

# Dingyi ZHUANG

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## EDUCATION

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### McGill University

Montreal, Canada

Master of Engineering (Thesis) in Transportation Engineering

Sep. 2019- Present

- **Supervisor:** Prof. Lijun Sun
- **Research interest:** Urban Computing, Data Mining, Graph Network, Probabilistic Model
- **GPA:** 3.8/4

### Shanghai Jiao Tong University

Shanghai, China

Bachelor of Science in Mechanical Engineering

Sep. 2015 - July. 2019





- **Tsien Hsue-Shen Class:** Honors Program in Shanghai Jiao Tong University (top 5%).
- **Overall GPA:** 3.55/4 (85.67/100), **Ranking:** 3/8

### Selected Honors & Awards:

- Mitacs Accelerate Fund, Mitacs
- Graduate Excellence Fellowship, McGill University
- First Prize (1/130), Chinese University Students Big Data Innovation Application and Modeling Contest
- Chungtsung Scholarship (10%), Hui-Chun Chin and Tsung Dao Lee Endowment Program Commission
- Eleme Scholarship (5%, twice), Shanghai Jiao Tong University
- Excellent Student (5%), Shanghai Jiao Tong University

## PUBLICATIONS

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- **D. Zhuang**, S. Hao, D.H. Lee, J.G Jin, From compound word to metropolitan station: Semantic similarity analysis using smart card data, *Transportation Research Part C: Emerging Technologies*. 
- **D. Zhuang**, J.G. Jin, Y. Shen, W. Jiang, Understanding the bike sharing travel demand and cycle lane network: the case of Shanghai, *International Journal of Sustainable Transportation*. 
- **D. Zhuang**, J.G. Jin, Y. Shen, W. Jiang, An empirical study on cycle lane network using bike sharing data: the case of Shanghai, *2018 International Conference on Transportation and Space-time Economics*.
- Y. Wu, **D. Zhuang**, A. Labbe, L. Sun, Inductive graph neural networks for spatiotemporal kriging, *Association for the Advancement of Artificial Intelligence 2021 (AAAI 2021)*. 
- S. Hao, **D. Zhuang**, D. Zhao, D.H. Lee, A Pseudo-3D Convolutional Neural Network based Framework for Short-term Mixed Passenger Flow Prediction in Large-scale Public Transit, *Transportation Research Board 2020*. 
- S. Hao, **D. Zhuang**, D.H. Lee, A spatial-temporal Deep Learning Framework for Network-wide Bus Passenger Flow prediction, *IET Intelligent Transport Systems*. (Provisionally accepted)
- Y. Wu, **D. Zhuang**, A. Labbe, L. Sun, Neural Spatiotemporal Point Process for City-Scale Traffic Accident Modeling. (submitting to *Analytic Methods in Accident Research*)
- **D. Zhuang**, L. Sun, Modeling Paratransit Demand with Hankel-structured Poisson Tensor Factorization (working paper)
- **D. Zhuang**, Z. Ma, L. Sun, Reinforcement Learning-based Traffic Signal Control in Special Scenario (working paper)
- F.Q. Liu, J.W. Wang, **D. Zhuang**, J.B. Tian, Luis Miranda-Moreno, L. Sun. A General Framework Based on Temporally Dynamic Adjacency Matrix for Long-Term Traffic Prediction. (working paper)

## SELECTED RESEARCH EXPERIENCE

**Modeling Paratransit Demand with Hankel-structured Poisson Tensor Factorization** **Canada**  
*Master Student, McGill University* *May. 2020 - Aug. 2020*

*Advisor: Lijun Sun, Assistant Professor, McGill University*

- Derived and implemented Hankel-based Poisson Tensor Factorization to learn latent seasonal spectrum of paratransit service for the disabled people in the region-level.
- Enhanced interpretability traditional probabilistic factorization model, and conducted cases studies on both temporal and spatial latent modes to discover behaviors from sparse and dispersed paratransit data.

**Inductive Graph Neural Networks for Spatiotemporal Kriging** **Canada**  
*Master Student, McGill University* *Apr. 2019 - Jun. 2020*

*Advisor: Lijun Sun, Assistant Professor, McGill University*

- Developed a dynamic sampling based inductive framework of graph neural network to recover data for unsampled sensors on a network/graph structure.
- Learned the spatial message passing mechanism by generating random subgraph samples and adjacency, then reconstructing signals on them.
- Implemented and outperformed advanced spatial kriging and matrix completion models on various spatiotemporal datasets to test the inductive ability. Paper in the proceeding of AAAI 2021.

**Pseudo-3D CNN based Framework for Short-term Mixed Passenger Flow Prediction** **Singapore**  
*Research Assistant, National University of Singapore* *Apr. 2019 - Aug. 2019*

*Advisor: Lee Der-Horng, Elected Fellow, Academy of Engineering Singapore*

- Proposed a Pseudo-3D Convolutional Neural Network (Pseudo-3DCNN) based model to predict the public transport passenger flow in a network-wide region level.
- Took metro passenger flow, bus passenger flow as well as the transfer flow between metro system and bus system together into consideration instead of merely predicting a single type of passenger flow.
- Presented paper in *Transportation Research Board 2020*.

**Understanding Semantic Similarity among Subway Stations Using Smart Card Data** **Singapore**  
*Research Assistant, National University of Singapore* *Jul. 2018 - Sep. 2018*

*Advisor: Lee Der-Horng, Elected Fellow, Academy of Engineering Singapore*

- Designed a station2vec approach using word2vec model in natural language processing and proposed to interpret station vectors as compound words to comprehend their mobility and service semantics.
- Applied stacked autoencoder on smart card data and topic modeling on Point of Interest data to discover the mobility and service semantics respectively to obtain a deeper similarity between subway stations.
- Completed all modeling and coding work independently, and then proposed several urban planning and commercial suggestions based on similarity analysis. Paper published in *TR Part C*.

**Empirical Study on Cycle Lane Network of Shanghai Using Bike Sharing Data** **Shanghai, China**  
*Team Leader, Chuntsung Program of Shanghai Jiao Tong University* *Mar. 2017 - Jun. 2018*

*Advisor: Jiangang Jin, Associate Professor at School of Civil Engineering, Shanghai Jiao Tong University*

- Designed procedures to scrape data automatically from the bike-sharing application and applied graphic clustering to mine the insight of four different bike-sharing mobility patterns.
- Suggested a method to explore cycle lane network based on bike-sharing mobility configurations and proposed policy recommendations accordingly.
- Presented paper on TSTE 2018 and published in *International Journal of Sustainable Transportation*.