

The Hong Kong University of Science and Technology

Seminar on Business Data Science

Department of ISOM

**Overlap approximations -
causal inference under positivity violations**

by

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Date: 6 November 2024 (Wednesday)

Time: 11:00am – 12:00noon

Venue: 4/F Meeting Room (LSK Business Building)

Abstract

Positivity violations constitute one of the two primary challenges of causal inference with observational data, alongside unmeasured confounding. The positivity assumption states that every unit has a strictly positive probability of receiving any treatment on each level of the covariate adjustment set. If positivity is violated, there are regions of the covariate space where we have no outcome information under one of the treatments. In the most serious scenario, our target causal effect is unidentifiable from the data, and we are left with the choice of either changing our target estimand or resorting to the high-risk strategy of extrapolation.

After reviewing some of the existing approaches for handling positivity violations, including the popular method of “trimming”, we address their key limitations by introducing a new method called “overlap approximation”. The idea is to start from a well-known estimand called the “average treatment effect on the overlap population (ATO)”, which we then perturb in the direction of the target causal effect (e.g., the average treatment effect or the average treatment effect on the treated). This produces a class of estimands that progressively approximates our target while remaining identifiable and estimable under positivity violations. We discuss how to perform semiparametric inference for these classes, and we demonstrate the methodology by shedding new light on the famous LaLonde dataset.

Bio

Dr. Yiu is currently a Postdoctoral Research Fellow in the Department of Statistics, University of Oxford. In January 2025, he will be joining the University of Southampton as a Lecturer in Statistics. Before joining Oxford, he completed his bachelor's, master's and PhD degrees at the University of Cambridge. His research interests include semiparametric theory, causal inference, and Bayesian inference.

**All interested are welcome!
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