The Hong Kong University of Science and Technology

Seminar on Business Data Science

Department of ISOM

Fighting Noise with Noise: Causal Inference with Many Candidate Instruments

By

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Date: 19 Jun 2025 (Thursday) Time: 11:00am – 12:00nn Venue: Room 4047 (LSK Business Building)

Abstract

Instrumental variable methods provide useful tools for inferring causal effects in the presence of unmeasured confounding. To apply these methods with large-scale data sets, a major challenge is to find valid instruments from a possibly large candidate set. In practice, most of the candidate instruments are often not relevant for studying a particular exposure of interest. Moreover, not all relevant candidate instruments are valid as they may directly influence the outcome of interest. In this article, we propose a data-driven method for causal inference with many candidate instruments that addresses these two challenges simultaneously. A key component of our proposal involves using pseudo variables, known to be irrelevant, to remove variables from the original set that exhibit spurious correlations with the exposure. Synthetic data analyses show that the proposed method performs favourably compared to existing methods. We apply our method to a Mendelian randomization study estimating the effect of obesity on health-related quality of life.

Bio

Linbo Wang is Canada Research Chair in Causal Machine Learning, and an associate professor in the Department of Statistical Sciences and the Department of Computer and Mathematical Sciences, University of Toronto. He is also a faculty affiliate at the Vector Institute and holds affiliate positions in the Department of Statistics at the University of Washington and the Department of Computer Science at the University of Toronto. His research focuses on causality and its interaction with statistics and machine learning.

All interested are welcome!

For details, please contact ISOM Department.