ELECTRICAL & COMPUTER ENGINEERING SEMINAR

"Tracking Variability and Dynamics in MEG/EEG"

by

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B101 Engineering Bldg.

Abstract

The conventional approach for processing electric or magnetic evoked brain response data involves averaging of repeated responses to increase the signal to noise ratio of the response of interest. It is recognized however, that evoked responses can vary significantly in amplitude, time course, and spatial distribution. Such variability may encode changes in subject performance or state associated with changes in expectation, arousal, attention, or learning. Hence, conventional averaging methods are not well suited to the study of brain dynamics.

In this talk we present a spatio-temporal linear dynamic system framework for representing evoked brain responses. We use this framework to model variability in evoked response amplitude. The unknown parameters in the model – the spatio-temporal signal pattern, dynamic system model parameters, and background noise covariance matrix – are estimated from the data using an expectation-maximization algorithm. Simulated data is used to evaluate the mean squared error and tracking performance relative to other approaches as a function of signal to noise ratio. A transcranial magnetic stimulation EEG dataset is employed to illustrate the potential of this approach for identifying state-dependent differences in response variability. Extension of this linear dynamic system framework to characterization of brain networks is also proposed.

Please contact Prof. Edwin Chong, echong@engr.colostate.edu, with any questions.