0 \quad (10)$$

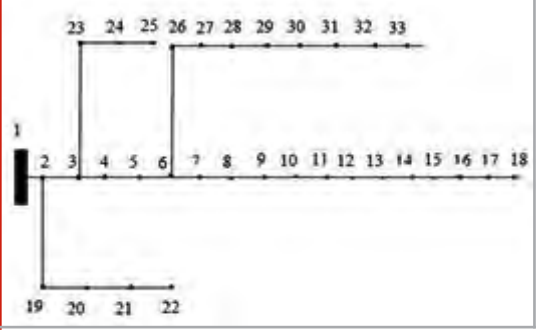
Inequality constraints

The usual of inequality constraints is governed by

$$V_{i,\min} \le V_i \le V_{i,\max} \quad (11)$$

$$I_{ij} \le I_{ij,\max} \quad (12)$$

Figure 1: 33 Bus radial distribution system



$$P_{i,min}^{DG} \le P_i^{DG} \le P_{i,max}^{DG} \quad (13)$$

$$Q_{i,min}^{DG} \le Q_i^{DG} \le Q_{i,max}^{DG} \quad (14)$$

De Algorithm

The succeeding sections depict four stages of DE: Initialization, mutation, crossover and selection.

Initialization

The initialization is consider as random generated individuals with population size NP. For this reason, the specific vector xi components are formed by Arbitrary Number Generator with identical distribution from the range which was determined for the issue by lower and upper bound.

$$x_{ij} = U_{[low\,erj, upperj]} for j = 1, \ldots . D \quad (15)$$

Mutation

In the mutation stage, three mutually dissimilar individuals x_{r1}, x_{r2}, x_{r3} starting a population are accidentally selected and joined in agreement through the mutation strategy. The inventive mutation strategy of canonical DE is jj$_{r\ andr/1jj}$) and was depicted in (16).

$$v_i = x_{r1} + F[x_{r2} - x_{r3}] \quad (16)$$

Crossover

In the crossover stage, mutated vector v_i was joined with the unique vector xi to deliver the trial vector v_i. The binomial crossover (17) is used in canonical DE.

$$U_{j,i} \begin{cases} u_{j,i} & if\ U[0,1] \le CR\ or\ j = j_{rand} \\ x_{j,i} & otherwise \end{cases} \quad (17)$$

Selection

The selection stage guarantees, that the optimization resolve advance towards better solutions since it permits just individuals of well or at slightest the same objective function value to continue into the after that generation G+ 1(18)

$$x_{i,G+1} \begin{cases} u_{i,G} & if\ f(u_i,G) \le f(x_i,G) \\ x_{i,G} & otherwise \end{cases} \quad (18)$$

L-SHADE

LSHADE algorithm expands the Achievement History based Adaptive Differential Evolution with the direct decrease of populace size. SHADE was executed in 2013. SHADE is an improved adaptation of JADE . L-SHADE is a blend of both SHADE and populace size decreasein the initialization. SHADE has be there the best positioned DE based calculation at CEC-2014 bench mark functions on real parameter objectives. The following next section deals the L-SHADE algorithm performance on different real parameter single objective functions along with DG placement in the RDS.

Simulation Results

The offered calculation is on 30 surely understood scientific benchmark test capacities preceding it is connected to power system optimization assignment. In the progressing years various sorts of novel improvement estimations have been offered to handle genuine parameter headway issues, including CEC'14 Real-Parameter Optimization. L-SHADE wins the test at CEC-2014 Special Session and Competition on Real-Parameter Single Objective Optimization (Brest). shows the CEC 2014 benchmark works on Real-Parameter Single Objective Optimization Functions and Table 2 shows the aftereffects of those Benchmark capacities. The measurements are D = 10, 30, 50 and 100 of 30 benchmark capacities and 51 keeps running of a calculation for each capacity. The most extreme number of target work estimations is D 10,000.(R. Tanabe et.al,).

Case study II: 33 Bus

The practicality of the proposed L-SHADE calculation is tried on a 33bus RDS. The 33 transport incorporate that 33 hubs and 32 branches. The assessed voltage of this structure is 12.66 KV with 100 KVA base. The system had all out genuine and responsive power heaps of 3.72 MW and 2.3 MVAr, separately. Irrefutably the genuine and receptive influence hardships of this system are 203 KW and 143 KVAr, separately, without foundation of DG. The single line portrayal of this transport framework is appeared in fig1. To support the practicality of the proposed L-SHADE calculation are associated

on this considered test structure. The target here is to, simultaneously, limit genuine influence incident, improve voltage ace le and increment VSI. For this circumstance, three amounts of genuine power DGs are undeniably allocated in the appointment arrange. The generation results for this test structure are sorted out.

The simulation outcomes for this assessment framework are arranged in. Table.1 also, are contrasted and the outcomes gotten by PSO (G. Celli et.al)GA-PSO(Rueda-Medina et al), SOS (Verma.S et al), CSOS (SubhodipSaha et al), DE(R. Storn et al),(J.Zhang et al) JADE(J.Zhang et al) SHADE(R.Tanabe et al) shown below Table 1.The voltage deviation gotten by the proposed L-SHADE is better than the SHADE, SOS, GA and PSO variations and the general voltage pro le of the framework likewise gets enhanced .VSI, as generated by the proposed L-SHADE, is superior to that of SHADE.It is clear that the proposed L-SHADE gives quicker convergence over its

Table 1. Optimal DG location for 33 bus RDS

Algorithm	Optimal DG'sposition	Optimal DG's size in (MW)	Loss (p.u)	No.of iterations	Central processing unit time in (sec)
	11	1.500			
GA[29]	29	0.423	0.1063	NRa	NRa
	30	1.071			
	8	1.177			
PSO[30]	13	0.982	0.1053	NRa	NRa
	32	0.829			
	11	0.925			
GA-PSO[31]	16	0.863	0.1034	NRa	NRa
	32	1.200			
	6	1.069			
SOS[32]	14	0.643	0.0770	48	11.95
	31	0.739			
		14	0.7540		
LSHADE	30	1.0714	0.0714	32	357.517
	24	1.0994			

