ZHANG YUNCHANG (Ph.D.)

yzhang@alumni.purdue.edu
https://yzhang-genghis.github.io/
(+65) 98115753

RESEARCH & WORK EXPERIENCE

Desay SV, Singapore
Senior Algorithm Engineer | August 2022 – Present

Motion Forecasting & Planning in Autonomous Driving

- Argoverse II: Large Scale Motion Forecasting Competition (Phase: Single Agent Forecasting) until 2023/06/30:
  - #2 in Missing Rate (K=1);
  - #3 in Missing Rate (K=6);
  - #3 in minFDE(K=1);
  - #3 in minADE(K=1);
  - #7 in minFDE(K=6); and
  - #10 in minADE(K=6).
- Waymo Motion Prediction Challenge (To-Be-Released)
- Developed parameterized graph-traversal-based motion forecasting algorithms in urban settings.
- Developed computationally efficient motion forecasting algorithms (Sparse Transformers with Multi-Hop Attention Mechanism) via Distributed Data-Parallel (DDP) Training in PyTorch.
- Deployed the complete motion forecasting pipeline in Intelligent Computing Platform (ICP), Aurora and squeezed the inference time within 100 millisecond latency via C++ & TensorRT.

Purdue University
Post-Doctoral Research Fellow | March 2022 – August 2022

Intelligent Traffic Management Systems (TMS)

- Real-time crowd-sourced probe data was monitored and retrieved through the Google Cloud Platform (GCP).
- Interstate operational performances were monitored by fusing connected vehicle data with High-Resolution Rapid Refresh data from the National Oceanic and Atmospheric Administration.
- Surrogate safety measures were developed for interstates in Indiana using connected vehicle data.

Smart Interaction: Making Crosswalks Smarter

- Extracted road user trajectory data from Miovision cameras mounted at urban intersections using advanced computer vision algorithms.
- Developed deep learning algorithms to predict marginal and joint behavior of heterogeneous road users during interactions.

- Implemented smart traffic signal control strategies in urban transportation networks using deep reinforcement learning. Code and demo: https://github.com/YZhang-Genghis/deep-reinforcement-learning-pedestrian-signal-design.

EDUCATION

Purdue University
Ph.D. in Civil Engineering | May 2019 – March 2022

Dissertation Title: Making Crosswalks Smarter: Using Sensors and Learning Algorithms to Safeguard Heterogeneous Road Users.

Advisor: Dr. Jon D. Fricker

Purdue University
M.S. in Civil Engineering | August 2017 – May 2019

Thesis Title: "Pedestrian-Vehicle Interactions at Semi-Controlled Crosswalks: Explanatory Metrics and Models".

Advisor: Dr. Jon D. Fricker

Jilin University
B.S. in Traffic Engineering | September 2013 – July 2017

PUBLICATIONS

Fricker, J. D., & **Zhang, Y.** (2019). Modeling pedestrian and motorist interaction at semi-controlled crosswalks: the effects of a change from one-way to two-way street operation. Transportation research record, 2673(11), 433-446.

Zhang, Y., Qiao, Y., & Fricker, J. D. (2020). Investigating Pedestrian Waiting Time at Semi-Controlled Crossing Locations: Application of Multi-State Models for Recurrent Events Analysis. *Accident Analysis & Prevention*, 137, 105437.

Zhang, Y., & Fricker, J. D. (2020). Multi-State Semi-Markov Modeling of Recurrent Events: Estimating Driver Waiting Time at Semi-Controlled Crosswalks. *Analytic Methods in Accident Research*, 100131.

Yabe, T., **Zhang, Y**., & Ukkusuri, S. V. (2020). Quantifying the economic impact of disasters on businesses using human mobility data: a Bayesian causal inference approach. *EPJ Data Science*, 9(1), 36.

Zhang, Y., & Fricker, J. D (2021). Investigating temporal variations in pedestrian crossing behavior at semi-controlled crosswalks: A Bayesian multilevel modeling approach. *Transportation Research Part F: Traffic Psychology and Behaviour*, 76, 92-108.

Zhang, Y., & Fricker, J. D. (2021). Quantifying the impact of COVID-19 on non-motorized transportation: A Bayesian structural time series model. *Transport Policy*, 103, 11-20.

Zhang, Y., & Fricker, J. D. (2021). Incorporating conflict risks in pedestrian-motorist interactions: A game theoretical approach. Accident Analysis & Prevention, 159, 106254.

Zhang, Y., Fricker, J. (2021). "Investigating Smart Traffic Signal Controllers at Signalized Crosswalks: A Reinforcement Learning Approach". *Accepted by IEEE Intelligent Transportation Systems Magazine*.

Zhang, Y., Fricker, J. (2022). "Forecasting the Motion and Behavior of Heterogenous Road Users at Crosswalks: A Spatial-Temporal Graph-Based LSTM Approach".

Zhang, Y., Fricker, J. (2022). "CrosswalkTrajectory: A Large-scale Spatial-Temporal Trajectory Dataset for Heterogeneous Road Users Behavior Prediction". *Pre-print.* URL: https://github.com/YZhang-Genghis/XwalkTrajectory.

Desai, J., Mathew, J. K., **Zhang, Y**., Hainje, R., Horton, D., Hasheminasab, S. M., ... & Bullock, D. M. (2022). Assessment of Indiana unmanned aerial system crash scene mapping program. Drones, 6(9), 259.

HONORS & AWARDS

Nellie Munson Teaching Assistant Award | Purdue University

STV Civil Engineering Grad Assistantship Endowment | Purdue University

STV Civil Engineering Grad Assistantship Endowment | Purdue University

PERSONAL WEBSITES

Personal Webpage: https://yzhang-genghis.github.io/

Google Scholar: https://scholar.google.com/citations?user=AHXbIzcAAAAJ&hl=zh-CN

LinkedIn: https://www.linkedin.com/in/yunchang-zhang-9758b2167/

GitHub: https://github.com/YZhang-Genghis

SOFTWARE & SKILLS

Programming Languages (from most to least experience)

C++, Python, PyTorch, C, R, MATLAB, SQL, Stata