Zhanhong Cheng

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EDUCATION

McGill University   Montreal, Canada
Ph.D. in Transportation   Jan 2019–Oct 2022

- Advisor: Prof. Lijun Sun (McGill, main) & Prof. Martin Trépanier (PolyMtl, co-supervisor)
- Thesis: "Travel-Behavior-Based Inference and Forecasting Methods in Metro System"

Harbin Institute of Technology   Harbin, China
M.S. in Transportation Planning and Management   Sep 2016–Jul 2018

- Advisor: Prof. Jia Yao
- Thesis: "An Analysis of Two Hybrid Route Choice Models in Stochastic Assignment Paradox"

Harbin Institute of Technology   Weihai, China
B.Eng. in Traffic Engineering   Aug 2012–Jul 2016

- Thesis: "Design of a Traffic Data Management and Analysis Software"

RESEARCH INTERESTS

- Travel behavior and mobility pattern mining
- Sustainable transportation
- Spatiotemporal data forecasting and modeling
- Applications of Machine Learning in Transportation

EXPERIENCE

McGill University   Montreal, Canada
Postdoctoral Researcher   Aug 2022–Current

- Advisor: Prof. Lijun Sun
- NSERC Alliance project with ExPretio and Mitacs: "Probabilistic forecasting of train ticket booking demand with hierarchical correlations"

Exo   Montreal, Canada
Intern   Feb 2019–Feb 2022

- Mitacs project: "Spatiotemporal travel behavior modeling and analysis for better public transport systems"

Wenzhou Urban Planning and Design Institution   Wenzhou, China
Intern   Summer 2016

- Residential area parking spaces renovation project

Weihai Traffic Engineering Research Institute   Weihai, China
Research Assistant   May 2015–Jun 2016

- Weihai traffic signal system optimization project
- Traffic impact analysis

Teaching

- **Guest Lecturer** at McGill University — Winter 2023
  Transportation Network Analysis (CIVE 542)
- **Teaching Assistant** at McGill University — Fall 2022
  Spatiotemporal Data Mining (CIVE 650)
- **Teaching Assistant** at McGill University — Winter 2021
  Traffic Engineering & Simulation (CIVE 440)
- **Teaching Assistant** at McGill University — Winter 2021
  Sustainable project management (CIVE 324)
- **Teaching Assistant** at McGill University — Fall 2021
  Traffic Engineering & Simulation (CIVE 440)

Awards and Scholarships

- Second-best Paper Award at the 15th CASPT and 8th TransitData. — 2022
- CIRRELT Excellence Scholarship (Doctoral Rédaction) — 2020
- McGill Engineering Doctoral Award (International) — 2019–2021
- Excellent Graduate Thesis of HIT — 2018
- First Level Scholarship of HIT — 2016, 2017
- Excellent Graduate of Shandong Province — 2016
- Third Prize of National Competition of Transport Science and Technology — 2015
- First Prize of China Undergraduate Mathematical Contest in Modeling — 2014

Journal Publications

[1] H. Cai, F. Wu, **Z. Cheng**, B. Li, and J. Wang, "A large-scale empirical study on impacting factors of taxi charging station utilization", *Transportation Research Part D: Transport and Environment*, vol. 118, p. 103 687, 2023. DOI: 10.1016/j.trd.2023.103687.

[2] **Z. Cheng**, M. Trépanier, and L. Sun, "Real-time forecasting of metro origin-destination matrices with high-order weighted dynamic mode decomposition", *Transportation Science*, vol. 56, no. 4, pp. 904–918, 2022. DOI: 10.1287/trsc.2022.1128.

[3] **Z. Cheng**, X. Wang, X. Chen, M. Trépanier, and L. Sun, "Bayesian calibration of traffic flow fundamental diagrams using gaussian processes", *IEEE Open Journal of Intelligent Transportation Systems*, 2022. DOI: 10.1109/OJITS.2022.3220926.

[4] F. Wu, H. Chen, K. Hou, **Z. Cheng**, and T. Z. Qiu, "Adaptive pushbutton control for signalized pedestrian midblock crossings", *Journal of Transportation Engineering, Part A: Systems*, vol. 148, no. 4, p. 04 022 011, 2022. DOI: 10.1061/JTEPBS.0000659.

[5] J. Yao, H. Yuan, Y. Jiang, S. an, and **Z. Cheng**, "Effect of route overlapping feature on stochastic assignment paradox", *Transportation Letters*, pp. 1–11, 2022. DOI: 10.1080/19427867.2022.2159058.

