

Fuzzy Synchronization Likelihood-wavelet methodology for diagnosis of autism spectrum disorder.

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This paper presents a methodology for investigation of functional connectivity in patients with autism spectrum disorder (ASD) using Fuzzy Synchronization Likelihood (Fuzzy SL). Fuzzy SLs between and within brain regions are calculated in all EEG sub-bands produced by the wavelet decomposition as well as in the full-band EEG. Then, discriminative Fuzzy SLs between and within different regions and different EEG sub-bands or full-band EEG for distinguishing autistic children from healthy control children are determined based on Analysis of Variation (ANOVA). Finally, the selected features are used as input to an Enhanced Probabilistic Neural Network classifier to make an accurate diagnosis of ASD based on the detected differences in the regional functional connectivity of autistic and healthy EEGs. The methodology is validated using EEG data obtained from 9 autistic and 9 healthy children. The ANOVA test showed high ability of the regional Fuzzy SLs in low frequency bands, delta and theta, as well as alpha band for discriminating the two groups. A high classification accuracy of 95.5% was achieved for distinguishing autistic EEGs from healthy EEGs. It is concluded that the methodology presented in this paper can be used as an effective tool for diagnosis of the autism. Further, the regional Fuzzy SLs discovered in this research can be used as reliable markers in neurofeedback treatments to improve neuronal plasticity and connectivity in autistic patients.

J Neurosci Methods. 2012 Nov 15;211(2):203-9. doi: 10.1016/j.jneumeth.2012.08.020. Epub 2012 Aug 28. Ahmadlou M, Adeli H, Adeli A. Dynamic Brain Research Office, 30 Khoddami, Tehran, Iran.

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