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RSEARCH INTERESTS

AI for Transport Planning, Human Mobility Modeling, Urban Data Science, Shared Mobility Systems, Urban Network Science

ACADEMIC QUALIFICATIONS

- Doctor of Philosophy, **Massachusetts Institute of Technology (MIT)** 09/2013 – 07/2018
- Master of Applied Science, **University of British Columbia (UBC)** 09/2011 – 08/2013
- Bachelor of Engineering, **Tongji University** 09/2007 – 07/2011

PROFESSIONAL EXPERIENCE

- Assistant Professor at **The University of Hong Kong (HKU)** 07/2020 – Present
- Senior Data Scientist at **Via Transportation, Inc.** 08/2018 – 06/2020

RESEARCH GRANTS

[1] PI. "Generalizable Deep Learning across Cities and Modes for Human Mobility Prediction". *National Natural Science Foundation of China (NSFC) Young Scientists Fund (NSFC 42201502)*. 01/2023-12/2025

PUBLICATIONS

(* refers to the corresponding author)

Journal Papers

[1] Jiang, F., Ma, J.*, Webster, C.J., Chiaradia, A.J.F., Zhou, Y., **Zhao, Z.** and Zhang, X. (2023). Generative urban design: A systematic review on problem formulation, design generation, and decision-making. *Progress in Planning*, 100795.

[2] Liang, Y., Ding, F., Huang, G. and **Zhao, Z.*** (2023). Deep trip generation with graph neural networks for bike sharing system expansion. *Transportation Research Part C: Emerging Technologies*, 154, 104241.

[3] Lin, Y., Xu, Y.*, **Zhao, Z.**, Park, S., Su, S. and Ren, M. (2023) Understanding changing public transit travel patterns of urban visitors during COVID-19: A multi-stage study. *Travel Behaviour and Society*, 100587.

[4] **Zhao, Z.*** and Liang, Y. (2023). A deep inverse reinforcement learning approach to route choice modeling with context-dependent rewards. *Transportation Research Part C: Emerging Technologies*, 149, 104079.

[5] Zhou, M., Zhou, J.*, Zhou, J., Lei, S. and **Zhao, Z.** (2023). Introducing social contacts into the node-place model: A case study of Hong Kong. *Journal of Transport Geography*, 107, 103532.

[6] Liang, Y., **Zhao, Z.*** and Zhang, X. (2022). Modeling taxi cruising time based on multi-source data: A case study in Shanghai. *Transportation*, accepted in October 2022.

[7] **Zhao, Z.***, Koutsopoulos, H. N. and Zhao, J. (2022). Identifying hidden visits from sparse call detail record data. *Transactions in Urban Data, Science, and Technology*, 1(3-4), 121-141.

[8] Liang, Y., **Zhao, Z.*** and Sun, L. (2022). Memory-augmented dynamic graph convolutional networks for traffic data imputation with diverse missing patterns. *Transportation Research Part C: Emerging Technologies*, 143, 103826.

[9] Liang, Y., Huang, G. and **Zhao, Z.*** (2022). Joint demand prediction for multimodal systems: A multi-task multi-relational spatiotemporal graph neural network approach. *Transportation Research Part C: Emerging Technologies*, 140, 103731.

[10] Bi, W., Lu, W.*, **Zhao, Z.** and Webster, C. (2022). Combinatorial optimization of construction waste collection and transportation: A case study of Hong Kong. *Resources, Conservation & Recycling*, 179, 106043.

[11] Li, J. and **Zhao, Z.*** (2022). Impact of COVID-19 travel-restriction policies on road traffic accident patterns with emphasis on cyclists: A case study of New York City. *Accident Analysis & Prevention*, 167, 106586.

[12] Liang, Y. and **Zhao, Z.*** (2021). NetTraj: A network-based vehicle trajectory prediction model based on directional representation and spatiotemporal attention mechanisms. *IEEE Transactions on Intelligent Transportation Systems*, 23 (9), 14470-14481.

[13] Mo, B., **Zhao, Z.***, Koutsopoulos, H.N. and Zhao, J. (2021). Individual mobility prediction in mass transit systems using smart card data: An interpretable activity-based hidden Markov approach. *IEEE Transactions on Intelligent Transportation Systems*, 23 (8), 12014-12026.

[14] **Zhao, Z.***, Koutsopoulos, H.N. and Zhao, J. (2020). Discovering latent activity patterns from transit smart card data: A spatiotemporal topic model. *Transportation Research Part C: Emerging Technologies*, 116, 102627.

