

Dingyi Zhuang

Research Interests

Urban Computing

- Spatiotemporal data mining
- Graph neural network on traffic network
- Bayesian probabilistic models

Intelligent transportation system

- Reinforcement learning based traffic control

Education

2021 – Now Massachusetts Institute of Technology

- Ph.D. in Transportation
- Advisor: Jinhua Zhao, Haris N. Koutsopoulos
- GPA: **5.0/5.0**




2019 – 2021 McGill University


- Master (Thesis) in Transportation Engineering
- Advisor: Lijun Sun
- GPA: **3.8/4.0**
- Thesis: Spatial Aggregation and Temporal Convolution Graph Neural Network for Kriging

2015 – 2019 Shanghai Jiao Tong University

- Bachelor of Science in Mechanical Engineering (Tsien Hsue-Shen Class)
- Advisor: Jiangang Jin
- GPA: **3.6/4.0**; Ranking: **3/8**
- Graduate with Outstanding Honor (Top 5%)

Journal Publications

- [J4] 2022 **A Universal Framework of Spatiotemporal Bias Block for Long-Term Traffic Forecasting**  .
Fuqiang Liu, Jiawei Wang, Jingbo Tian, Dingyi Zhuang, Luis Miranda-Moreno, Lijun Sun*
IEEE Transactions on Intelligent Transportation Systems
- [J3] 2021 **Low-Rank Hankel Tensor Completion for Traffic Speed Estimation**  .
Xudong Wang, Yuankai Wu, Dingyi Zhuang, Lijun Sun*
IEEE Transactions on Intelligent Transportation Systems
- [J2] 2020 **From compound word to metropolitan station: Semantic similarity analysis using smart card data**  .
Dingyi Zhuang, Siyu Hao, Lee Der-Horng*, Jiangang Jin
Transportation Research Part C: Emerging Technologies, Volume 114, May 2020, Pages 322-337

- [J1] 2019 **Understanding the bike sharing travel demand and cycle lane network: the case of Shanghai** .
Dingyi Zhuang, Jiangang Jin*, Yifan Shen, Wei Jiang
International Journal of Sustainable Transportation, 2019: 1-13


Conference Proceedings

- [C6] 2023 **Uncertainty Quantification in the Road-level Traffic Risk Prediction by Spatial-Temporal Zero-Inflated Negative Binomial Graph Neural Network(STZINB-GNN)** .
Xiaowei Gao, James Haworth, Dingyi Zhuang, Huanfa Chen, Xinke Jiang
12th International Conference on Geographic Information Science (GIScience-2023)
- [C5] 2022 **Uncertainty Quantification of Sparse Trip Demand Prediction with Spatial-Temporal Graph Neural Networks** .
Dingyi Zhuang, Shenhao Wang*, Haris N. Koutsopoulos, Jinhua Zhao
28th ACM SIGKDD Conference on Knowledge Discovery & Data Mining (KDD-2022, oral pre.)
- [C4] 2022 **The Braess Paradox in Dynamic Traffic** .
Dingyi Zhuang, Yuzhu Huang, Vindula Jayawardana, Jinhua Zhao, Dajiang Suo, Cathy Wu*
25th IEEE International Conference on Intelligent Transportation Systems
- [C3] 2020 **Inductive graph neural networks for spatiotemporal kriging** .
Yuankai Wu, Dingyi Zhuang, Lijun Sun*
The Thirty-Fifth AAAI Conference on Artificial Intelligence (AAAI-21, oral pre.)
- [C2] 2020 **A Pseudo-3D Convolutional Neural Network based Framework for Short-term Mixed Passenger Flow Prediction in Large-scale Public Transit.**
Siyu Hao, Dingyi Zhuang, De Zhao, Lee Der-Horng*
Transportation Research Board 2020
- [C1] 2018 **An empirical study on cycle lane network using bike sharing data: the case of Shanghai.**
Dingyi Zhuang, Jiangang Jin*, Yifan Shen, Wei Jiang
2018 International Conference on Transportation and Space-time Economics (oral pre.)

In Preparation

All manuscripts are available upon reasonable requests




- 2023 **Virtual Nodes Improve Graph Neural Networks for Long-horizon Traffic Forecasting.**
Dingyi Zhuang, Shenhao Wang*, Haris N. Koutsopoulos, Jinhua Zhao
Working paper, targeting at International World Wide Web Conference 2023 conference
- 2023 **Spatio-temporal Sparse Data Mining Urban Traffic Risk Prediction Uncertainty Quantification Zero-Inflated Tweedie Distribution.**
Xiaowei Gao, Xinke Jiang, Dingyi Zhuang, Huanfa Chen, Shenhao Wang, James Haworth
In submission to Transportation Research Part C: Emerging Technologies
- 2023 **Spatio-Temporal Graph Neural Networks with Uncertainty Quantification for Sparse Urban Road-Level Risk Prediction.**
Xiaowei Gao, James Haworth, Huanfa Chen, Dingyi Zhuang, Xinke Jiang
Submitted to the 12 International Conference on Geographic Information Science
- 2023 **ST-GIN: An Uncertainty Quantification Approach in Traffic Data Imputation with Spatio-temporal Graph Attention and Bidirectional Recurrent United Neural Networks** .
Zepu Wang, Dingyi Zhuang*, Yankai Li, Jinhua Zhao, Peng Sun
Submitted to IEEE International Conference on Intelligent Transportation Systems

