Abstract

The present doctorate thesis discourses the development of appropriate methodology for time series analysis and classification. The proposed methodology is applied to Event Related Potentials (measurements of electric potential, at various cranium points, through time), but can be generalized in order to aid in the study of any time series.

Initially the ERPs' recording process is described, followed by three types of analysis measures: statistical (t-test, discriminant analysis, kolmogorov-smirnov test), dynamic (Approximate Entropy – ApEn) and Artificial Neural Networks (namely Time Delay NN).

The successful time series classification (a Pattern Recognition problem) will pave way for the accurate identification of a subject's mental status, based on its ERP. The proposed methodology's ultimate goal is the creation of a potent diagnostic tool, complementary to the psycho-physiological trials which are applied to mentally ill subjects. The process can also evolve into a tool for evaluating the existing therapeutical procedures.

KeyWords

Statistics, Time Series, Event Related Potential, ERP, APEN, Artificial Neural Networks, ANN, Time Delay, Pattern Recognition.