



THE HONG KONG UNIVERSITY OF SCIENCE & TECHNOLOGY

Department of Mathematics

PHD STUDENT SEMINAR

Optimal Estimation and Computational Limit of Low-rank Gaussian Mixtures

By

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Abstract

We propose a low-rank Gaussian mixture model (LrMM) assuming each matrix-valued observation has a planted low-rank structure. Minimax lower bounds for estimating the underlying low-rank matrix are established allowing a whole range of sample sizes and signal strength. Under a minimal condition on signal strength, referred to as the information-theoretical limit or statistical limit, we prove the minimax optimality of a maximum likelihood estimator which, in general, is computationally infeasible. If the signal is stronger than a certain threshold, called the computational limit, we design a computationally fast estimator based on spectral aggregation and demonstrate its minimax optimality. Moreover, when the signal strength is smaller than the computational limit, we provide evidences based on the low-degree likelihood ratio framework to claim that no polynomial-time algorithm can consistently recover the underlying low-rank matrix. Our results reveal multiple phase transitions in the minimax error rates and the statistical-to-computational gap.

Date : 25 April 2022 (Monday)

Time : 10:30am 9:30am *

Zoom Meeting : <https://hkust.zoom.us/j/97582756639> (Passcode: hkust)

All are Welcome!