A KSOM based neural network model for classifying the epilepsy using adjustable analytic wavelet transform

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Abstract

Epilepsy is a nervous disorder occurring in the cerebral cortex location of the brain which is caused by irregular harmonization of neurons. Since the existence of this disorder is between the neurons, it is tedious to diagnose correctly. Research works of epilepsy mostly done on an Electroencephalogram (EEG) signals for analyzing the neuron activity of the brain during seizures. Analyzing the continuing EEG reports manually for a patient affected by epilepsy is time-consuming, and it needs a large storage volume. The proposed paper is based on a unique method for detecting epileptic seizures by Adjustable Analytic Wavelet Transform (AAWT). This work is also focused on testing the practicability of utilizing the Kohonen network maps for predicting the dynamics of the brain states in the form of the trajectory which may provide the occurrence of the seizure event. AAWT is applied on each EEG signal to decompose EEG signals into the sub-band signals. The fractal dimension is applied to these sub-bands signals as a discriminating feature due to its nonlinear chaotic trait. The received solutions are fed into Kohonen self-organizing network map (KSOM) to get a stable performance rate for the categorization of an epileptic seizure. The results proved that the introduced methodology achieved 98.72% sensitivity, 93.90% specificity, 93.03% selectivity, and 94.12% efficiency than the existing models and provided promising classification accuracy.

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