Figure 2. performance of 33RDS by using L-SHADE algorithm

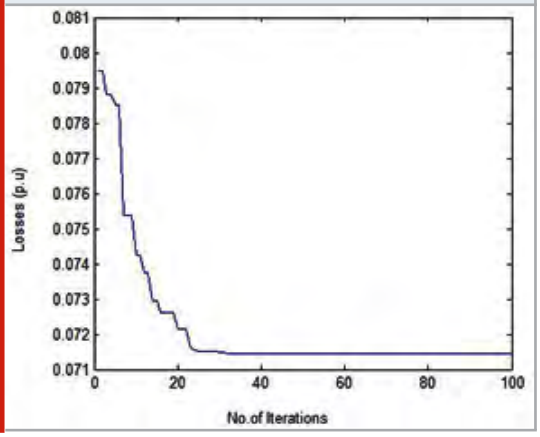


Figure 3. Performance of 69 RDS by using L-SHADE algorithm

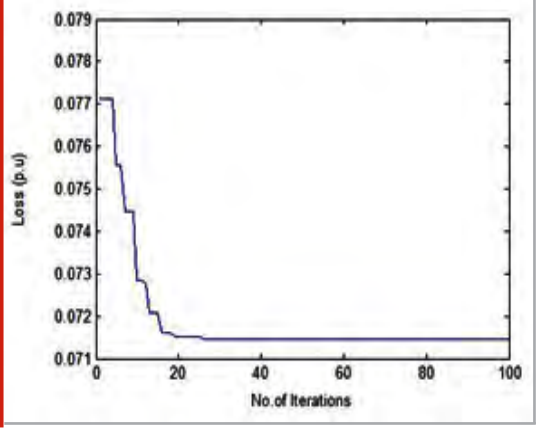


Table 2. Optimal DG location for 69 bus RDS

Algorithm	Optimal DG's Position	Optimal DG's size in (MW)	Loss (p.u)	No.of iterations
	21	1.500		
GA[29]	62	0.423	0.1063	NRa
	64	1.071		
PSO[30]	17	1.177		
	61	0.982	0.1053	NRa
	63	0.829		
GA-PSO[31]	21	0.925		
	61	0.863	0.1034	NRa
	63	1.200		
SOS[32]	61	1.069		
	64	0.643	0.0770	48
	66	0.739		
	17	0.538		
LSHADE	61	1.211	0.0716	32
	64	0.606		

unique partner, as it has taken just 30 repetitions. In this way,it might be noticed that the suggested L-SHADE algorithm yields preferred preparation overother algorithms as far as by and large FF minimisation and convergence features.

Case study 3: 69-Bus

In this case, the presentation of the recommended calculation L-SHADE is tried on an outspread conveyance framework, for example, 69-transport. The quantity of hubs of the framework has 69 and 73 branches, in addition to tie-lines. Each branch is numbered dependent on the quantity of its beginning hub. The branch information and burden information for this framework may be found from Matpower for a base of 12.66 kV and 1000 kVA. The simulation outcomes for this assessment framework are arranged in Table.1 also, are contrasted and the outcomes gotten by PSO (G. Celli et.al)GA-PSO(Rueda-Medina et al), SOS (Verma.S et al), CSOS (SubhodipSaha et al), DE (R. Storn et al),(J.Zhang et al) JADE(J.Zhang et al) SHADE(R.Tanabe et al) shown below Table 1.The voltage deviation gotten by the proposed L-SHADE is better than the SHADE, SOS, GA and PSO variations and the general voltage pro le of the framework likewise gets enhanced .VSI, as generated by the proposed L-SHADE, is superior to that of SHADE. It is clear that the proposed L-SHADE gives quicker convergence over its unique partner, as it has taken just 30 repetitions. In this way,it might be noticed that the suggested L-SHADE algorithm yields preferred arrangement over other algorithms as far as by and large FF minimisation and convergence features.

CONCLUSION AND FUTURE WORK

The establishment of DG units in power distribution systems is winding up additional noticeable. Subsequently, dispersion organizations have begun to change their electric framework to adjust to DG units because of the advantages of DG establishment on their distribution frameworks. These advantages incorporate lessening power losses,improving voltage pro les, decreasing sentimentsetc. and improving power quality. Extra advantages are abstaining from redesigning.

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Implemantation of Weather Detection Band Using IoT

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ABSTRACT

Internet of things(IOT) is the area of the internetworking of physical devices , vehicles and other objects which consists of implanted system with sensors, actuators and network connectivity that enable to collect ,transmit and receiving data. Internet of Things is the concept of connecting any device to the Internet and to other connected devices. The IOT is a giant network of connected things and people – all of which collect and share data about the way they are used and about the environment around them. . In existing, people might forget to record the weather parameters or simply made mistake in writing any value. This can affect the systems integrity. The time taken for sensing using these types of analog instruments is very much hence it also causes the error. As far as the accuracy is concern this system is less accurate than now a day's digital system. Sensing time is very high, high installation cost, Complex installation, Hard to replace any elements. This paper exhibits an alert message is sent to the mobile phone, this is less implementation cost and less time consumption. It sends the message to mobile phone from the wrist band. There is no possibility to cause human error. It is easy to replace the elements. Arduino is used to connect hardware and software devices. Hence it is easy to connect any hardware and software devices.

KEY WORDS: INTERNET OF THINGS, SENSORS, ACTUATORS , ARDUINO.

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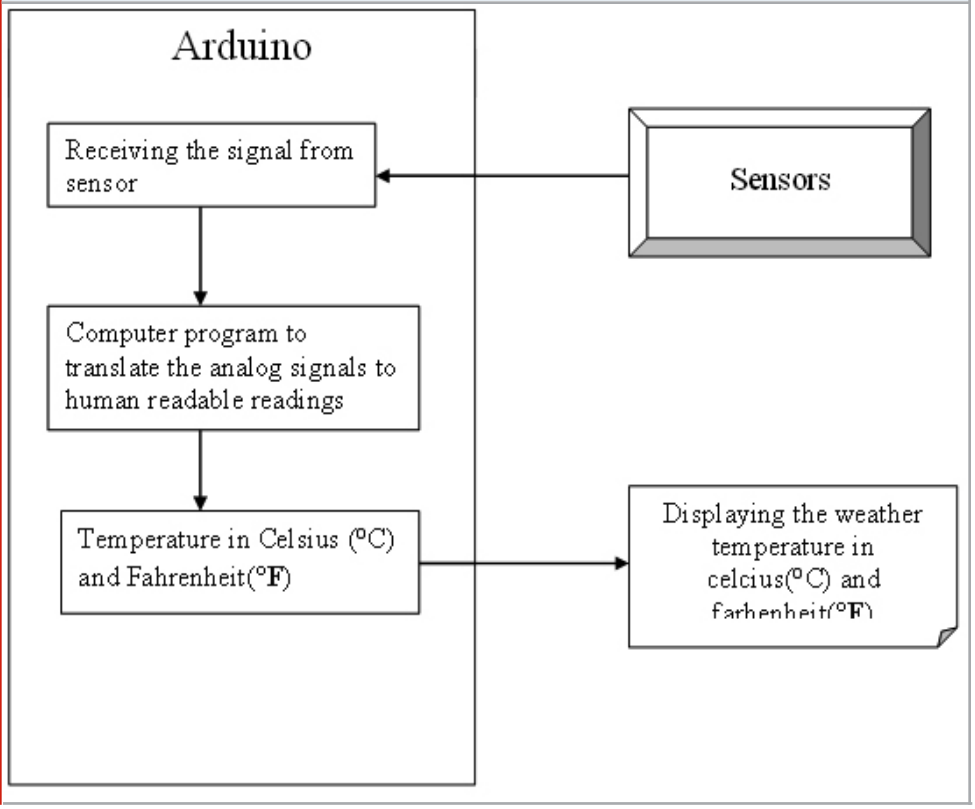
INTRODUCTION

