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THE HONG KONG UNIVERSITY OF SCIENCE & TECHNOLOGY

Department of Mathematics

PHD STUDENT SEMINAR

Debiased Causal Inference for Latent Treatment Effects in Observational Studies

By

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Abstract

Evaluating the causal effects of a latent treatment embedded in complex interventions is challenging. When the treatment is not directly observed but must be inferred from the intervention, the analysis typically involves two interconnected components: a latent-treatment model and an outcome model. In observational studies, a two-stage framework that first estimates the latent treatment and then conducts causal inference using the estimated treatment is practically appealing, but it can bias downstream causal inference because of misclassification of the latent treatment. This talk focuses on a binary latent treatment and investigates how unbiased and efficient causal inference can be conducted for latent treatments in observational studies. We propose a novel debiased estimator that explicitly corrects for misclassification by modeling the embedding of latent treatment in interventions through a sub-Gaussian mixture model. The proposed method can lead to consistent estimation and efficient inference for latent treatment effects. We demonstrate its merit through simulation studies and an application to persuasive dialogue data.

Date : 17 April 2026 (Friday)

Time : 10:00am

Venue : Room 4472 (near Lifts 25/26)

All are Welcome!