World Academy of Science, Engineering and Technology
International Journal of Biomedical and Biological Engineering
Vol:9, No:03, 2015

Electroencephalography (EEG) Analysis of Alcoholic and Control Subjects Using Multiscale Permutation Entropy

Authors : Lal Hussain, Wajid Aziz, Sajjad Ahmed Nadeem, Saeed Arif Shah, Abdul Majid

Abstract : Brain electrical activity as reflected in Electroencephalography (EEG) have been analyzed and diagnosed using various techniques. Among them, complexity measure, nonlinearity, disorder, and unpredictability play vital role due to the nonlinear interconnection between functional and anatomical subsystem emerged in brain in healthy state and during various diseases. There are many social and economical issues of alcoholic abuse as memory weakness, decision making, impairments, and concentrations etc. Alcoholism not only defect the brains but also associated with emotional, behavior, and cognitive impairments damaging the white and gray brain matters. A recently developed signal analysis method i.e. Multiscale Permutation Entropy (MPE) is proposed to estimate the complexity of long-range temporal correlation time series EEG of Alcoholic and Control subjects acquired from University of California Machine Learning repository and results are compared with MSE. Using MPE, coarsed grained series is first generated and the PE is computed for each coarsed grained time series against the electrodes O1, O2, C3, C4, F2, F3, F4, F7, F8, Fp1, Fp2, P3, P4, T7, and T8. The results computed against each electrode using MPE gives higher significant values as compared to MSE as well as mean rank differences accordingly. Likewise, ROC and Area under the ROC also gives higher separation against each electrode using MPE in comparison to MSE.

Keywords : electroencephalogram (EEG), multiscale permutation entropy (MPE), multiscale sample entropy (MSE), permutation entropy (PE), mann whitney test (MMT), receiver operator curve (ROC), complexity measure
Conference Title : ICBSE 2015 : International Conference on Biomedical Science and Engineering
Conference Location : London, United Kingdom
Conference Dates : March 14-15, 2015