Due to the technological innovations man is leading a comfortable life. But at the same moment these advancements have at times become troublesome. The number of people does not know about weather condition. This becomes an immense issue especially in big cities. Now the question arises, is it possible to

introduce such a system that would solve all these issues and will be intelligent too. An interface is provided and software/ hardware module which is validated using a test case scenario. The extensive experimentation proves the feasibility of the approach. The work is aimed at providing such a system that would be feasible all over the world. This approach is less cost effective and it covers all the features of a complete intelligent weather monitoring system. The Weather monitoring system provides higher efficient in detecting current weather condition. Apart from these it will also used to detect the weather condition on remote location. By using this weather detection system we can able to analyze the reading at various weather conditions like cold, hot. The complete system is developed using Arduino, Temperature Sensors, Bread Board, Connecting wires. Arduino is an open-source electronics platform based on easy-to-use hardware and software. Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED, publishing something online. Sensors are sophisticated devices that are frequently used to detect and respond to electrical or optical signals. A Sensor converts the physical parameter (for example: temperature, blood pressure, humidity, speed, etc.) into a signal which can be measured electrically.

Classical classification methods were used first to weather detection. After the results of this classification, studies were conducted to select only the features that are critical to classification, rather than all features, with a view to reducing the level of performance with fewer features. These studies were conducted on two classifiers; a classifier was first used to detect “rainfall” or “no rainfall” in the region and then classified for “bird-insect” or “clutter”. From the total of eight features found in our database, the most important and most useful features for both classifiers have been determined. The results show that the feature selection method has developed

Figure 1. weather monitoring system

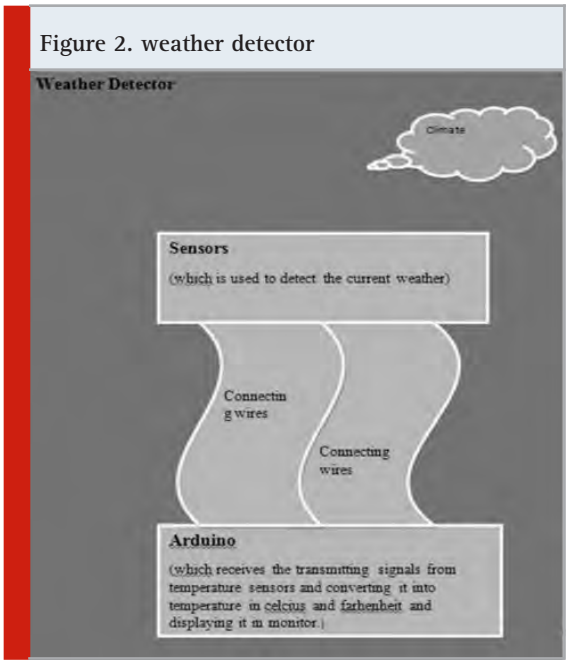


a similar performance when a few attributes are used instead of all. Thus, it is possible to achieve similar classification performance with lower calculation capacity. Since severe weather events are rare, dedicating servers for such application wastes resources. In this paper, we present the feasibility of using commercial cloud services for severe weather detection and prediction. We show that commercial cloud services provide the required network capability to perform the real-time operation of weather detection and prediction from the radars to the cloud service instance. Automated the process of weather prediction on the cloud based on the results of our weather detection algorithms.

MATERIAL AND METHODS

Weather monitoring system can be done by several ways. this is one of the best way to calculate the weather temperature using sensors. In this system Arduino board is used in major role which is used to transmit and receive the signals from sensors to calculate the weather temperature. Temperature sensor is used in this system to sense the temperature of the current environment. By this process we can know whether climate is cold or hot. We can able to replace the sensors by highly cost and highly efficient sensors to find the weather condition on remote locations. Arduino is connected to LM 35 DZ sensor to detect weather conditions. The sensor predict the current temperature and calculate to degree Celsius by using Arduino programming, here a sensor is used as a input ,the output will be displayed in serial monitor after the execution of the arduino program .The temperature will detect for every seconds. Arduino is an open-source hardware and software company, project and user community manufactures and microcontroller kits for building digital devices and interactive objects that can sense and control objects in the physical and digital world. Its products are licensed under the GNU Lesser General Public License (LGPL) or the GNU General Public License (GPL),[1] permitting the manufacture of Arduino boards and software distribution by anyone. Arduino boards are available commercially in preassembled form or as do-it-yourself (DIY) kits. Arduino board designs use a variety of microprocessors and controllers. The boards are equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards or breadboards (shields) and other circuits. The boards feature serial in communications interfaces, including Universal Serial Bus (USB) on some models, which are also used for loading programs from personal computers. The microcontrollers are typically programmed using a dialect of features from the programming languages C and C++. In addition to using traditional compiler tool chains, the Arduino project provides an integrated development environment (IDE) based on the Processing language project. The LM35 is one kind of commonly used temperature sensor that can be used to measure temperature with an electrical o/p comparative to the temperature (in °C). It can measure temperature more correctly compare with a thermistor. This sensor generates a high output voltage than thermocouples and may not need that The output voltage is amplified. The LM35 has an output voltage that is proportional to the Celsius temperature. The scale factor is .01V/°C. A computer program is placed in Arduino software. This program is coded to calculate the temperature in Celsius and Fahrenheit. The temperature is sensed by sensor and transmitted to the arduino there we have computer programming logic to

Figure 2. weather detector



translate the sensed signal to human readable numerical readings.

Generalized Algorithm

1. Sliding Window Algorithm

Input: Processed weather-related time series sequences T= 1 2 , ,....., t t t n

Output: Number of segmented weather cases (Sequences).

