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Dynamic Mode Brain Epileptic Seizure Detection in EEG Signals

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ABSTRACT

The objective of this paper is reliable detection of the epilepsy seizures. Epilepsy seizures are very hazardous diseases which affects million people across the world and makes them inactive to the world. The best quality automated system will really help the patients to lead their life in happy manner. Here we introduce the dynamic mode technique, as an epileptic seizure detector techniques. This mode helps in efficient detection of the seizure which enables modern medical technology need to be utilized in the right manner for the diagnosis. The proposed algorithm is checked with various types of data sets acquired from various sources and the algorithm found performing better than the other algorithms. Various parameters were considered like noise affected signals and DMD signals and it is found the proposed technique out perform the existing techniques available. The results shows improved ability in identification of epilepsy seizures in the field of medical sciences.

KEY WORDS: EPILEPTIC SEIZURES, DYNAMIC DECOMPOSITION, EEG

INTRODUCTION

Around couple of million people affected from the epileptic seizures in world. We can determine the function of brain by two types of methods first one is invasive and second is non-invasive (Sharma et al. 2017). This paper discuss about the non invasive scalp EEG. EEG is a important diagnosing test in detecting the epilepsy (Vijayprasath et al. 2012). This measure's electrical signals generated by the brain and by increasing the number of electrodes used, we can increase the percentage of detection of epilepsy (Dinesh et al. 2018b). But there will be disagreeing in recordings of these measurements between two physicians, when the test are manually

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conducted (Sukanesh et al. 2010b). So we are going for an automated solution so that all the physician will agree with the results obtain and it will be a great help for the patient in increasing their life cycle. Here we need to know some basic waves generated by the brain and those are recorded in EEG (Sukanesh et al. 2010a). The below figure will discuss those in detail and a diagram of basic EEG setup also given here.

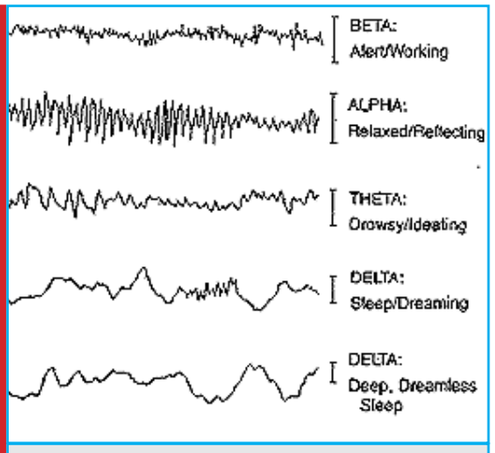

Figure 1. Brain waves.

In previous work (Sukanesh et al. 2013), there are various works are done in detecting the epileptic patient and treating. Here we are proposing a dynamic system will target on the scalp EEG, and helps the physician further in a better way to detect the seizures (Kavitha et al. 2017).

RELATED WORKS

We have various related work in determining the seizures of the brain (Davood et al. 2015). Some of the publication proposes the support vector machine by which the extraction of the electrical signal is partially automated (Ramesh et al. 2018a & b). In some of the methods proposed we have online training mechanism which helps in determining the seizures (Rajan et al. 2015b). Some other patient friendly technique proposes classification of brain areas using various built in optimization techniques (Rajan et al. 2015a). Some techniques were proposed in considering wavelet decomposition and time domain parameters (Rajan et al. 2013).

PROPOSED SYSTEM

Dynamic mode methodology in detecting seizures proposes the principle of finding low dimensional structure below the larger one. So the detected brain signals from

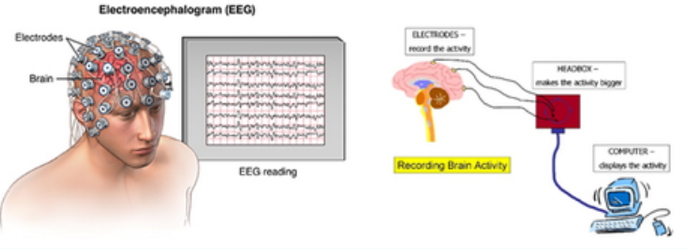

Figure 2. EEG setup.

