THE UNIVERSITY OF CHICAGO | THE COMMITTEE ON COMPUTATIONAL AND APPLIED MATHEMATICS

Computational and Applied Mathematics Colloquium

Joint colloquium with the Department of Statistics

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Asymmetry Helps: Non-Backtracking Spectral Methods for Sparse Matrices and Tensors

TUESDAY, January 16, 2024, at 4:00PM
Jones 303, 5747 S. Ellis Ave. Chicago, IL 60637

ABSTRACT

The non-backtracking operator, an asymmetric matrix constructed from an undirected graph, connects to various aspects of graph theory, including random walks, graph zeta functions, and expander graphs. It has emerged as a powerful tool for analyzing sparse random graphs, leading to significant advancements with established results for sparse random matrices using this operator. Additionally, algorithms employing the non-backtracking operator have achieved optimal sample complexity in many low-rank estimation problems. In my talk, I will present my recent work utilizing the non-backtracking operator, demonstrating how theoretical elegance drives the design of innovative algorithms through the introduction of asymmetry into data matrices. The discussion will include estimates of the extreme singular values of sparse random matrices and explore data science applications such as hypergraph community detection and tensor completion.

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