A Novel Approach Based on Eigen Vector Methods and Hybrid BOA-SVM optimization Techniques for the Classification of Epileptic Seizure

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Abstract

The most common neurological disease of the human brain is known as epilepsy. It affects the nervous system of brain which shows the impact on an individual life because of its repetitious occurrences of seizure. Seizure causes a mild or severe electrical activity variation in the brain which in turns distorts the cortical region of the brain and causes fatigue, unconsciousness, spasms in muscles etc. The most widely used diagnostic method for epilepsy is Electroencephalography (EEG) signals. A novel approach developed on the implementation of a hybrid model along with Eigen Vector Method (EVM) is presented for the classification of epileptic seizure. In this work, combination of eigen vector methods namely Pisarenko's method, MUSIC method, and Minimum-Norm methods are implemented to obtain the features. Then, the obtained features are optimized with Bat Optimization Algorithm combined with support vector machine. The classification accuracy of 99.42% is achieved which implies that the eigen vector method and hybrid optimization method provides high classification accuracies. The main aim of this research work is to use bat algorithm to implement a novel approach, called BOA-SVM, for tuning the SVM parameters to increase the performance metrics of the classification output.

Keywords- Eigen vector methods (EVM); Electroencephalogram (EEG) signals; Bat Optimization Algorithms (BOA); Support vector machine (SVM); Classification.