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Markov Decision Processes in Shared Mobility Operation Problems

Dr. Zheng Zhu

Department of Civil Engineering, Zhejiang University, China

Date: December 28, 2023 (Thursday)

Time: 2:00 p.m. - 3:00 p.m.

Venue: Room 612B, 6/F Haking Wong Building, The University of Hong Kong

Abstract

The supply-demand imbalance of shared mobility (e.g., ride-sourcing and bike-sharing) is one critical factor that leads to passenger queueing and congestion, idle ride-sourcing vehicles, accumulation of shared bikes, low public transit ridership, and high-level travel costs, so that it restricts the mobility efficiency and social welfare of urban transportation systems. Designing spatial-temporal operation strategies (e.g., pricing, (e)bike rebalancing/recharging, ride-sourcing idle vehicle relocation) can be a feasible approach for mitigating the imbalance. However, concerning the coupling mechanism among supply, demand, and operational strategies, it is difficult to seek smart spatial-temporal strategies via conventional modeling and optimization approaches. Recently, with Markov decision processes (MDPs) and reinforcement learning (RL) have received increasing attention, which have the capability of formulating and solving dynamic optimization problems in complex environments. In this presentation, we show several MDPs the research team has developed for depicting and solving spatial-temporal operational problems in the shared mobility market. Aiming at developing smarter shared mobility systems, we would share our knowledge and experiences for a better understanding of similar problems.

About the Speaker

Zheng Zhu, “Hundred Talents Program” Professor, Assistant Head of Department of Civil Engineering at Zhejiang University. Research interests include the planning, design, simulation, management/control and optimization of multi-modal transportation systems. From 2008 to 2021, Zheng has been studying and working at Tsinghua University, University of Maryland, Hong Kong University of Science & Technology. He is the principal investigator of 1 Hong Kong Research Grants Committee General Research Fund (RGC-GRF), the participant of 1 Major Research Plan of China National Natural Science Foundation. Zheng has participated in research projects funded by many agencies, such as the US department of transportation (USDOT), the US department of energy (USDOE), US National Science Foundation (NSF), US Federal Highway Administration (FHWA), Aspiration Zealous Force Trustworthy (AZFT), Smart Urban Future (SURF) Laboratory, Zhejiang Province. He has published over 50 SCI papers in top transportation journals such as IEEE TITS, TR Part B, POM, TR Part C, and TR Part E. Zheng serves as the area editor in the annual meeting of the Chinese Overseas Transportation Association (COTA) and an editorial board member in Transportation Safety and Environment.

- ALL ARE WELCOME -