Title:

Detection and classification in biomedical signals : Modeling by wavelet and graph theory. Applications in Neurology and Uterine Electromyography.

Outline and motivation:

Simultaneous detection and isolation of events in a noisy non-stationary signal is a major problem in medical signal processing. Classification needs modeling and characterization. For that, parameters form non stationary medical signals depend on the choice of the signal modelling. The Wavelets Transform (WT) allows representing signals with reference to frequency components. It is used by many authors for detection and characterization of medical signals: ECG, EEG. We used the multiscale representation of signals when a priori information about time-band width and frequency bandwidth exists.

Two kind of biomedical signals are used by our team: the Electromyogram Signal (EMG) and Electroencephalogram Signal (EEG). EMG signal is used to acquire the uterine EHG signal and the aim is to detect the preterm birth deliveries. Electroencephalography signals (EEG) are used to detect epilepsy, Alzheimer disease and depression. It is used also to study the connectivity between cells in the brain. Connectivity based analysis combined with graph theory is used. For that, multichannel data processing is achieved using graph analysis. Parameters are used from graphs and a method of parameters selection is applied before classification.

Keywords:

Parameters extraction from physiological signals, Multichannel data processing using graph theory, Classification using Non parametric algorithms and Neural Networks, Neurology and EEG signals, Electromyography signals.