1 Begin

2 Initialize start_point = ti , point = start_point, next = start_point + 1 ;

and end_point = next;

3 for each ti in T, i = 1.....n

4 Set error = 0

5 Read data at time ti

Figure 3. Layout of weather detection using IOT

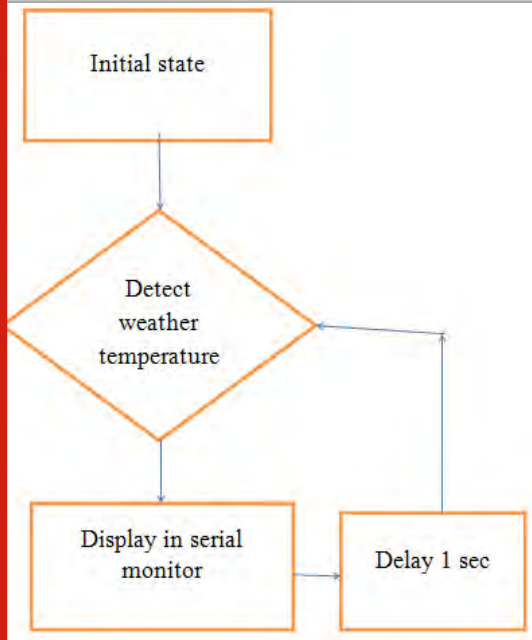


Figure 4.1: Environmental temperature variation

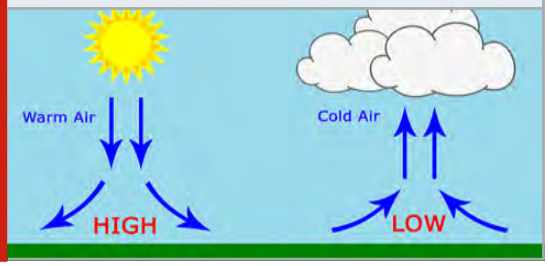


Figure 4.2: Displaying weather temperature

6 if (point is not equal to next and error equal to 0) // weather level change (change point)

7 Create a segment start from start_point to end_point // add into window slices set

8 Set point = next + 1; and next = point + 1

9 Set the start_point = point; end_point = next; and error = 0

10 else 11 Set next = i; 12 Set end_point = next+1; Set error = 1

13 end if

14 end for

15 End

RESULTS AND DISCUSSION

As our weather monitoring system keeps track of all temperature variation on a particular current location. By the help of this weather monitoring system we can prevent ourselves from critical weather circumstances. It will display weather temperature in Celsius and Fahrenheit format in computer monitor. we can replace the computer monitor by LED screen. BY using some advanced technology it will also display in phone.

CONCLUSION AND FUTURE SCOPE

This concludes that the present work was a success and it will provide a competent method for recording real time weather readings and help farmers whose livelihood depends on the weather in a country like India to produce better quality crops. It can be used to gather information about the requirements for each area over the years. The gathered information is used to determine the optimal conditions for plants to grow and the farmer can modify the environment suitable for the growth of the plant. This, in turn will have a huge impact on agriculture and also on farmers throughout the world. Limitations of the

weather system is mentioned below, this system is developed for Small area. It is not web based system. In future, sensors to analyze air quality using gas detectors could be included and a web interface or service to feed the data directly to Internet could also be built.

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Indian Geolocation Based Call Quality Prediction Using Machine Learning Algorithms and their Hyperparameter Tuning

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ABSTRACT

In today's era, there are billions of calls made worldwide. And every user wants the better quality of service to experience. So, the network operators need to ensure the network availability and coverage in all types of locations. They need to continuously monitor the network performance and perform the adaptations to new technology wherever possible. In this paper firstly, we have done deep analysis of the geolocation based call quality data and perform the machine learning techniques to find the rating, the user is more likely to give depending upon the service and the location. Secondly, we have performed the tuning of hyper parameters of algorithms and finally we have compared the performance of different machine learning models.

KEY WORDS: ACCURACY, CALL QUALITY, CLASSIFICATION, GEOLOCATION, HYPERPARAMETER , MACHINE LEARNING.

INTRODUCTION

In today's world communication plays as one of the most important roles in everyone's life. Every individual wants to get connected with each other via well established network. In the field of telecommunication there are lots of call establishment, call connections, call forwarding, call drop etc. taking place in the regular basis. There may be problems of call drop, network coverage, handover depending upon the location of the base station, height of antenna, congestion in the channel and demographic estimate of a particular location.

The quality of service is the measure of network performance whereas the quality of experience is defined as the degree of delightness or satisfaction by the user to continue using the same type of service. Every user wants a proper network coverage, and thus best services to

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experience in the field of cellular network. For this purpose TRAI (Telecom Regulatory Authority of India) has set certain benchmark as such every network operator needs to ensure their services above the benchmark set. There is a need to evaluate the network performance and a new technology adaptation has to be made to ensure better services. In India TRAI has set different benchmark of call drop rate (<2%), SDCCH congestion (<1), HOSR (>=95%), TCH congestion (<2%) average CSR (>=95%) but most of the network service provider do not meet it. So, keeping this problem in mind, here analysis is done on the geolocation based call quality data containing various call quality parameters. User mode of accessing, wireless technology used, call drop category have been considered and expected satisfaction level in the form of rating given by the user have been predicted in the paper. And steps that can be taken to minimize these issues in the future have been discussed in the later section. The customer feedback is important to evaluate their satisfaction level. Author P. Casas et al (2017) focused upon monitoring, prediction and assessment of user QoE in mobile networks from user equipment i.e. Smartphone. They worked upon the QoS/QoE based dataset of mobile networks obtained by performing some field based trial study. They used different supervised based machine learning algorithms such as Decision tree, SVM,MLP, RF etc. to predict the user QoE in some of the popular mobile apps like facebook, youtube etc. The different algorithms performances are compared and decision tree is found to be an excellent classifier giving the best performance. Author Pedro Casas et al(2016) have worked in cellular network for monitoring of QoE of user from Smartphone's. They worked by combining the results obtained from user feedbacks in operational cellular network in fields and results obtained from lab tests using end devices. They studied the impact of latency and changing bandwidth on the user's quality of experience of five different mobile apps namely, whatsapp, facebook, Google maps, youtube and Google chrome. Their work mainly focused on evaluating the impact of changing network conditions and fluctuating bandwidth in cellular networks. They provided a base to better understand the QoE requirements for all these mobile apps.

Author Menkovski et al(2010) have worked upon the prediction of quality of experience by users in a multimedia stream. It led towards improvement and optimization of the provision of mobile streaming multimedia services. They have proposed a QoE model which is adaptive in the changing environment. The data is obtained from subjective tests and the practical and real time QoE models are built using the machine learning classification algorithms. Here, decision

