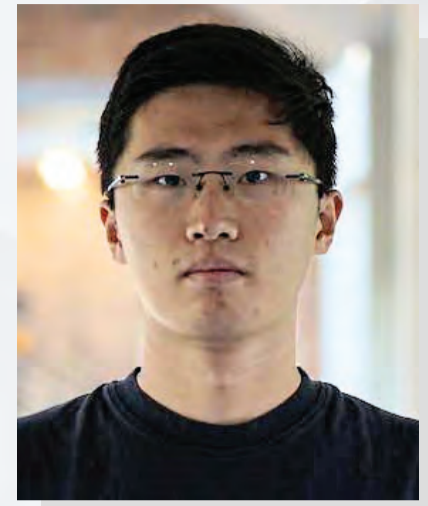




Data-Driven Decision Making with Safety Guarantee



30 Nov 2022 (Wed) | 10:30 am

Seminar Link: <https://cityu.zoom.us/j/99852327234>

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Abstract

In many real-world applications, decision makers usually need to make better decisions without the precise knowledge of the uncertainty. With limited amount of data, distributionally robust chance-constrained optimization (DRC) becomes a powerful tool for decision making because it alleviates the ambiguity in distribution by protecting the optimal solution against a family of candidate distributions, and thus generalizes better when previously unseen samples arise. However, DRC models are usually very hard to solve in general. Therefore, in this talk, I will seek to answer the following two questions: (1) how can we solve DRCs more efficiently, and (2) when are DRCs convex and/or tractable? For DRCs with a covering structure, which arise frequently in facility location, scheduling, production planning, and vehicle routing, we establish their NP-hardness, propose a two-stage reformulation and derive families of strong valid inequalities. For general DRCs, we uncover a set of sufficient conditions under which DRCs produce a convex feasible region and design efficient algorithms for solving such convex DRCs. I will demonstrate the effectiveness of our proposed solution approaches in multiple real-world applications including emergency medical facility location problem, optimal power flow problem, and the planning of charging stations for battery electric buses.

About the Speaker

Haoming Shen is a fifth year Ph.D. Candidate in the Department of Industrial and Operations Engineering at the University of Michigan, where he is advised by Prof. Ruiwei Jiang. His research focuses on data-driven optimization under uncertainty with applications to robotics, power grids, and transportation systems. He has received the honorable mention award in 2022 INFORMS Optimization Society Best Student Paper Competition.