

Comparison of Nonlinear Complexity Measures of EEG Rhythms in Cognitive Tasks of ASD and ADHD Patients

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Using the complexity measures of maximal Lyapunov exponent, approximate entropy and Higuchi fractal dimension [1], we extract EEG features from Autism Spectrum Disorder (ASD) and Attention Deficit Hyperactivity Disorder (ADHD) patients and healthy controls, during heavy load cognitive tasks (Aristotelian valid, invalid, paradox & illusions type of Syllogism)[2,3,4]. We assess the performance of these features in classifying correctly subjects in the three groups, via a variety of tools (Support Vector Machines (SVM), Receiver Operating Curve (ROC) and confusion matrix). The results indicate that the approximate entropy is the most efficient tool in distinguishing more accurately the participants suffering from ASD and ADHD disorders from the Healthy controls. The results of this work also support a widely held view that complexity measures of ‘entropy origin’ are extremely useful diagnostic tools in general, compared with extracted EEG features via other linear or nonlinear complexity measures.

References

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