Title:
Flexible Clustering of Longitudinal Trajectories with Applications in Psychology

Abstract:
This talk presents a Bayesian approach to clustering longitudinal trajectories into latent classes. In psychology, the implicit theory of abilities (ITA) proposes that individuals are classified as one of two groups: entity theorists who believe ability is innate and incremental theorists who believe ability is an acquired set of skills. Entity theorists are more likely to interpret failure as evidence of a lack of ability and doubt their future capacity to learn the task. Incremental theorists are more likely to interpret failures as part of a learning strategy, potentially leading to recovery over time. The hypothesis in psychology is that learning performances of entity theorists are more prone to downward “spirals” than incremental theorists. To assess this claim we formulate two models. The first model assumes individual performance trajectories are generated from a mixture of potentially two random effects models with nonparametric mean functions, generated from integrated Wiener process priors. The second assumes the regression coefficients of the random effects model are generated from a time-varying mixture of an unknown but finite number of processes. Both approaches model the clustering probability of an individual trajectory as a function of an individual’s ITA classification. Such an approach is referred to as a mixtures-of-experts model. The statistical methods illustrate how the Bayesian paradigm, together with Markov chain Monte Carlo algorithms, afford flexibility to tailor models to address specific research questions in applications and in turn motivate more general statistical procedures.