



Department of Data Science

香港城市大學
City University of Hong Kong

DS SEMINAR

Counterfactual Policy Learning

Date: 20 December 2024 (Friday)

Time: 10:00am - 11:00am

Venue: Rm G7603, Yeung Kin Min Academic Building,
City University of Hong Kong

ABSTRACT

With the abundance of data available today, many enterprises are eager to adopt data-driven prescriptive analytics to improve decision-making. However, despite significant advancements in machine learning, several challenges still hinder the widespread adoption of prescriptive analytics. In this talk, I will present recent work at IBM Research on counterfactual policy learning, designed to address these challenges. One key framework is the counterfactual prescriptive tree, which derives interpretable optimal policies from observational data. This framework combines a causal model, which generates counterfactual outcomes for different treatment actions, with a prescriptive model that distills these insights into optimized policies in the form of a tree. The tree can be learned greedily for rapid deployment or constructed as an optimal prescriptive tree by solving a large-scale mixed-integer optimization problem using column generation. I will also share results from a real-world deployment, where this solution drove a 7% revenue increase in premium seat upselling for a major U.S. airline, outperforming the legacy pricing benchmark. Finally, I will demonstrate an LLM-based agent that enables non-ML business users to interact with advanced AI models through a natural language interface, democratizing prescriptive analytics for strategic decision-making across enterprises.



Dr. Wei SUN

GUEST SPEAKER'S PROFILE

Wei is a Senior Research Scientist at the IBM Watson Research Center in New York, working as part of the MIT-IBM Lab under the AI Data Model Factory. Her research lies at the intersection of machine learning and optimization, focusing on areas such as data-driven policy learning, constrained prediction, counterfactual inference, and game theory. Wei's work has been applied to real-world challenges across industries, including digital marketing, travel and transportation, and financial services. She has published in top-tier venues such as ICML, AAAI, and Management Science, and holds over 20 patents.

Wei earned her Ph.D. in Operations Research and an M.S. in Computational Design and Optimization from the Massachusetts Institute of Technology. She also holds an M.S. in Computational Engineering and a B.Eng. in Electrical and Computer Engineering with First-Class Honors from the National University of Singapore.

Enquiries: ds.go@cityu.edu.hk

All are welcome