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Chapter

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A Study to Investigate Different EEG Reference Choices in Diagnosing Major Depressive Disorder

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Abstract

Choice of an electroencephalogram (EEG) reference is a critical issue during measurement of brain activity. An appropriate reference may improve efficiency during diagnosis of psychiatric conditions, e.g., major depressive disorder (MDD). In literature, various EEG references have been proposed, however, none of them is considered as gold-standard [_1_]. Therefore, this study aims to evaluate 3 EEG references including infinity reference (IR), average reference (AR) and link-ear (LE) reference based on EEG data acquired from 2 groups: the MDD patients and healthy subjects as controls. The experimental EEG data acquisition involved 2 physiological conditions: eyes closed (EC) and eyes open (EO). Originally, the data were recorded with LE reference and re-referenced to AR and IR. EEG features such as the inter-hemispheric coherences, inter-hemispheric asymmetries, and different frequency bands powers were computed. These EEG features were used as input data to train and test the logistic regression (LR) classifier and the linear kernel support vector machine (SVM). Finally, the results were presented as classification accuracies, sensitivities, and specificities while discriminating the MDD patients from a potential population of healthy controls. According to the results, AR has provided

the maximum classification efficiencies for coherence and power based features. The case of asymmetry, IR and LE performed better than AR. The study concluded that the reference selection should include factors such as underlying EEG data, computed features and type of assessment performed.

Keywords

EEG measurements Infinity reference Average reference Link-ear reference Major depressive disorder

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