The Hong Kong University of Science and Technology

# Seminar on Business Data Science

**Department of ISOM** 

## **Estimation and Inference for Differential Networks**

By

### Professor Mladen KOLAR University of Southern California Marshall School of Business

## Date: 28 April 2025 (Monday) Time: 11:00am – 12:00nn Venue: Room 4047 (LSK Business Building)

#### Abstract

Understanding how networks of interactions change across conditions is a fundamental problem in many scientific domains, including neuroscience, finance, and genomics. In this talk, I will present recent advances in differential network inference for high-dimensional data. I will first describe methodology for directly estimating the difference between two Gaussian graphical models, avoiding the need to estimate each graph separately. The approach relies on a debiasing procedure that enables valid inference and confidence interval construction under weak assumptions. I will then extend these ideas to settings involving latent variable models, where the differential network decomposes into sparse and low-rank components. A nonconvex optimization procedure is proposed, and we establish linear convergence with optimal error guarantees. Finally, I will discuss a broader class of models, including elliptical copula and functional graphical models, that allow for non-Gaussian and infinite-dimensional data.

#### Bio

Mladen Kolar is a professor in the Department of Data Sciences and Operations at the USC Marshall School of Business. Mladen earned his PhD in Machine Learning from Carnegie Mellon University in 2013. His research focuses on high-dimensional statistical methods, probabilistic graphical models, and scalable optimization methods, driven by the need to uncover interesting and scientifically meaningful structures from observational data. Mladen was selected as a recipient of the 2024 Junior Leo Breiman Award for his outstanding contributions to these areas. He currently serves as an associate editor for the Journal of Machine Learning Research, the Annals of Statistics, the Journal of Computational and Graphical Statistics, and the New England Journal of Statistics in Data Science.

All interested are welcome!

For details, please contact ISOM Department.