Department of Mathematics, Statistics and Computer Science
St. Francis Xavier University
Presents

Studies on Intelligent Information Processing based on Electroencephalograph

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It is of increasing interest in neuroscience research and clinical applications to localize electric sources within the brain from the scalp electroencephalograph (EEG). It is further motivated by the report of scalp EEG observations of electrical activity from deep cortical structures. How to localize and characterize current sources in the brain has, thus, become the motivation of many efforts to elucidate the neural activity from the scalp potential or magnetic field over the past decades

The ill-posed nature of the inverse EEG problem is due to the lack of a unique solution such that different configurations of neural sources within the brain may generate identical electrical fields over the scalp. An often used sourced model is the equivalent current dipole, parameterized by their location and moment. The inverse problem is then defined as estimation of the location and moment parameters of one or more dipoles whose modeled potentials best fit the actual measurements in a least-squares sense. The first part of the talk will present some proposed methods to tackle the above-mentioned research problem.

In the second part of the talk, the evoked related potentials (ERPs) analysis, which has become very useful for neuropsychological studies and clinical procedures, will be addressed. Instead of the traditional way to visualize ERPs by taking an average over time locked single-trial measurements, the latest advance can permit the dynamic assessment of changes in cognitive state and the estimation of single potentials, which is called single-trial extraction. Several techniques have been proposed to improve the visualization of ERPs from the background electroencephalogram (EEG) with various successes.

Refreshments will be served before the talk in AX24A