ABSTRACT

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Electroencephalogram (EEG) test is used to identify brain disorders especially for epilepsy. Careful analysis of EEG provides valuable information about the functions of the brain. Providing quality treatment is very essential for the epileptic patients. Research in Computer-Aided Detection (CAD) system has been successfully carried out in recent years. Creating a supportive system for physicians will be helpful for efficient diagnosis. Focusing on automated epileptic seizure detection is necessary for the future development. Six different EEG signal analysis has been examined in this research. The objective of this research is to analyze and classify the EEG signals based on their frequency waveforms. Machine learning algorithms, particularly Artificial Neural Network (ANN) and Support Vector Machine (SVM) are applied efficiently to create an expert system which is called Automated Epileptic Seizure Detection.

The first analysis of this research: Observation is concentrated on the classification of normal and seizure EEG signals by using ANN classifier with back propagation algorithm. For training the system using EEG signals, the Gray Level Co-Occurrence Matrix (GLCM) features have been extracted to represent the enormous digitized EEG vectors from the signal. The extracted features as the
input are given to the classifier. The confusion matrix method is used to evaluate
the classifier's performance. The second analysis is carried out to compare the
performance of the classifiers. The third analysis is observed to check the
progress of the SVM classifier with different kernels through the segmentation of
EEG signals. These analyses are performed in spatial domain. The fourth analysis
of this research is principally focused on decomposing the signal into sub bands
based on the EEG signal frequency. Since the EEG signal is non stationary, it is
analyzed through Wavelet Transform (WT). Using EEG signals and its sub bands
various features are extracted such as GLCM, statistical and entropy features. The
performance of ANN and SVM classifier is compared to have suitable classifier
for the seizure detection. The fifth analysis is concentrated on entropy
measurements for EEG signals. The final analysis of this research focuses on the
automated epileptic seizure detection system using Genetic Algorithm (GA) to
select relevant features. The model has been tested and validated by means of real
time data. Finally the system achieves 90% in performance accuracy.