Speaker: Mark Fiecas (University of Minnesota)

Date: 07/11/2023 at 13:15 in 1 West 2.03

Title: Hidden (Semi-)Markov Models for Dynamic Connectivity Analysis in Resting-State fMRI

Abstract:
Motivated by a study on adolescent mental health, we conduct a dynamic connectivity analysis using resting-state functional magnetic resonance imaging (fMRI) data. A dynamic connectivity analysis investigates how the interactions between different regions of the brain, represented by the different dimensions of a multivariate time series, change over time. Hidden Markov models (HMMs) and hidden semi-Markov models (HSMMs) are common analytic approaches for conducting dynamic connectivity analyses. In this seminar, we will give an overview of HMMs and their utility of dynamic connectivity analysis, and describe how we can use an HMM to approximate an HSMM. The approximate HSMM model allows one to explicitly model dwell-time distributions that are available to HSMMs, while maintaining the theoretical and methodological advances that are available to HMMs. We use these models to conduct a dynamic connectivity analysis on fMRI data obtained from female adolescents, where we show how dwell-time distributions vary across the severity of non-suicidal self-injury (NSSI).