ACMS Statistics Seminar

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3:30 PM – 4:30 PM
Zoom

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

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.