



THE HONG KONG UNIVERSITY OF SCIENCE & TECHNOLOGY

Department of Mathematics

PhD Student Seminar

Truncated Power Method for Sparse PCA

By

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Abstract

In this talk, we study the single-spiked covariance model in the sparse Principal Component Analysis (sparse PCA) problem, which aims to recover a sparse vector from noisy samples. It was well known that in a large dimension p , a k -sparse signal can be recovered using only $\Omega(k \log p)$ samples. However, all known efficient (polynomial time) algorithms require $\Omega(k^2 \log p)$ samples. We present a truncated power iteration algorithm with a carefully designed initialization method to tackle the sparse PCA problem. We prove that $\Omega(k\bar{k} \log p)$ samples are sufficient for recovering the unknown signal, with \bar{k} representing the stable sparsity of the signal. When the underlying signal contains only very few significant components, the sample complexity of the proposed algorithm is $\Omega(k \log p)$ and optimal.

Date : 2 May 2023 (Tuesday)

Time : 5:00pm

Venue : Room 5501 (Lifts 25/26)

All are Welcome!