Table 1. Dataset before preprocessing

Operator	In Out Travelling	Network Type	Rating	Call Drop Category	Latitude	Longitude	State Name
Airtel	Indoor	4G	3	Satisfactory	12.99850186	77.67243651	Karnataka
Vodafone	Indoor	4G	1	Call Dropped	23.55419	72.6201102	Gujarat
Airtel	Indoor	3G	1	Call Dropped	11.32732904	76.74974316	Tamil Nadu
Airtel	Indoor	Unknown	1	Poor Voice Quality	28.63315667	77.24087333	NCT
Airtel	Indoor	4G	3	Satisfactory	22.27966031	73.14936897	Gujarat
Idea	Outdoor	Unknown	2	Poor Voice Quality	-1	-1	NaN
Airtel	Travelling	4G	3	Satisfactory	18.5463442	73.81909018	Maharashtra
Airtel	Travelling	4G	3	Satisfactory	18.5466271	73.8195324	Maharashtra
Airtel	Travelling	4G	5	Satisfactory	18.54752846	73.81910528	Maharashtra
Airtel	Travelling	4G	4	Satisfactory	18.54752846	73.81910528	Maharashtra
Airtel	Indoor	4G	5	Satisfactory	10.58310397	77.26359549	Tamil Nadu
RJio	Indoor	4G	5	Satisfactory	29.672815	77.0076626	Haryana
BSNL	Outdoor	3G	4	Satisfactory	13.0105591	77.66805832	Karnataka

tree and SVM algorithms is used for classification giving the accuracy above 90%. Machine learning is an effective newer technology that evaluates network performance using automatic prediction based on the input Suresh Kumar1(2018). The Machine Learning classification models has been proposed to measure the customer satisfaction level and predict the customer ratings in advance based on the call quality parameters and hence steps for network improvements can be taken. In this paper different algorithms have been applied for different jobs such as clustering and classification. We have considered two main types of algorithm.1. For clustering, k means clustering .Here, we have used k means for clustering the latitude and longitude features in the dataset.2.For Classification we have used three different algorithms namely K-Nearest Neighbors, Artificial Neural Network and Support Vector Machine. It classifies the clustered data along with other call quality parameters into rating from 1-5, which indicates the satisfaction level of the user. Based on the particular set of parameter values the algorithm outputs the rating in the particular class.

This paper is structured as follows

In next section we have presented the Materials and Methods, followed by the results and discussions.

MATERIALS AND METHODS

Dataset Description

We have taken six months data from May 2018 to October 2018 from TRAI. It consists of 336781 rows and 8 columns. The various attributes present are Operator, In Out Travelling, Network Type, Rating, Call Drop Category, Latitude, Longitude and State Name.

Data Preprocessing

The dataset needs to be clean before inputting it to the machine learning model for better results. It helps to find the correct pattern in the dataset. We are exploring the different types of features present in the dataset.

A. Handling of NULL Values: we have removed the rows with NULL values.
B. Handling of Categorical attributes: We have categorical data in our dataset which the machine learning algorithms finds challenging. So, We have converted the text features into the numeric format.

Data Analysis

We explored each column and we find that the operators Tata, MTNL, Other, Aircel, Telenor have really small number of examples so we have removed them. The next, In Out Travelling column is fine so change is not required on anything as we have enough examples of each category. In the network type column the type Unknown has no meaning, so we have filtered those out. The next Call Drop Category column seems fine, again we have enough examples of each category. Next, there are too many states and only Maharashtra, Gujarat, Uttar Pradesh, West Bengal represents majority examples so we have considered them.

Finding Correlation

Correlation tells us how the features are related to each other. Also, which feature is dominant and have a major impact upon the target variable. We have checked the correlation of Y and each X , + sign means as X increases Y also increases and - sign means as X increases Y decreases. In this dataset we have obtained some correlation between each X and Y, and each feature seems to be of value for prediction.

Standardizing the input dataset

Performing Standardizing on a dataset involves the distribution of data points as such the mean and standard deviation of observed value is 0 and 1 respectively. Performing standardization on a dataset is important as some machine learning algorithms input are in different scales.

Splitting of the Dataset into train and test We have splitted the data into train and test set in the ratio 8:2.

Machine Learning Methodology

The machine learning approach works as searching for the patterns in the dataset and generate results.

K-means clustering

K-means is an algorithm used to cluster the

Table 2. Dataset after removing NULL values

Operator	In Out Travelling	Network Type	Rating	Call Drop Category	Latitude	Longitude	State Name
Airtel	Indoor	4G	3	Satisfactory	12.99850186	77.67243651	Karnataka
Vodafone	Indoor	4G	1	Call Dropped	23.55419	72.6201102	Gujarat
Airtel	Indoor	3G	1	Call Dropped	11.32732904	76.74974316	Tamil Nadu
Airtel	Indoor	4G	3	Satisfactory	22.27966031	73.14936897	Gujarat
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BSNL	Outdoor	3G	4	Satisfactory	13.0105591	77.66805832	Karnataka

Table 3. Dataset after Preprocessing

Region	Operator Airtel	Operator BSNL	Operator Idea	Operator RJio	Operator Vodafone	In Out Travelling Indoor	In Out Travelling Outdoor	In Out Travelling Travelling	Network Type 2G
26	0	1	0	0	0	1	0	0	0
101	0	0	0	0	1	1	0	0	0
89	0	0	0	0	1	1	0	0	0
66	1	0	0	0	0	1	0	0	0
66	1	0	0	0	0	1	0	0	0
23	0	1	0	0	0	1	0	0	0
23	0	1	0	0	1	1	0	0	0
92	0	1	0	0	1	1	0	0	1

unlabeled data together. The number of clusters formed is represented by k. Each cluster has a center called as centroid. K-means assigns these data points to the nearest cluster. This algorithm works in iterative manner until all the data points are assigned to the nearest group. Shown as Algorithm 1.

K-nearest neighbors

K-nearest neighbor is one of the classification algorithm which classifies a new data point into a class which is most frequently among the k nearest neighbors. It uses the Euclidean distance approach to calculate the distance between the new data point and rest of the data points present. If the value of k=1, then the new data point is classified in to the nearest neighbor class. The value of K can be taken as an odd number as such we are able to calculate the majority in the case where only two groups are present. Shown as algorithm 2.

Artificial neural network

It is a computational based model. It contains the processing unit called neuron. It models the complex relationship between the input and output and generates patterns from the data. A neural network learns and predicts the output. The structure of the neural network is affected by the information that flows through it. There are three types of layers in the neural network.

Algorithm 1: K-Means Clustering

Input: D={d1,d2,d3,.....dn} (set of data points)
k (total number of clusters)
MaxIters (limits the number of iterations)
Output: V={v1,v2,v3,.....vk} (set of centroids of clusters)
L={l(d)| d=1,2,3,.....n}(set of cluster labels of D)

```
1  foreach vi ∈V do
2      vi←dj∈D (e.g. random selection)
3  end
4  foreach di∈D do
5      l(di) ←argminDistance(di, vj )j∈{1....k}
6  end

7  changed←false;
8  iter←0;
9  repeat
10     foreach vi∈V do
11         UpdateCluster(vi);
12     end
13     foreach di∈D do
14         minDistance←argminDistance(di,vj) j∈{1.....k};
15         if minDistance≠l(di ) then
16             l(di )←minDistance;
17             changed←true;
18         end
19     end
20     iter ++;
21  until changed=true and iter≤ MaxIters;
```

Algorithm 2: K- Nearest Neighbor

Input: Let k be the number of nearest neighbors and D be the set of training examples
1 **For each** class test example z=(x',y')do
2 Compute d(x',x),the distance between z and every example(x,y) ∈ D.
3 Select Dz⊆ D, the set of k closest training examples to z

$$y' = \underset{v}{\operatorname{argmax}} \sum_{(x_i, y_i) \in Dz} I(v = y_i)$$

Input Layer
The input layer accepts the input from the external environment and transfers it to the hidden layer.

