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DETECTION OF EPILEPTIC SEIZURE BASED ON EEG SIGNALS USING ENSEMBLE AND LSTM APPROACH

S.Abinaya[1], C.Sujatha[2]
Department of ECE, SSM Institute of Engineering and Technology, Dindigul, India.

Abstract
Epileptic seizures are a neurological disorder which consists of immoderate and activities recurring at particular period in the brain. Clinically, diagnosing by skilful clinicians according to EEG, which is time consumption even for doctors. Therefore, the paper proposes a detection program by the major phases for performance of epileptic seizure detection and follows signal preprocessing, feature extraction and classification. EEG signals are divided into certain time and frequency features are drawn out away from one and all epoch. On the layout to assess the proposed method in which experiments are carried on publicly obtainable EEG dataset (CHB-MIT). The proposed scheme benefit from the EEG signals for enhancement by PCA and extracted discriminative feature used to name the onsets of seizure. Ensemble classifiers are used to make additional accurate solutions than single model would. The LSTM model makes use of a broad field of features extracted preceded the classification, as well as time-frequency features. The experimental outcome shows that the task of the method is competitive also performs better than some other futuristic of seizure detection on standard EEG dataset.

Keywords*: Seizure detection, multi-domain feature, principle component analysis, Ensemble classifier, long-short term memory.*

1. Introduction

Epilepsy is known to be nervous disorder diseases. To identify epilepsy, most famous testing tool as EEG signal are used, because of its painless, non-intrusive tool for examining multiplex manners and for supervising separate physiological circumstances of the brain. EEG is referred to be graphical data for proceeding activities of the brain between different electrodes. In this aspect, signal enhancements like principal component analysis are used largely for decreasing the proportionality and signal are enhanced by the application such as common spatial patterns which are explored less in number on detection. There are small group of factors that exert influence on a behaviors which involved in the feature area and the availability of imbalanced labels as well as an efficient method are the main concept to design an accurate feature extraction technique as well as quality of feature set make a role on classification. LSTM networks entrenched on detection of seizure and its algorithms are enlarged by utilizing EEG datasets.
The contributions of the recommended methods are,
I. Feature extraction based on time as well as frequency domain features.
II. The output is classified by LSTM and Ensemble classifier.

2. Related work

Recently so many researchers aimed on feature extraction namely statistical, wavelet as well as fractal dimension for detection from EEG datasets and then be fused with various classifiers such as bi-spectral phase concurrence index (BSPCI) [1], artificial neural network [9], and Q-Tuned wavelet transform [3]. In EEG database, the benefits of the wavelet transform are outlined in [2] to decompose EEG signal into five frequency wavelets and to achieve overall sensitivity of 91.03%. To developed a patient-non-specific method [6] for seizure detection depending on Undecimated Wavelet Transform and also for the mean values of parameters. It established for similar accuracies in detection by making use of ELM classifier [4] with set up of nonlinear features namely entropy as well as Hurst exponent. Basing on the above mentioned observation, for EEG, the paper explored a latest feature extraction method that use multi- domain for extracting multiple channel EEG datasets and also combined with RF classifier [8]. EEG datasets are used to focus on varies algorithm for detection by an automated soft computing system. It evaluated the performance of three ensemble methods, namely, bagging [5], boosting [10], and random subspace ensembles [7].The paper is sorted in order as: in Section II explained about the methodology used which deals with signal preprocessing, feature