DATA SCIENCE
Ph.D. Dissertation Defense
Xin Zhang
April 20th, 1:00PM – 2:30PM EST (12:00PM – 1:30PM CST)
Unity Hall 471 (limited seating available)
Zoom: https://wpi.zoom.us/j/95713755056

Committee:
Advisor: Dr. Yanhua Li, Associate Professor, WPI
Dr. Ziming Zhang, Assistant Professor, WPI
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External member: Dr. Zhi-Li Zhang, Professor, University of Minnesota

Title: Human Behavior Analysis via Generative Adversarial Imitation Learning

Abstract:
Technology advancement in mobile sensing and communication has enabled a massive amount of mobility data to be generated from human decision-makers, which we call human-generated spatial-temporal data (HSTD). Applying the HSTD to extract the unique decision-making strategies of human agents and design human-centered urban intelligent systems (*e.g.,* self-driving ride services) has transformative potential. They can not only promote the individual well-being of gig-workers and improve service quality and revenue of transportation service providers, but also enable downstream applications in smart transit planning, efficient gig-work dispatching, safe autonomous vehicle (AV) routing, and so on.

However, analyzing human decision strategies from HSTD is a challenging task. Human behaviors are complex and vary in different geographical locations (*i.e.*, spatial challenge), and the quality of the learned strategies is also dependent upon the model expressibility (i.e., theoretical challenge). In addition, leveraging human decisions for human-centered smart cities has some practical gaps.

This talk presents a picture of my work on human behavior analysis from HSTD based on imitation learning and its downstream applications. They focus on tackling the above challenges by providing solutions to the following research questions:
(1) How to capture the unique human decision-making strategies leveraging HSTD?
(2) How to design human-centered smart city services leveraging human decisions?

By answering these questions, a series of works including cGAIL, *f*-GAIL and CAC are introduced with novel designs in problem formulation, model architecture, and algorithm. Extensive experiments support the effectiveness of the proposed models on human behavior analysis and self-driving decision-making from HSTD and provide superior performance over state-of-the-art works.