

Department of Statistics Seminar Series



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Robust generalization and transfer learning with sensitivity analysis

Wednesday, October 15th, 2025

12:10-1:30 PM

SEC 117

Zoom Meeting: Meeting ID: 983 2864 8232

Password: 665123

<https://rutgers.zoom.us/j/98328648232?pwd=gcHifQ9OouKZnUY0EHLe8sjNXaV1oj.1>

Light refreshments will be served in Hill 452, 11:40am

Abstract:

In recent years, a popular task in data science has been to learn a feature of a new, target distribution Q , denoted as $f(Q)$, using an existing dataset from a source distribution P . This task, broadly referred to as generalization or transfer learning, relies on a key assumption called conditional exchangeability. Unfortunately, this assumption is often untenable in practice and worse, the assumption cannot be verified with data.

The main theme of the talk is to study the sensitivity of learning about $f(Q)$ when conditional exchangeability is violated. The first part of the talk presents how to conduct nonparametric and efficient inference for $f(Q)$ under a well-known sensitivity model from causal inference. We also propose a method to benchmark or calibrate the sensitivity parameter using an idea from design sensitivity by Rosenbaum (2004). The second part of the talk proposes a novel measure to assess the sensitivity of learning $f(Q)$ under local violations of conditional exchangeability. The measure, which we call SLOPE, is inspired by an idea from Hampel (1974)'s influence curve and sensitivity analysis from causal inference. Practically, SLOPE helps investigators address questions about which datasets to use for generalization and reflects a philosophy that robust generalization should start with a robust study design.

This work is joint work with Xinran Miao (UW-Madison) and Jiwei Zhao (UW-Madison).

Bio:

Hyunseung (pronounced Hun-Sung) is an Associate Professor in the Department of Statistics at the University of Wisconsin-Madison. In 2015, he received his Ph.D. in Statistics from the University of Pennsylvania, where he was advised by Tony Cai and Dylan Small. From 2015 to 2016, he completed his NSF postdoctoral fellowship under Guido Imbens at Stanford University, and he has been at Madison since 2017. His research focuses on developing methods for causal inference, with particular emphasis on (a) instrumental variables and unmeasured confounding, (b) semi/nonparametric inference, and (c) dependence. He is also interested in applications to genetics, education, political science, and applied microeconomics.