Output Layer
This layer makes available the final output to the external world after some processing and computation is completed. Here, the counts of neurons present vary according to the type of task given to the neural network.

Hidden Layer
It is an intermediate layer hence; it transfers information from input to output layer. It contains activation functions through which it performs computations. It performs the function of feature extraction from the information available. The number hidden layer in a neural network depends upon the complexity of the problem.

Neural network elements
Neural network layers are made up of nodes. Computations take place in these nodes. A node function is to compute the input weight product and after summation pass it to the activation function.As shown in figure 1.

Figure 1. Neural network element

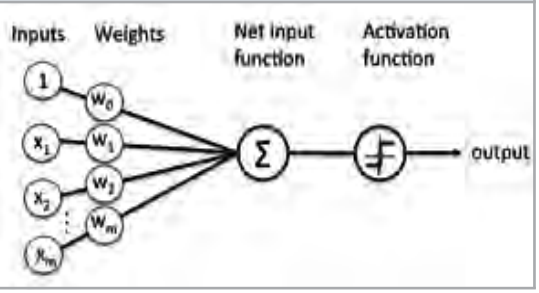
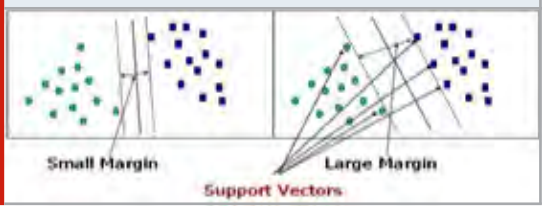


Figure 2. Support Vectors and Margin



Support Vector Machine

It is one of the classification algorithm which is used to predict the class to which a particular data point belongs. SVM is a supervised learning algorithm as it requires a training data to work upon. The decision boundary called hyperplane is used to classify the data points. The data points on the either side of the hyperplane are classified in different class. The number of features present in the data decides the dimension of the hyperplane. The aim of the SVM algorithm is to find a hyper plane in a N-dimensional space that has the maximum margin, means such hyper plane is chosen that has the maximum distance between the data points of different the classes. These data points which are close to the hyper plane are referred to as the support vectors. Hence, it can result in classification of the new data point accurately.In figure 2 the support vectors and Margin are shown. We need to maximize the margin between the support vectors and the hyper plane

Performing K-Means Clustering

As this call quality dataset contains geolocation features, these features individually have no meaning unless they are combined. The feature latitude alone can point to many places around the world and same applies for the feature longitude. So to make our work simple and improve the model performance, we have performed K-means clustering and grouped them by converting in to new feature called regions. Each region is represented via unique ID called region. We have added useful feature called as region and removed the latitude longitude column from our dataset. As we know that geo location represents a point in a region these points together makes a cluster. In a telecommunication organization the network is distributed through telecom towers which are separated over a distance in a region. Each tower has a number of connections which are present in that region the quality of the signal is determined by the active connections and data transfer and various few other parameters. To provide the excellent quality of the connections we must understand which region has problem and try to solve it. We are clustering the geo location points to separate them in k different regions, in case of any problem with the quality of the call made it will be associated to a particular region where the network availability is assured by the cellular tower present there We can now able to find which cellular tower has problem based upon the feedback from the user and other parameters present in the dataset. The red dot in the cluster represents the region centre and yellow green and blue colors are differentiating different clusters. For the proper distribution we have taken the value of k=200. Clustering shown in figure 3.

Figure 3. Clustering based on latitude and longitude feature

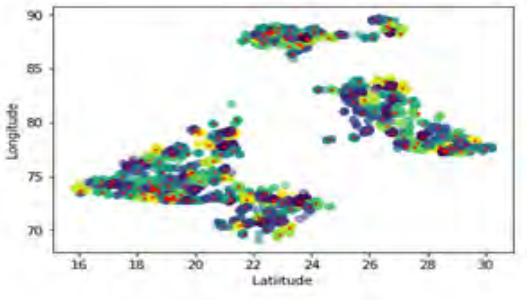


Figure 4. Showing the graph plotted between F-Score and K

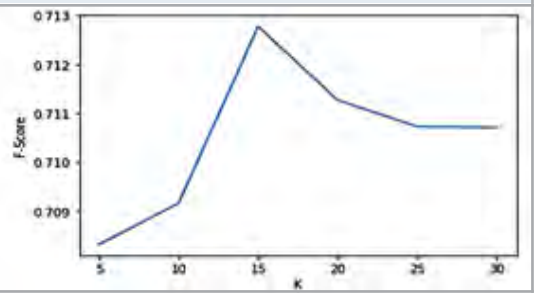


Table 4. Optimal set of parameters for different algorithms

Algorithms	Optimal set of Hyperparameter	Accuracy (%)
KNN	K=15	71.5
ANN	Epoch=80, Batch size=100, activation= tanh, optimizer= adam	71.4
SVM	C=10,Gamma=0.01, Kernel= rbf	61.0

Hyperparameter Tuning

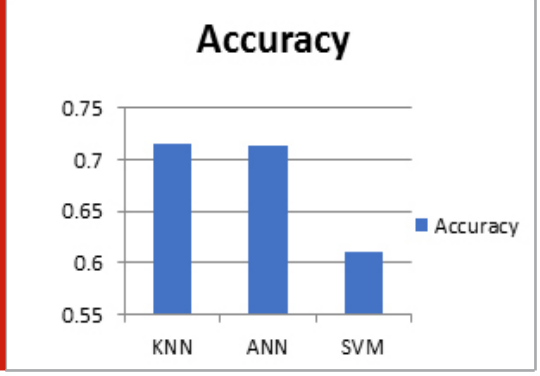
Hyperparameter are those parameters whose value is set before the model is trained. Hyperparameter tuning refers to the choosing the best set of values for a model's learning process.There are various method to perform the hyperparameter tuning:

1. Grid-search Approach: In this method of hyperparameter tuning, for each combination of parameter present in the grid layout the model will be build and evaluated.
2. Random Search: This approach randomly selects the different combinations of hyperparameter values to train the model.

