Department of Statistics

DISSERTATION PRESENTATION AND DEFENSE

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Two Problems in High-Dimensional Inference: L^2 Test by Resampling and Graph Estimation of Non-Stationary Time Series

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ABSTRACT

We consider two problems in high-dimensional inference. We first establish an invariance principle for quadratic forms of sample mean vectors under Lyapunov-type conditions that involve a delicate interplay between the dimension *p*, the sample size *n* and the moment condition. Under proper normalization, central and non-central limit theorems are obtained. The latter invariance principle is applied to test for mean vectors of high-dimensional data. To obtain cutoff values of our tests, we introduce a plug-in Gaussian multiplier calibration method and normalized consistency, a new matrix convergence criterion. We also propose a sub-sampling and a half-sampling procedure to approximate the distributions of the quadratic forms that does not need estimation of the underlying covariance matrices.

The second part deals with the estimation of time-varying networks for high-dimensional time series. Two types of non-stationarity are investigated: structural breaks and smooth changes. Our approach can achieve consistent detection of the change points and simultaneous estimation of the piece-wisely smooth-varying networks. Rates of convergence for estimating change point and networks are obtained under mild moment and dependence condition.

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