[6] K. Zhu, **Z. Cheng**, J. Wu, F. Yuan, and L. Sun, "Quantifying out-of-station waiting time in oversaturated urban metro systems", *Communications in Transportation Research*, vol. 2, p. 100 052, 2022. DOI: 10.1016/j.commtr.2022.100052.

[7] Z. Zhuang, **Z. Cheng**, J. Yao, J. Wang, and S. An, "Bus travel time reliability incorporating stop waiting time and in-vehicle travel time with avl data", *International Journal of Coal Science & Technology*, vol. 9, no. 1, p. 71, 2022. DOI: 10.1007/s40789-022-00544-7.

[8] **Z. Cheng**, M. Trépanier, and L. Sun, "Incorporating travel behavior regularity into passenger flow forecasting", *Transportation Research Part C: Emerging Technologies*, vol. 128, p. 103 200, 2021. DOI: 10.1016/j.trc.2021.103200.

[9] **Z. Cheng**, J. Yao, A. Chen, and S. An, "Analysis of a multiplicative hybrid route choice model in stochastic assignment paradox", *Transportmetrica A: Transport Science*, pp. 1–25, 2021. DOI: 10.1080/23249935.2021.1953189.

[10] X. Wang, **Z. Cheng**, M. Trépanier, and L. Sun, "Modeling bike-sharing demand using a regression model with spatially varying coefficients", *Journal of Transport Geography*, vol. 93, p. 103 059, 2021. DOI: 10.1016/j.jtrangeo.2021.103059.

[11] **Z. Cheng**, M. Trépanier, and L. Sun, "Probabilistic model for destination inference and travel pattern mining from smart card data", *Transportation*, pp. 1–19, 2020. DOI: 10.1007/s11116-020-10120-0.

[12] J. Yao, **Z. Cheng**, J. Dai, A. Chen, and S. An, "Traffic assignment paradox incorporating congestion and stochastic perceived error simultaneously", *Transportmetrica A: Transport Science*, vol. 15, no. 2, pp. 307–325, 2019. DOI: 10.1080/23249935.2018.1474962.

[13] J. Yao, W. Huang, A. Chen, **Z. Cheng**, S. An, and G. Xu, "Paradox links can improve system efficiency: An illustration in traffic assignment problem", *Transportation Research Part B: Methodological*, vol. 129, pp. 35–49, 2019. DOI: 10.1016/j.trb.2019.07.018.

[14] J. Yao, **Z. Cheng**, F. Shi, S. An, and J. Wang, "Evaluation of exclusive bus lanes in a tri-modal road network incorporating carpooling behavior", *Transport Policy*, vol. 68, pp. 130–141, 2018. DOI: 10.1016/j.tranpol.2018.05.001.

Preprints

[1] F. Wu, **Z. Cheng**, H. Chen, T. Z. Qiu, and L. Sun, "Traffic state estimation with anisotropic gaussian processes from vehicle trajectories", 2023. arXiv: 2303.02311.

[2] X. Chen, **Z. Cheng**, J. Jin, M. Trépanier, and L. Sun, "Probabilistic forecasting of bus travel time with a bayesian gaussian mixture model", 2022. arXiv: 2206.06915.

[3] X. Chen, **Z. Cheng**, and L. Sun, "Bayesian inference for link travel time correlation of a bus route", 2022. arXiv: 2202.09485.

[4] X. Chen, **Z. Cheng**, N. Saunier, and L. Sun, "Laplacian convolutional representation for traffic time series imputation", 2022. arXiv: 2212.01529.

[5] Y. Wu, **Z. Cheng**, and L. Sun, "Individual mobility prediction via attentive marked temporal point processes", 2021. arXiv: 2109.02715.

Conferences

[1] H. Cai, F. Wu, **Z. Cheng**, B. Li, and J. Wang, "A large-scale empirical study on impacting factors of taxi charging station utilization using random forest and shapley value method", in *Transportation Research Board 102th Annual Meeting*, Washington, D.C., 2023.

[2] **Z. Cheng**, X. Wang, X. Chen, M. Trépanier, and L. Sun, "Bayesian calibration of traffic flow fundamental diagrams using gaussian processes", in *Transportation Research Board 102th Annual Meeting*, Washington, D.C., 2023.