K-Nearest Neighbors Hyperparameter Tuning

For a classification model it takes test data and output a accuracy metric. This metric compares the predicted value and the test data. The model giving the best accuracy is selected and the corresponding value of k is taken as the optimal value of hyperparameter k. Here, in the call quality dataset we have used different values of k ranging from k=5 to k=30.Where the model is tested for different values of k. The test data value and the predicted value are compared. As shown in figure 4. The accuracy is obtained for every value of k and the best accuracy is obtained at k=15 which is accuracy of 71.5%.The plot between F-score plotted in Y-axis and the value of K plotted in X-axis depicts that model has obtained highest score at k=15. For our data increasing the number of neighbors increases the score up to a certain point.

Figure 5. Comparison of different algorithms based on accuracy



Support Vector Machine Hyperparameter tuning

Support vector machine has various hyperparameters such as:

1. **Kernel:** The kernel does the work of transforming the observed value in to the feature space. The performance of the SVM algorithm depends on the choice of kernel and the hyperparameter associated with it.
2. **Regularization:** C is the regularization parameter in the SVM. C indicates misclassification or error term. The C parameter indicates how much error is bearable.
3. **Gamma:**It is a parameter for nonlinear hyperplanes. If the gamma value is higher it will exactly fit the training data and may lead to overfitting and the lower may underfit the data.

We have used the grid search approach for tuning the hyperparameters.We have imported the GridSearchCV from sklearn.grid for the same. In the GridSearchCV method we have passed the parameter grid, number of cross validations and the algorithm. And it returned the optimal set of parameters which results in the best performance of algorithm. Here parameter grid comprised of gamma=1e-3 and 1e-2, c=1 and 10, and kernel is rbf. Grid search method is applied and cross validated. After training the model the optimal set of parameters obtained are c=10, gamma=0.01 and kernel is rbf. Artificial Neural Network Hyperparameter Tuning. While training the Artificial neural Network we need to choose the metric to measure the performance and loss function upon which we are going to perform optimization, then we make choice on the hyperparameter carefully. The hyperparameter that needs to be tuned are:

1. Number of hidden Layers and units: - Increase in the number of hidden units may increase the accuracy of the model and smaller number may lead to underfitting.
2. Activation Function: - Activation functions

make the model to learn the non-linear prediction boundaries.

3. Batch Size: -It is the number of samples fed to the network after which parameter update occur.
4. Number of Epochs: - Number of epochs states the number of times the entire training data is fed to the model.
5. Optimization: There are many methods of optimization among them the simples is SGD i.e. Stochastic Gradient Descent. The optimizer tells how the weights are updated given the gradient.
6. Dropout Regularization: In the dropout technique the randomly selected neurons are dropped during the training. Results is neural network becomes less sensitive towards the weights of the neurons.

In the case of Artificial Neural Network we have performed hyperparameter tuning in the batch size, number of epochs and activation function. Firstly, We have taken number of epochs=1 and batch size=50. And after performing cross validation we have obtained the accuracy of 51.06% using baseline modeling. In the next, we have taken number of epochs=80 and batch size=100,activation function as tanh and optimizer as adam in the hidden layer and after performing cross validation we have obtained the accuracy of 71.5 % using baseline modeling.

RESULTS AND DISCUSSION

Evaluation of the model

Accuracy

In the case of the K-Nearest Neighbors model we have obtained the accuracy of 71.5%. For the Artificial Neural Network we have obtained the accuracy of 71.4%.And for Support Vector Machine we have obtained the accuracy of 61%. We can observe here that the KNN performance is quiet better than the other two. As shown in figure 5.

Confusion Matrix

It the metric used for finding the accuracy and correctness of the classification model where we have two or more classes. It tells how many predictions are correct and how many are predicted incorrect. Here, the table shows predictions made by the model in the x-axis and the accuracy outcome of the model in the y-axis. The cells of the table represent the number of predictions made by our machine learning model. Even though if the array is appeared without heading in rows and columns, we can observe here that majority of the predictions have fallen in the diagonal of the matrix, which shows all the correct predictions made by the model. Here, for multiclass classification problem our machine learning model is predicting the class form 1 to 5. And each prediction may have value from 1 to 5. Predictions for class 1 that is actually 1 appears in the cell for prediction value =1 and actual value =1, whereas predictions made for 1 that is actually 2 will appear in the cell for prediction=1 and actual value=2. Similarly, for each class of predictions made. As shown in figure 6.

Classification Report

The classification report shows the precision, recall, F1-score and support values of the classification model. As shown in figure 7.

1. **Precision:** It is the ratio of true positive to the sum of true positive and false positive. If precision value is high it can be related to low false positive rate. We obtained here the average Precision of .71 for K Nearest Neighbor, .71 for Artificial Neural Network and .61 for Support Vector Machine, which is quite good.

$$\text{Precision} = TP/(TP + FP) \quad (1)$$

2. **Recall (Senstivity):** Recall is the ratio of true positive values to the sum of true positive and false negative values. We obtained the average recall value of 0.71, 71 and .61 for KNN, ANN and SVM respectively which is good for these model as it is above 0.5.

$$\text{Recall} = TP/(TP+FN) \quad (2)$$

3. **F1 Score:** F1 score is equal to weighted averag e of precision and recall..The greater is the value of F1-score the higher is the performance of the model. We have obtained the F1 score of .71, .71 and .59 for KNN, ANN and SVM.