- 2023 **Deep Hybrid Model for Choice Modelling with Graph-embedded Urban Road Network.**
 Dingyi Zhuang, Qingyi Wang, Yunhan Zheng, Xiaotong Guo, Shenhao Wang*, Haris N. Koutsopoulos, Jinhua Zhao
Working paper, targeting at Transportation Research Part C: Emerging Technologies
- 2023 **Mitigating The Braess's Paradox in A Closed System Using Reinforcement Learning.**
 Yuzhu Huang, Dingyi Zhuang, Vindula Jayawardana, Jinhua Zhao, Dajiang Suo, Cathy Wu*
Working paper, targeting at IEEE Intelligent Transportation Systems
- 2023 **Fairness-enhancing deep learning for ride-hailing demand prediction.**
 Yunhan Zheng, Qingyi Wang, Dingyi Zhuang, Shenhao Wang*, Jinhua Zhao
Submitted to Transportation Research Part C: Emerging Technologies
- 2023 **Uncertainty Quantification of Spatiotemporal Travel Demand with Probabilistic Graph Neural Networks.**
 Qingyi Wang, Shenhao Wang*, Dingyi Zhuang, Haris Koutsopoulos, Jinhua Zhao
Submitted to IEEE Transactions on Intelligent Transportation Systems
- 2022 **Understanding Incident Impacts on Ridership Demand Change in Urban Transit System: the Case in Chicago.**
 Dingyi Zhuang, Baichuan Mo, Haris N. Koutsopoulos, Jinhua Zhao*
- 2021 **Spatial Aggregation and Temporal Convolution Networks for Real-time Kriging** .
 Yuankai Wu, Dingyi Zhuang, Lijun Sun*

Invited Talks & Guest Lectures

- July 2023 **Uncertainty Quantification of Sparse Trip Demand Prediction**
 Lyft
- July 2023 **Deep Hybrid Model with Urban Road Network for Travel Demand Analysis**
 World Conference on Transportation Research 2023
- May 2023 **Deep Hybrid Model with Urban Road Network**
 MIT Mobility Initiative Forum
- Apr 2023 **Uncertainty Quantification of Sparse Trip Demand Prediction**
 Urban Artificial Intelligence Laboratory, University of Florida
- Oct 2022 **Uncertainty Quantification of Sparse Trip Demand Prediction**
 College of Computer Science, Sichuan University

Work & Research Experience

- Apr 2021–
 Now **MIT Transit Lab** 
 Research Assistant
 Advisor: Jinhua Zhao; Shenhao Wang
 Working agencies:
 ○ Chicago Transit Authority (CTA), rail incident data analysis
 ○ Department of Energy (DOE), travel demand prediction
- Aug 2020–
 Jun 2021 **Mitacs Accelerate with ExPretio** 
 Winter Intern
 ○ Combination of multi-horizon models for demand forecasting
- 2019-2021 **Interuniversity Research Centre on Enterprise Networks, Logistics and Transportation (CIRRELT)** 
 Master's Student
 Advisor: Lijun Sun

Jul 2018– **Civil and Environmental Engineering, National University of Singapore**
 Sep 2018 Research Assistant
 Advisor: Lee Der-Horng

Oct 2017– **Institute of Refrigeration and Cryogenic Engineering, Shanghai Jiao Tong Univ.**
 Nov 2017 Research Assistant

Mar 2017– **Chuntsung Program, Shanghai Jiao Tong Univ.** [!\[\]\(125d701e9425b54c764340b5671b38cd_img.jpg\)](#)
 Jun 2018 Research Assistant

Aug 2016– **Robotics Institute, Shanghai Jiao Tong Univ.**
 Sep 2015 Research Assistant

Honors & Awards

2020 **CIRRELT Excellence Scholarships (Master's), CIRRELT**

2019 & 2021 **Graduate Excellence Fellowship, McGill University**

2019 **Hsue-shen Tsien Class, Shanghai Jiao Tong University**
 Top 5%, Honor Program in School of Mechanical Engineering

2017 **Chungtsung Scholarship, Hui-Chun Chin and Tsung-Dao Lee Chinese Undergraduate Research Endowment**
 Top 10% in selected excellent research students in Shanghai Jiao Tong University

2017 **Chinese Big Data Innovation Application and Modeling Contest** [!\[\]\(2bdfe261b986065ee0ac76460d6528c9_img.jpg\)](#)
 First Prize (1/135)

2016 & 2017 **Eleme Scholarship, Shanghai Jiao Tong University**

2017 **2017 Mathematical Contest in Modeling**
 Honorable Mention

2016 **Excellent Student, Shanghai Jiao Tong University**
 Top 5%

2015 **Freshmen Scholarship, Shanghai Jiao Tong University**

Academic Service

Journal Referees IEEE Transactions on Neural Networks and Learning Systems • IEEE Transactions on Intelligent Transportation Systems • Transportation Research Part C

Conference Referees Transportation Research Board Annual Meeting (TRB) • IEEE Conference on Intelligent Transportation (IEEE ITSC) • COTA International Conference of Transportation Professionals

Position of Responsibility

Mar 2023– **MIT Film Makers Association**
 Now President of publicity

Oct 2015– **Center of Quality Development, Shanghai Jiao Tong University**
 Sep 2017 Vice president

Teaching

Spring 2023 Teaching Assistant of 1.041/1.200 Transportation Foundation and Methodology [!\[\]\(05be7c7a8995decd503647c99211f7c2_img.jpg\)](#)

Technical skills

Languages Python, MATLAB, R, \LaTeX

Tools Adobe PhotoShop, Premier, Lightroom