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Nonlinear Time Series Analysis of Electroencephalogram Tracings of Children with Autism

得獎獎項

Mathematics Second Award

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Abstract

Methods of nonlinear time series analysis were compiled for use in the analysis of Electroencephalogram (EEG) tracings of children aged three to seven with varying degrees of autism in order to provide a quantitative means of diagnosing autism and determining its severity in a child. After determining the EEG leads to be used for analysis, the identified methods were coded and saved as functions on Scilab. To test the compiled program, a minimum of five EEG readings per cluster of children diagnosed with mild, moderate, severe and no autism will be obtained. The project was able to identify the mean, standard deviation, skewness, kurtosis and other higher order moments, the autocorrelation function, and the Fourier Series as the time-resolved statistical methods to be used for time series analysis. The nonlinear analysis methods identified include the use of the correlation integral, time-delay embedding and the Lorenz equations. One-way ANOVA testing will then be used on the numerical data obtained from the analysis to determine if a significant numerical differentiation has been obtained between the different clusters of EEG. This will provide a definitive way to medically diagnose autism, pinpointing children afflicted with the disorder and giving them proper treatment.

Two copies of the "Abstract of Exhibit" (in English) should be sent to the National Taiwan Science Education Center or email to fung@mail.ntsec.gov.tw or yuonne@mail.ntsec.gov.tw before December 31, 2009.