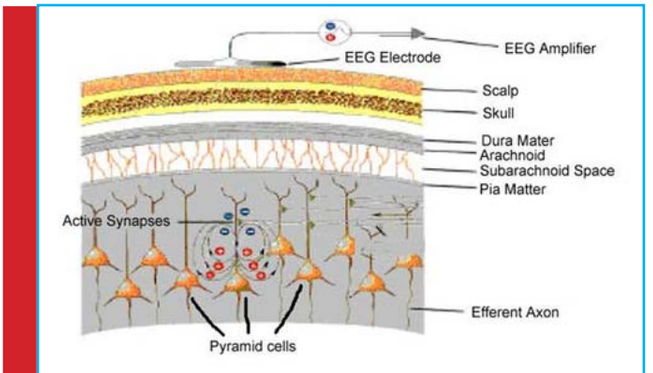

Figure 3. Layers of brain with electrodes

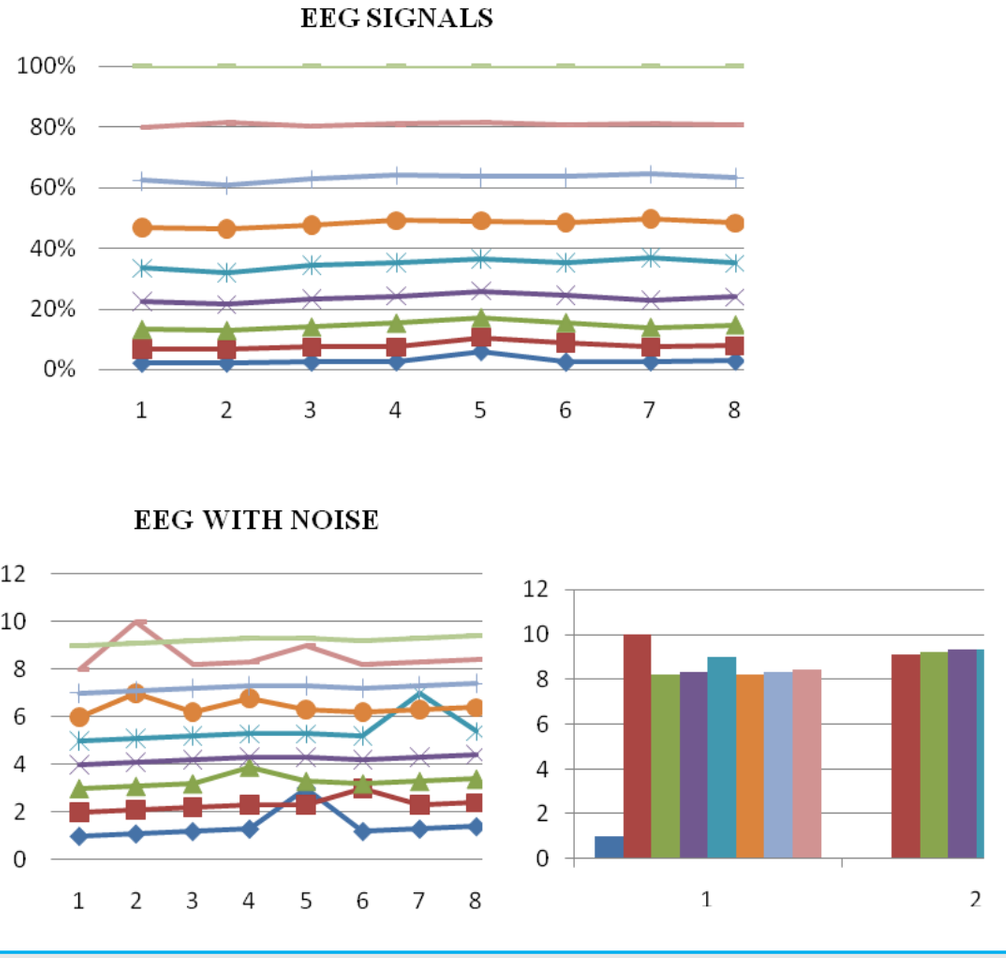

Figure 4. (a) EEG signals. (b) EEG signals with noise. (c) DMD mode powers of the waveform

the brain are vary much reliable through this technology. By using this technology we are able produce time resolved image and those images are mainly noise free. The technique not that much derivative, it is mainly detailing about the collection of the neural signals from the brain. This technology gives a snapshot in measuring the seizure which is effortless so that less consumption of time can be done. The signals from the brain are given below as fig. 4 and various analysis were done with that.

In this proposed methodology, follows the standard sequence of preprocessing, feature extraction, classifica-

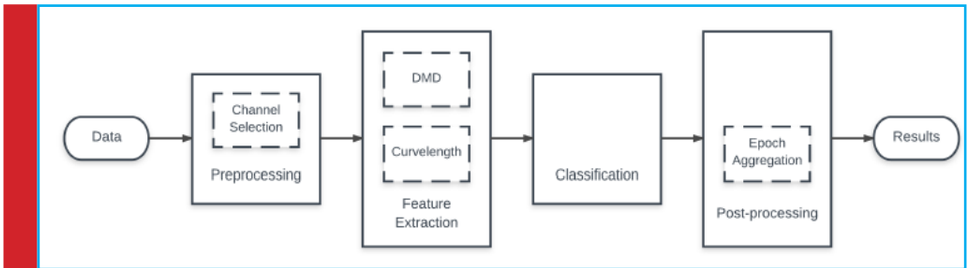

Figure 5. Block diagram of Detection model

tion, and post processing. Preprocessing does all subjects are in the exact recording conditions. And two data sets are taken for work. Feature extraction does the extraction the DMD modes power and lengths of the curves of the time-domain EEG signal. Mode power is calculated using the augmentation of the signals. The curve length give the amplitude of the EEG signals .here below we give the block diagram of the proposed system

POST-PROCESSING

The method is very important in concluding the seizure in the signals detected (Brunton, et al. 2016). To detect the data we need to take large of data samples from patients and also we need to compare the data received from the patients with the data's which we have as data sets (Rajan et al. 2014). The earlier reference data sets are received from the various medical institutions with permission of authority (Dinesh et al. 2018a). Which From this kind of post processing we are able to find the various seizures ranging from 10second to 100 seconds (Dinesh et al. 2015). we also have come filters to find the accurate output to the maximum level.

CONCLUSION

The paper discussed above gives a estimation of the epileptic seizure with the spatial and temporal characteristics picked up from the EEG signals. The Dynamic power modes and length of the curves are taken as the parameters in sensing the datas. We have utilized two sets of well known data sets .The investigation of the proposed algorithm indicated that Dynamic mode captures the EEG signals and is able to distinguish seizure and non-seizure portions of scalp EEG better than the previous methodologies.

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