



Department of
Statistics and Data Science
THE CHINESE UNIVERSITY OF HONG KONG

SEMINAR

DEPARTMENT OF STATISTICS AND DATA SCIENCE
THE CHINESE UNIVERSITY OF HONG KONG

Learning mixture models with latent graphical dependence

INVITED SPEAKER

Seunghyun Lee
Ph.D. Candidate
Department of Statistics
Columbia University

TIME

April 1st, 2026 (Wednesday) · 4:30pm – 5:30pm

VENUE

SC L2 · CUHK

ABSTRACT

Mixture models are effective tools for modeling data generated from multiple unobserved sources, and have been popular in the social and behavioral sciences as well as modern machine learning. This talk explores the estimation of two complex mixture models that both involve a latent graphical structure. In the first part, I consider Gaussian mixture models where labels exhibit network dependence, such as an Ising model. I illustrate the surprising rate-optimality of a naive estimator based on a misspecified likelihood, and propose a refined estimator that utilizes the dependence structure for superior performance. The second part considers another mixture model with a deep latent structure formulated as a directed graphical model. I discuss the identifiability of this model, which is a critical challenge in unsupervised learning. I also propose a computationally tractable method and provide illustrations in image representation learning and topic modeling. Finally, I conclude with broader implications of my work and other research directions, including applications in psychometrics and high-dimensional theoretical analysis of (empirical) Bayes procedures.