Colloquium

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Covariance and Precision Matrix Estimation for High-Dimensional Time Series

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10:20 a.m. - 11:10 a.m.
Refreshments 10:00am
C405 Wells Hall

Abstract: Covariance matrix and its inverse (a.k.a. precision matrix) play a central role in a broad range of problems in statistics and machine learning. In the past few years, there has been an explosion of interest in regularized covariance and precision matrix estimation for high-dimensional i.i.d. random vectors with sub-Gaussian tails.

In this talk, we shall discuss the estimation of covariance and precision matrices for stationary and locally stationary high-dimensional time series. In the latter case, the covariance matrices evolve smoothly in time and thus form a covariance matrix function. Under the framework of Wu (2005)'s functional dependence measure, we obtain the rate of convergence for the thresholded covariance matrix estimate and illustrate how the dependence affects the rate of convergence. Asymptotic properties are also obtained for the precision matrix estimate based on the graphical Lasso principle. Our theory substantially generalizes earlier ones by allowing dependence, by allowing non-stationarity and by relaxing the associated moment conditions. Our new results have implications on a number of classical problems, including spatial-temporal statistics and graphical models, among many others.