

## Major Depressive Disorder: Diagnosis based on Electroencephalogram Analysis

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**Abstract :** In this paper, a technique based on electroencephalogram (EEG) analysis is presented, aiming for diagnosing major depressive disorder (MDD) among a potential population of MDD patients and healthy controls. EEG is recognized as a clinical modality during applications such as seizure diagnosis, index for anesthesia, detection of brain death or stroke. However, its usability for psychiatric illnesses such as MDD is less studied. Therefore, in this study, for the sake of diagnosis, 2 groups of study participants were recruited, 1) MDD patients, 2) healthy people as controls. EEG data acquired from both groups were analyzed involving inter-hemispheric asymmetry and composite permutation entropy index (CPEI). To automate the process, derived quantities from EEG were utilized as inputs to classifier such as logistic regression (LR) and support vector machine (SVM). The learning of these classification models was tested with a test dataset. Their learning efficiency is provided as accuracy of classifying MDD patients from controls, their sensitivities and specificities were reported, accordingly (LR =81.7 % and SVM =81.5 %). Based on the results, it is concluded that the derived measures are indicators for diagnosing MDD from a potential population of normal controls. In addition, the results motivate further exploring other measures for the same purpose.

**Keywords :** major depressive disorder, diagnosis based on EEG, EEG derived features, CPEI, inter-hemispheric asymmetry

**Conference Title :** ICSRD 2020 : International Conference on Scientific Research and Development

**Conference Location :** Chicago, United States

**Conference Dates :** December 12-13, 2020