

Automatic Computer-Aided Detection of Major Depressive Disorder (MDD) and Alcohol Use Disorder (AUD) using EEG Recording

^{1*}Muhammad Nur Aiman Haja Maidin, ²Norashikin Yahya
*Leader

¹muhammad_19001315@utp.edu.my, ²norashikin_yahya@utp.edu.my,

^{1,2}Department of Electrical and Electronics Engineering

²Centre for Intelligent Signal and Imaging Research

Universiti Teknologi PETRONAS, Malaysia

Major Depressive Disorder (MDD) and Alcohol Use Disorder (AUD) are two common neurological disorders which have been impacting a huge number of populations in the world. There are a lot of negative consequences faced by individuals who are suffering from these two diseases including physical health problems, family problems, occupational challenge and many more. The key factor in successful treatment of these diseases is the accurate diagnosis for early intervention and treatment. The conventional method used for individuals to be diagnosed with MDD or AUD is by meeting certain criteria and symptoms specified in the Diagnostic and Statistical Manual of Mental Disorders (DSM). However, there is a gap in this method as it is subjective in nature and might be misleading due to dishonesty or memory problems of the affected individuals. Therefore, this study proposed an assessment scheme for objective diagnosis of brain disorders which is more reliable and accurate. Hence, for that purpose, EEG recording of 30 healthy controls (HC), 30 MDD patients and 30 AUD patients were employed as the feature input for a machine learning model aimed at achieving a three-class classification. EC was estimated using partial directed coherence method which then utilised as the input to SVM classifier for the model training purpose. With 10-fold cross validation, the classification of MDD vs AUD vs HC adjacency matrix yielded an average accuracy of 87.7 ± 4.5 %. This research study provides a comprehensive overview on the background of the study, problem statement, objectives, algorithm development and evaluation of the software product. Moreover, discussion of future research directions, areas for improvement and target market analysis are also covered.

Keywords: Electroencephalogram (EEG), Neurological disorders, Effective Connectivity (EC), Automatic Computer-Aided Detection.