Indiana University-Purdue University Indianapolis

Department of Mathematical Sciences

STATISTICS SEMINAR

12:15pm—1:15pm, Tuesday, October 31, 2023
Zoom Meeting: Meeting ID: 845 0989 4694

Speaker: Abolfazl Safikhani
Department of Statistics, George Mason University

Title: Estimation and inference for change points in high-dimensional non-stationary time series models

Abstract:

Assuming stationarity is unrealistic in many time series applications. A more realistic alternative is to assume piece-wise stationarity, where the model is allowed to change at certain time points which are called change (break) points. In the first part of the talk, we propose a unified framework for change point detection which is suitable for a large class of models including mean shift models, high-dimensional linear regression models, vector auto-regressive models (VARs), and Gaussian graphical models. Moreover, the proposed algorithm automatically achieves consistent model parameter estimates during the change point detection process, without the need for refitting the model. The strong guarantees are proved on both the number of estimated change points and the rate of convergence of their locations. In the second part of the talk, we study a refitted least squares estimator for change point parameters in high-dimensional time series models, focusing on VARs with sparse transition matrices. We show that the newly defined estimator reaches optimal rate of convergence. Further, the limiting distribution of the proposed estimate is obtained, thereby allowing the construction of confidence intervals for change point locations. Both proposed methodologies are tested empirically over different synthetic data sets while an application to analyzing an EEG data set is also provided.

Bio:
Dr. Abolfazl Safikhani is currently an assistant professor in the department of statistics at George Mason University. Prior to this position, he was a term assistant professor in the department of statistics at Columbia University and an assistant professor at University of Florida. He received his PhD from the department of statistics and probability,

Michigan State University. His main research interests include network modeling, high-dimensional statistics, spatio-temporal models, statistical machine learning, and applications in neuroscience, urban planning, and smart cities.