[3] X. Chen, **Z. Cheng**, and L. Sun, "Bayesian inference for link travel time correlation of a bus route", in *Conference on Advanced Systems in Public Transport (CASPT) and TransitData 2022*, Tel Aviv, 2022.

[4] **Z. Cheng**, M. Trépanier, and L. Sun, "Real-time forecasting of metro origin-destination matrices with high-order weighted dynamic mode decomposition", in *Conference on Advanced Systems in Public Transport (CASPT) and TransitData 2022*, Tel Aviv, 2022.

[5] X. Wang, **Z. Cheng**, M. Trépanier, and L. Sun, "Modeling bike-sharing demand using a regression model with spatially varying coefficients", in *Transportation Research Board 100th Annual Meeting*, Washington, D.C. (virtual), 2021.

[6] **Z. Cheng**, H. Alizadeh, M. Nazem, M. Trépanier, and L. Sun, "Long-term ridership forecast using heuristic, SARIMA and random forest methods", in *TransitData 2020*, Toronto (virtual), 2020.

[7] **Z. Cheng**, M. Trépanier, and L. Sun, "Integrating travel behavior regularity into passenger flow prediction", in *TransitData 2020*, Toronto (virtual), 2020.

[8] **Z. Cheng**, M. Trépanier, and L. Sun, "Inferring trip destinations in transit smart card data using a probabilistic topic model", in *TransitData 2019*, Paris, 2019.

[9] Z. Zhuang, **Z. Cheng**, J. Yao, J. Wang, and S. An, "Bus travel time reliability incorporating in-stop waiting time and in-vehicle travel time with AVL data", in *Transportation Research Board 98th Annual Meeting*, Washington, D.C., 2019.

[10] J. Yao, **Z. Cheng**, S. An, and A. Chen, "Analysis of a multiplicative hybrid route choice model in stochastic assignment paradox", in *Transportation Research Board 97th Annual Meeting*, Washington, D.C., 2018.

[11] J. Yao, J. Dai, A. Chen, **Z. Cheng**, and S. An, "Traffic assignment paradox incorporating congestion and stochastic perceived error simultaneously", in *Transportation Research Board 97th Annual Meeting*, Washington, D.C., 2018.

PROJECTS

- Probabilistic forecasting of train ticket booking demand with hierarchical correlations   Aug 2022–Current
  – NSERC Alliance project with ExPretio and Mitacs
  – Postdoctoral researcher

- Enhancing Transit Service by Intelligent Trip Inference and Recommendation System   Nov 2021–Aug 2022
  – NSERC Alliance project with *Transit* (https://transitapp.com/)
  – Principal researcher

- Spatiotemporal Travel Behavior Modeling and Analysis for Better Public Transport Systems   2019–2022
  – Mitacs Accelerate project with *exo* (https://exo.quebec/en)
  – Student participant

- Research on Spatiotemporal Characteristics of Travel Route Selection Based on Big Data   2018–2019
  – GAIA collaborative research funds for young scholars with DiDi (https://www.didiglobal.com/)
  – Student participant

- Research on the Characteristics of Traffic Paradox in Random Route Choice Model   2016–2018
  – National Natural Science Foundation of China
  – Student participant

INVITED TALKS

[1] "Travel-behavior-based inference and forecasting methods in metro systems", in *School of Economics and Management, Dalian University of Technology*, Dalian, China (virtual), Nov. 26, 2022.

[2] "Probabilistic model for destination inference and travel pattern mining from smart card data", in *Zooming in on collaborative digital intelligence*, Montreal, Canada (virtual), Apr. 21, 2021. [Online]. Available: https://youtu.be/xLuYrb_mmdM.

PROFESSIONAL SERVICE

Reviewer

- Reviewer of Transportation Research Part C: Emerging Technologies
- Reviewer of IEEE Transactions on Intelligent Transportation Systems
- Reviewer of Transportation Research Board (TRB) Annual Meeting
- Reviewer of Journal of Advanced Transportation
- Reviewer of Public Transport
- Reviewer of Transport Policy

Member

- Member of IEEE   2022–Current
- Student member of Chinese Overseas Transportation Association (COTA)
- Student member of Interuniversity Research Centre on Enterprise Networks, Logistics and Transportation (CIRRELT)
- Friend member of TRB Standing Committee on Urban Transportation Data and Information Systems (AED20)
- Friend member of TRB Standing Committee on Public Transport Planning and Development (AP025)
- Student member of McGill Sustainability Systems Initiative (MSSI)