

浙江大学概率统计学术报告

报告人: Dr. Xinghua Zheng

Hong Kong University of Science and Technology

题目: Testing High-dimensional Covariance Matrices under the Elliptical Distribution and Beyond

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摘要: We study testing high-dimensional covariance matrices when data exhibit heteroskedasticity. The observations are modeled as $Y_i = \omega_i Z_i$, where Z_i 's are i.i.d. p -dimensional random vectors with mean 0 and covariance Sigma, and ω_i 's are random scalars reflecting heteroskedasticity. The model is an extension of the elliptical distribution, and accommodates several stylized facts of real data including heteroskedasticity, heavy-tailedness, asymmetry, etc. We aim to test $H_0 : \Sigma \propto \Sigma_0$, in the high-dimensional setting where both the dimension p and the sample size n grow to infinity proportionally. We remove the heteroskedasticity by self-normalizing the observations, and establish a CLT for the *linear spectral statistic* (LSS) of $\tilde{S}_n := \frac{p}{n} \sum_{i=1}^n Y_i Y_i^T / |Y_i|^2 = \frac{p}{n} \sum_{i=1}^n Z_i Z_i^T / |Z_i|^2$. The CLT is different from the existing ones for the LSS of the usual sample covariance matrix $S_n := \frac{1}{n} \sum_{i=1}^n Z_i Z_i^T$ ((Bai and Silverstein(2004), Najim and Yao (2016))). Our tests based on the new CLT neither assume a specific parametric distribution nor involve the fourth moment of Z_i . Numerical studies show that our tests work well even when Z_i 's are heavy-tailed.

欢迎大家参加

联系人: 苏中根, suzhonggen@zju.edu.cn, 87953676