Indiana University Indianapolis Department of Mathematical Sciences

STATISTICS SEMINAR

12:15pm—1:15pm, Tuesday, April 29, 2025 Zoom Meeting: Meeting ID: 845 0989 4694

Speaker: Archer Y. Yang Department of Mathematics and Statistics, McGill University

Title: Multivariate Conformal Selection

Abstract:

Selecting high-quality candidates from large datasets is critical in applications such as drug discovery, precision medicine, and alignment of large language models (LLMs). While Conformal Selection (CS) provides rigorous uncertainty quantification, it is limited to univariate responses and scalar criteria. To address this issue, we propose Multivariate Conformal Selection (mCS), a generalization of CS designed for multivariate response settings. Our method introduces regional monotonicity and employs multivariate nonconformity scores to construct conformal *p*-values, enabling finite-sample False Discovery Rate (FDR) control. We present two variants: mCS-dist, using distance-based scores, and mCS-learn, which learns optimal scores via differentiable optimization. Experiments on simulated and real-world datasets demonstrate that mCS significantly improves selection power while maintaining FDR control, establishing it as a robust framework for multivariate selection tasks.

Bio:

Dr. Archer Yang is an associate professor of statistics in the department of mathematcis and statistics at McGill University. He earned his PhD in Statistics from University of Minnesota in 2015. His research focuses on statistical machine learning, high dimensional statistics, statistical computing, biomedical, biochemical and industrial data science and applications in drug discovery.