[15] **Zhao, Z.** and Zhao, J.* (2020). Car pride and its behavioral implication: An exploration in Shanghai. *Transportation*, 47(2), 793-810.

[16] **Zhao, Z.**, Koutsopoulos, H.N. and Zhao, J.* (2018). Detecting pattern changes in individual travel behavior: A Bayesian approach. *Transportation Research Part B: Methodological*, 112, 73-88.

[17] **Zhao, Z.**, Koutsopoulos, H.N. and Zhao, J.* (2018). Individual mobility prediction using transit smart card data. *Transportation Research Part C: Emerging Technologies*, 89, 19-34.

[18] Goulet-Langlois, G.**,** Koutsopoulos, H.N., **Zhao, Z.** and Zhao, J.* (2018). Measuring regularity in individual travel patterns. *IEEE Transactions on Intelligent Transportation Systems*, 19 (5), 1583-1592.

[19] Zhao, J.*, Frumin, M., Wilson, N. H. and **Zhao, Z.** (2013). Unified estimator for excess journey time under heterogeneous passenger incidence behavior using smartcard data. *Transportation Research Part C: Emerging Technologies*, 34, 70-88.

[20] Frumin, M., Zhao, J.*, Wilson, N. H. and **Zhao, Z.** (2013). Automatic data for applied railway management: Case study on the London Overground. *Transportation Research Record: Journal of the Transportation Research Board*, 2353, 47-56.

[21] **Zhao, Z.**, Zhao, J.* and Shen, Q. (2013). Has transportation demand of Shanghai, China, passed its peak growth? *Transportation Research Record: Journal of the Transportation Research Board*, 2394, 85-92.

Conference Papers

[1] Liang, Y., Ding, F., Tang, Y. and **Zhao, Z.*** (2023). Time-aware trip generation for bike sharing system planning. *The 12th ACM SIGKDD International Workshop on Urban Computing (UrbComp'23)*, Long Beach, CA, USA.

[2] Liang, Y., Huang, G. and **Zhao, Z.*** (2022). Bike sharing demand prediction based on knowledge sharing across modes: A graph-based deep learning approach. *2022 IEEE 25th International Conference on Intelligent Transportation Systems (ITSC)*, 857-862.

[3] **Zhao, Z.***, Koutsopoulos, H.N. and Zhao, J. (2018). Discovering latent activity patterns from human mobility. *The 7th ACM SIGKDD International Workshop on Urban Computing (UrbComp'18)*, London, UK.

[4] **Zhao, Z.**, Koutsopoulos, H. N. and Zhao, J.* (2018). Detecting changes in individual travel behavior patterns. *Transportation Research Board 97th Annual Meeting*, Washington, DC.

[5] **Zhao, Z.**, Koutsopoulos, H. N. and Zhao, J.* (2017). Mobility as a language: Predicting individual mobility in public transportation using n-gram models. *Transportation Research Board 96th Annual Meeting*, Washington, DC.
[6] **Zhao, Z.**, Zhao, J.* and Koutsopoulos, H. N. (2016). Individual-level trip detection using sparse call detail record data based on supervised statistical learning. *Transportation Research Board 95th Annual Meeting*, Washington, DC.
[7] **Zhao, Z.** and Zhao, J.* (2015). Car pride: Psychological structure and behavioral implications. *Transportation Research Board 94th Annual Meeting*, Washington, DC.
[8] **Zhao, Z.**, Chua G. and Zhao, J.* (2012). Evolution of trip chaining patterns in London from 1991 to 2010. *Innovations in Travel Modelling Conference*, Tampa, FL.

Book Chapters

[1] **Zhao, Z.**, Koutsopoulos, H. N.* and Zhao, J. (2020). Chapter 7 – Uncovering Spatiotemporal Structures from Transit Smart Card Data for Individual Mobility Modeling. *Demand for Emerging Transportation Systems*, 123-149.

