Mathematics and CS Seminar

Estimation of a spectral projector

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Let X_1, ... ,X_n be i.i.d. sample in R^p with zero mean and covariance matrix S. The problem of recovering the projector onto the eigenspace of S from these observations naturally arises in many applications. Recent technique from [Koltchinskii and Lounici, 2015] helps to study the asymptotic distribution of the distance in the Frobenius norm between the true projector P_r on the subspace of the r-th eigenvalue and its empirical counterpart \hat{P}_r in terms of the effective trace of S. This paper offers a bootstrap procedure for building sharp confidence sets for the true projector P_r from the given data. This procedure does not rely on the asymptotic distribution of || P_r - \hat{P}_r ||_2 and its moments, it applies for small or moderate sample size n and large dimension p. The main result states the validity of the proposed procedure for finite samples with an explicit error bound on the error of bootstrap approximation. This bound involves some new sharp results on Gaussian comparison and Gaussian anti-concentration in high dimension. These are the joint results with V. Spokoiny and V. Ulyanov.

Thursday, March 30, 2017 04:45pm - 06:00pm

Seminar room Big Ground floor / Office Bldg West (I21.EG.101)