

EEG preprocessing algorithm to measure DMN connectivity

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Motivation and Aim: Depression is a very dangerous psychophysiological disease. By now, many methods of depression diagnostics, based on brain activity (for example, evaluated by EEG), developed. There is the concept of default-mode network, clusters of neurons that are highly correlated by their activity when a subject is distracted or daydreaming. High DMN connectivity in active states can be interpreted as a marker of depression [1], so a DMN connectivity measuring algorithm should be developed.

Methods and Algorithms: To test the algorithm on a large set of data, EEG data from ICBrainDB [2] was used, 173 EEG recordings at rest and during an active task. To measure DMN activity, correlation analysis was performed. Total DMN activity depends on inner correlations of DMN regions.

Results: Algorithm was applied to EEG of healthy subjects. Because DMN is highly correlated in resting state and lower correlated in active state, binary classification models were trained to test DMN activity quantities for EEG samples between states. RandomForest and KNeighbours models have above 80 % precision.

Conclusion: Preprocessing algorithm should be used in further studies to test more experimental groups and conditions.

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References

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