Under Review

[1] Hu, Y. and **Zhao, Z.*** (2023). Bikeable streets: Uncovering the effects of link-level street design on bike-sharing usage. *Transportation Research Part D: Transport and Environment*, submitted in August 2023.
[2] Tang, Y., He, J. and **Zhao, Z.*** (2023). Activity-aware human mobility prediction with hierarchical graph attention recurrent network. *The 32nd ACM International Conference on Information and Knowledge Management* (*CIKM'23*), submitted in May 2023.
[3] Fu, T., Li, X., Wang, J.*, Zhang, L., **Zhao, Z.** and Sobhani, A. (2023). Trajectory prediction and risk assessment in car-following scenarios using a noise-enhanced generative adversarial network. *Transportation Research Part C: Emerging Technologies*, submitted in March 2023.
[4] Wang, X., **Zhao, Z.***, Zhang, H., Guo, X. and Zhao, J. (2023). Quantifying the uneven benefits of ridesharing market integration. *IEEE Transactions on Intelligent Transportation Systems*, submitted in February 2023.
[5] Huang, G., Lian, T., Yeh, A.G.O. and **Zhao, Z.*** (2023). To share or not to share? Revealing determinants of individuals' willingness to share rides through a big data approach. *Transportation Research Part C: Emerging Technologies*, submitted in January 2023.
[6] Liang, Y., Huang, G. and **Zhao, Z.*** (2022). Cross-mode knowledge adaptation for bike sharing demand prediction using adversarial graph neural networks. *IEEE Transactions on Intelligent Transportation Systems*, submitted in August, 2022.
[7] Huang, G., Liang, Y. and **Zhao, Z.*** (2022). Understanding spatiotemporal dynamics of market competition among transportation network companies. *Transportation Research Part A: Policy and Practice*, submitted in August 2022.

INVITED TALKS

[1] AI for transport planning. *HKU-PKU Joint Summer School in Urban Science*, July 2023.
[2] AI-driven travel demand modeling for smart transport planning. *KTH Royal Institute of Technology*, March 2023.
[3] Urban transport networks and trajectory data mining. *Peking University-HKU Sustainable Development and Smart Cities in the Greater Bay Area*, November 2021.
[4] Trajectory data mining for smart urban mobility. *University of Michigan-Shanghai Jiaotong University Joint Institute*, June 2021.
[5] Transportation big data and data mining for cities. *Seminar-Workshop Series in Urban Analytics for Lands Department, The Government of Hong Kong SAR*, December 2020.
[6] Uncovering behavior dynamics in human mobility using transit smart card data. *Hong Kong Polytechnic University*, September 2020.

TEACHING EXPERIENCE

As Instructor

- URBA6002 Urban Big Data Analytics (HKU) 2021-Present
- URBA6004 Spatial Mobilities Analytics (HKU) 2021-Present
- URBP6157/GEOG7003 Transport Economics (HKU) 2022-Present
- URBA6402 Smart Planning and Design Studio (HKU) 2022-Present
- URBS2005 Research Methods in Urban Studies (HKU) 2021- 2022

As Teaching Assistant

- 11.478 Behavior and Policy: Connections in Transportation (MIT) 2015
- CIVL 441 Transportation Planning and Analysis (UBC) 2013
- CIVL 587 Urban Transportation Economics and Policy (UBC) 2012

HONORS & AWARDS

- Second Prize, 6th Chengyuan Cup - Planning Decision Support Model Design Contest, 2022
- Fellow, Meeting of Minds@HKU Forum for Outstanding Young Scholars, 2019
- Mitacs-Accelerate Internship Award, 2012
- Tongji University Outstanding Graduate Award, 2011
- Second Prize, Competition of Transport Science and Technology of Tongji University, 2010
- Scholarships for Excellent Academic Performance, 2008-2010

SERVICE & AFFILIATION

- Editorial Board Member, *Transactions in Urban Data, Science, and Technology*, 2022-Present
- Member, HKU Musketeers Foundation Institute of Data Science, 2022-Present
- Fellow, HKU Institute of Transport Studies, 2021-Present
- Deputy program director for HKU MSc in Urban Design and Transport (MScUDT), 2022-Present
- Chief examiner for HKU MA in Transport Policy and Planning (MATPP), 2022-Present
- Organizing committee member for International Symposium for Transport Network Resilience, 2023 (INSTR2023)
- Organizer for University of Glasgow-HKU Symposium on Urban Analytics, June 2021
- Reviewer for reputable academic journals including *Transportation Research Part A/B/C/D*, *IEEE Transactions on Intelligent Transportation Systems*, *Sustainable Cities and Society*, *Journal of Transport Geography*, *Travel Behaviour and Society*, *IEEE Transactions on Mobile Computing*, *GIScience & Remote Sensing*, and *PLOS ONE*.

GRADUATE STUDENTS

As Primary Supervisor

- Yuebing Liang, PhD Student, 2020-Present
- Yijia Hu, PhD Student, 2021-Present
- Fangyi Ding, PhD Student, 2022-Present
- Yihong Tang, MPhil Student, 2022-Present
- Luyun Zhao, PhD Student, 2023-Present
- Xiaohan Wang, PhD Student, 2023-Present

As Co-supervisor

- Yunting Miao, PhD Student, 2023-Present