Lingyun Zhong

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EDUCATION BACKGROUND

University of Michigan, *Ann Arbor, USA* **08/2023-12/2024**

Degree: Master's Degree of Science in Transportation System Engineering

Tongji University, *Shanghai, China* **09/2019-07/2023**

Degree: Bachelor's Degree of Engineering in Transportation Engineering

RESEARCH INTEREST

Shared Mobility, Behavioral Modeling, Traffic Flow Theory;

Machine Learning, Deep Learning, Reinforcement Learning, Operation Research

RESEARCH EXPERIENCE

Distributed Road Traffic Flow Prediction based on Federated Learning: A Case Study in New York [On Going] **12/2023-05/2024**

Transportation System Engineering Research; Advisor: Neda Masoud, Ethan Zhang

- ✓ Processed traffic flow data from multiple road segments in the New York City area by filling missing values and performing sampling to create a training dataset.
- ✓ Constructed distributed traffic flow prediction models using MLP, CNN, LSTM, and GRU architectures based on the Flower federated learning framework.
- ✓ Analyzed the impact of central server federated learning on local traffic flow predictions.

Unveiling Heterogeneity in Household Vehicle Purchasing Choices: A Comprehensive Analysis Using Machine Learning and Logit Models **08/2023-01/2024**

Advisor: Atiyya Shaw

- ✓ Processed the Panel Study of Income Dynamics (PSID) dataset (from 2011 to 2021) by extracting two sets of features: vehicle ownership attributes and household socio-demographic attributes, specifically for households with cars.
- ✓ Classified the processed dataset using the nested logit model and LightGBM model to predict the vehicle purchase decisions of households with cars.
- ✓ Applied the Tree Explainer from the SHAP(SHapley Additive exPlanations) toolbox to perform interpretable result analysis on the LightGBM model.

Enhancing the Carbon Reduction Potential in Ridesplitting through Reinforcement Learning: A Case Study in Chengdu **11/2022-06/2023**

Undergraduate Thesis; Advisor: Meiting Tu, Ye Li

- ✓ Developed a ridesplitting probability identification algorithm based on the vehicle-shareability network considering economic and environmental benefits of ridesplitting, modeling the matching problem as a general graph's maximum weighted independent set problem.
- ✓ Developed a reinforcement learning algorithm for evaluating the value of ridesplitting orders, considering instant reward and future expected value increment.
- ✓ Proposed a maximum weighed independent set algorithm accelerated by single-vertex and two-vertex reduction for solving the ridesplitting order matching problem.

Paper: Enhancing the Carbon Reduction Potential in Ridesplitting through Reinforcement Learning: A Case Study in Chengdu

*Conference paper; Poster No. TRBAM-24-03952(**accepted**), TRB Annual Meeting, Washington, D.C*

A Trajectory Construction Method of Global Vehicles on Expressway Based on Incomplete Sensing Data **09/2021-07/2022**

National Innovation and Entrepreneurship Project; Advisor: Yuchuan Du, Cong Zhao

- ✓ Built the data processing system of radar sensor data and used yolov3 to extract vehicle trajectory data from multiple camera video data.

- ✓ Built a vehicle ID bipartite graph matching algorithm under camera and radar sensor domain based on headway characteristics of traffic flow.
- ✓ Utilized the award-winning Re-ID algorithm from AI CITY 2021 incorporating road environment features into network architecture to achieve vehicle ID matching across multiple sensors domains.

Patent: A Trajectory Construction Method of Global Vehicles on Expressway Based on Incomplete Sensing Data

*Patent for Invention; Application No. 202210763169.7 (**Pending**)*

Highway Management and Control Strategy Optimization Based on Deep Reinforcement Learning **11/2020-06/2021**

Advisor: Rongjie Yu

- ✓ Built a highway environment with a single ramp entrance and ramp traffic lights using SUMO.
- ✓ Optimized the highway management using the Dueling DQN model to control speed limits on the main lanes and phase actions of ramp entrance traffic lights.

AWARD

The First Class Scholarship for Academic Excellence, Tongji University **09/2022**

The First Prize, The 17th "Huazhan Cup" National College Student Transportation Science and Technology Competition **07/2022**

The Silver Award, The Internet+ Innovation and Entrepreneurship Contest (The Final of Tongji University) **06/2022**

The Bronze Prize, The 7th "Zhuoyue Cup" and the 13th "Challenge Cup" Undergraduate Entrepreneurship Plan **06/2022**

The First Prize, The 21st Tongji University Transportation Science and Technology Competition **05/2022**

The Second Class Scholarship for Academic Excellence, Tongji University **09/2021**

The First Prize, "Shanshu Cup" Mathematical Contest in Modeling **08/2021**

SKILL

Language: Python, Matlab

Package: PyTorch, TensorFlow, Scikit-learn, Numpy, Pandas, Gurobi, Matplotlib

Others: SPSS, LaTex, ArcGIS

AFFILIATION

The Red Cross Society of Tongji University, *Liaison* **09/2019-09/2020**

- ✓ Assisted in promoting this association and helped organize relevant activities like first aid knowledge competitions in college.

The Innovation Club of Student Union of The Transportation Department, *Member* **09/2020-09/2021**

- ✓ Engaged in the club's publicity, annual expense accounting and reimbursement , activity organization, etc.