Figure 6. Comparison based on Confusion Matrix

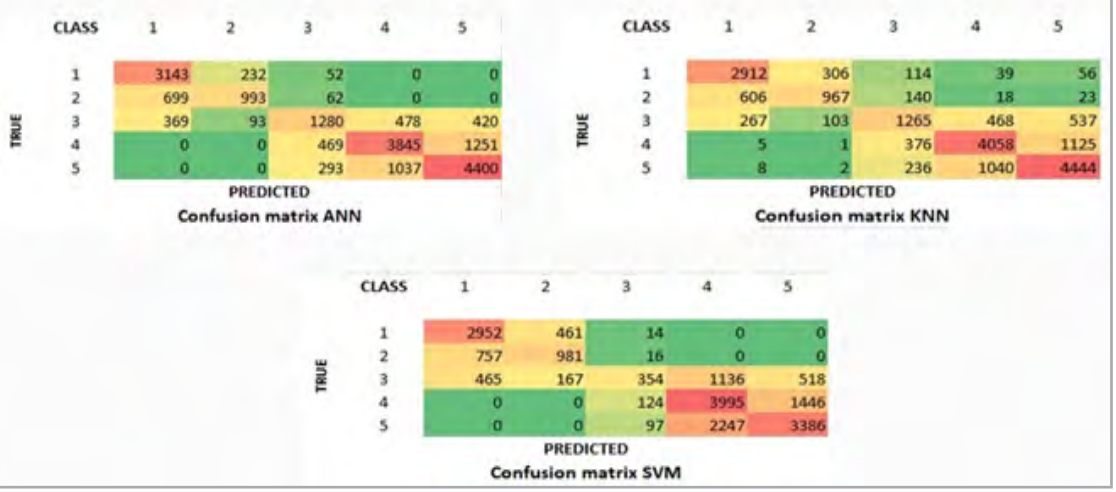


Figure 7. Comparison based on Classification Report

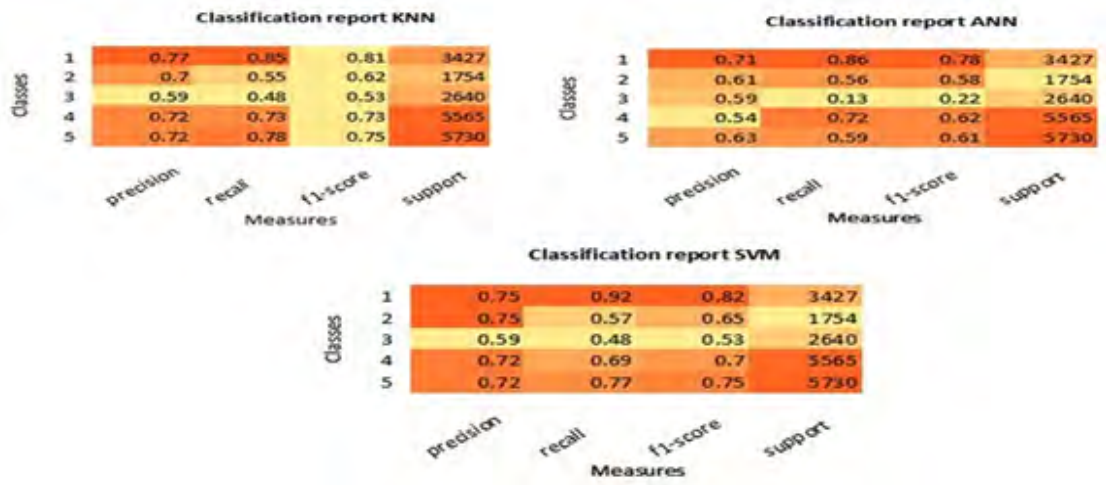


Figure 8. Plot for Network Types counts

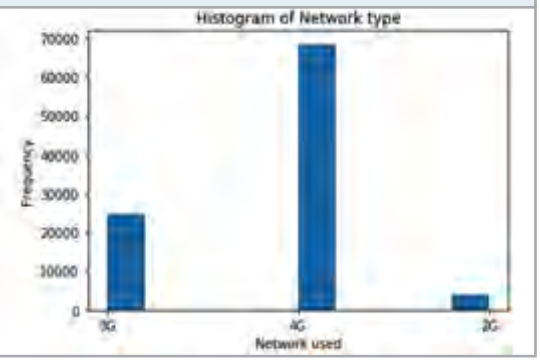
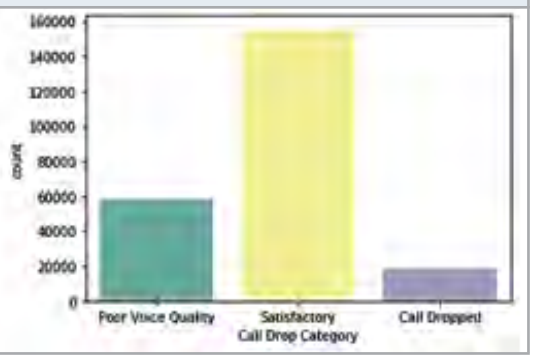


Figure 9. Plot for Call Drop Category counts



4. **Support:** It is the number of samples present in the class having true response. The support value for each class and the total support value is given here as 19116.

Figure 10. Plot for Network Operators count

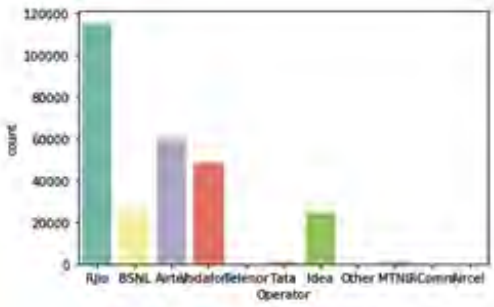
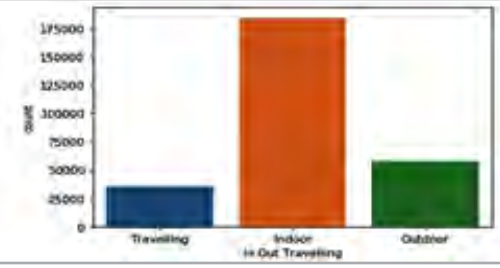


Figure 11. Plot for User's modes counts



From this work we conclude that based on geolocation and other call quality parameters we have obtained the call quality service of a particular region. We have predicted the class in which user is more likely to give rating based upon the quality of service being delivered .The new feature obtained called the region has given more information about which state which region the customer has experienced what quality of service whether he is satisfied by the performance. Also, we have performed tuning the hyperparameters of the machine learning algorithm as such model performance is improved. The KNN and ANN both algorithms have performed better than the SVM with an accuracy of 71.5% and 71.4% respectively. Using these techniques we will be able to improve call quality services in Indian from Rural to Urban Areas. Building of such a machine learning model will help us to identify those locations where network need to be improved. It provides Telecom

Figure 12. Plot for Rating counts

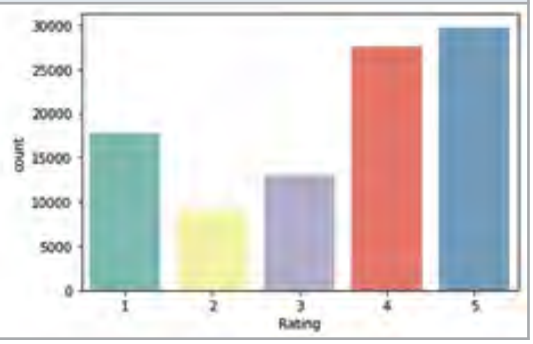
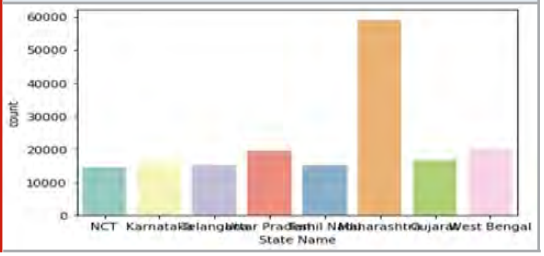


Figure 13. Plot for different State counts



Industry Insight of how and what Problem user are facing, so that new solutions can be developed for same. In Future based on these analyses and expected ratings we will be able to take appropriate actions such as deployment of a new node in the area, increasing the amplitude of antenna, switching of technology from 2G-3G-4G and soon to 5G, availing of new cellular plans etc. so as to improve the network availability of the call quality service.

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