



The Chinese University of Hong Kong
Department of Statistics

Seminar

Bayesian Estimation of Sparse Spiked Covariance
Matrices in High Dimensions

By

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Abstract

We propose a Bayesian methodology for estimating spiked covariance matrices with jointly sparse structure in high dimensions. The spiked covariance matrix is reparametrized in terms of the latent factor model, where the loading matrix is equipped with a novel matrix spike-and-slab LASSO prior, which is a continuous shrinkage prior for modeling jointly sparse matrices. We establish the rate-optimal posterior contraction for the covariance matrix with respect to the operator norm as well as that for the principal subspace with respect to the projection operator norm loss. We also study the posterior contraction rate of the principal subspace with respect to the two-to-infinity norm loss, a novel loss function measuring the distance between subspaces that is able to capture element-wise eigenvector perturbations. We show that the posterior contraction rate with respect to the two-to-infinity norm loss is tighter than that with respect to the routinely used projection operator norm loss under certain low-rank and bounded coherence conditions. In addition, a point estimator for the principal subspace is proposed with the rate-optimal risk bound with respect to the projection operator norm loss. These results are based on a collection of concentration and large deviation inequalities for the matrix spike-and-slab LASSO prior. The numerical performance of the proposed methodology is assessed through synthetic examples and the analysis of a real-world face data example.

Date: March 19, 2019 (Tuesday)
Time: 2:30 p.m. - 3:30 p.m.
Venue: Science Centre L2
The Chinese University of Hong Kong

ALL INTERESTED ARE WELCOME !!