

Haoran Su

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EDUCATION

New York University Ph.D. in Transportation Engineering focusing on Data Science and Machine Learning <u>Selected Courses</u> : Machine Learning, Deep Learning, Data Mining, Stochastic Modeling	New York, NY expected 06/2022
University of California, Berkeley M.Sc. in System Engineering <u>Selected Courses</u> : Artificial Intelligence, Dynamic Programming, Statistical Modeling	Berkeley, CA 05/2018
University of California, Berkeley B.Sc. Computer Science B.Sc. Civil Engineering <u>Selected Courses</u> : Data Structure, Algorithms, Computer Architecture, Software Engineering, Database	Berkeley, CA 05/2017 05/2017

EXPERIENCE

Siemens , North America R&D Hub <i>AI/Machine Learning Research Internship</i>	Princeton, New Jersey 05/2021 - 08/2021
<ul style="list-style-type: none">Developed a dynamic routing algorithm within a decentralized multi-agent reinforcement learning for emergency vehicle dispatched in congested urban traffic network.Incorporated the dynamic routing algorithm on traffic signal control to simultaneously improve average travel time within the traffic network. Developed the agent-simulator pipeline to establish the reinforcement learning training.Experimented and validated proposed method on both synthetic and real world map. Submitted the prototype for EMV traveling to Siemens Mobility and Aim-sum future updates.	
C2SMART Center , New York University <i>Research Assistant</i>	New York, NY 01/2020 - present
<ul style="list-style-type: none">Leading the project of deep reinforcement learning-based connected vehicles coordination for emergency services in mixed-connectivity urban settings. Conducted experiments on simulation software as well as in-field tests.Bridged the deep reinforcement learning and simulation software with Python and PyTorch packages. Maintaining the interaction channel for performance and scalability to cope with intensive dataset generated from field tests.Participated in autonomous vehicles platooning project to reduce congestion in traffic bottlenecks. Developed a LSTM-based model to send real-time control strategies to target vehicles.	
BUILT Lab , New York University <i>Research/Teaching Assistant</i>	New York, NY 06/2018 - 12/2019
<ul style="list-style-type: none">Collaborated with Uber for the Uber-transit booking service test pilot project.Launched a machine learning/deep learning pipeline to model and predict the probability of successful orderingDesigned and performed experiments for machine learning approaches and benchmark multinomial logit model.Instructed selected classes in graduate-level courses of Stochastic Modeling and Operation Research. Taught fundamentals in dynamic programming and linear programming. Drafted and graded homework assignments, coursework materials and exams. Held weekly office hours to help students solve questions in homework.	
SOGA Research Group , UC Berkeley <i>Research Assistant</i>	Berkeley, CA 08/2017 - 05/2018
<ul style="list-style-type: none">Developed a Python web crawler to collect real-time transit data from London TFL and BART systems.Dynamically rank most significant junctions via PageRank.Visualized network systems with predicted traffic flow on sierra-charlie, deployed in Docker and AWS EC2.	

PROJECTS

E-scooters Modal Demand Estimation in NYC (CitiBike)

- Established a multivariate log-log linear regression model to estimate ridership demand based on socio-demographically factors such as ratio of age groups, number of scooters provided and population on a multi-TAZ zone basis. Validated the proposed model based on MAE and coefficient of variation.
- Proposed a nonlinear multi-factor model to break down components of e-scooter demands are replacing other modes or replacing access/egress trip for transit. Result demonstrated distance as the pivot factor to separate two motivates for traveling via e-scooters. Evaluated coefficients of estimation via bootstrap method.
- Performed revenue analysis for Manhattan daily travel and compared with revenue management with CitiBike. The proposed model projects an annual revenue of \$77M for a fleet of 2000 e-scooters deployed in Manhattan.

Uber-Transit Booking Service Analysis (Uber Colorado)

- Data mining and wrangling based on designed data schema with users and trip information. Formulated model scope and identified as well as labeled users on 2 million trip information. Applied PCA and LDA to reduce dimensionality.
- Applied assorted classification algorithms including Logistic Regression, Random Forest, SVM, XGBoost and KNN, via built-in and self-developed python packages and increase the accuracy of target service usage by 20%.
- Established a LSTM-based deep neural network model to predict target user's multimodal traveling demand in proposed time-frame. Experimented on target population and increased booking by 30% through revenue management.

Reinforcement Learning on Connected Vehicle Coordination with Mixed-autonomy (Ph.D. Thesis)

- Customized OpenAI Gym to model urban roadway from microscopic motion planning perspective to macroscopic traffic management perspective. Established an interface to bridge PyTorch-RL frameworks with simulation software.
- Reproduced state-of-the-art value-based learning algorithms with prioritized experience replay and fixed targets through dueling/double DQN to dispatch real time coordination strategies for vehicles.
- Extended the model into Dec-POMDP settings against non-stationarity. Designed and improved multi-agent actor-critic methods for vehicle coordination. Saved 30% time for emergency vehicle passage than the benchmark system.

SELECTED PUBLICATIONS

Dynamic Queue-Jump Lane for Emergency Vehicles under Partially Connected Settings: A Multi-Agent Deep Reinforcement Learning Approach. **H Su**, K Shi, JYJ Chow, L Jin, arXiv preprint [arXiv:2003.01025](#) (Under Revision of Transportation Research Part C: Emerging Technologies)

EMVLight: Learning for Network-level Cooperation of Traffic Signal Control for Emergency Vehicles **H Su**, Y Zhong (Under Revision of IEEE Transaction of Intelligent Transportation System)

AWARDS AND CERTIFICATES

Dwight David Eisenhower Transportation Fellowship	10/2020
NYU School of Engineering PhD Fellowship	09/2019
C2SMART Student Scholarship	08/2018
Dean's List multiple semesters, UC Berkeley College of Engineering	2013 - 2017
Udemy certificate: Deep Reinforcement Learning: Actor-critic Methods	
Udemy certificate: Deep Q Learning in PyTorch	

TECHNICAL SKILLS

Programming Languages	Python, PyTorch, TensorFlow, Java, C/C++, Ruby-on-rail, Matlab, R
Libraries & Toolbox	Pandas, NumPy, SciKit-learn, TensorBoard, Matplotlib, Seaborn, Gym
Platforms & Tools	Git, Docker, Bash, Apache Hadoop, Jupyter, PySpark, AWS EC2, S3

LEADERSHIP AND SERVICE

Vice President of ITE NYU Chapter	2019 - present
President of Chi Epsilon, Engineering Honor Society at UC Berkeley Chapter	2016 - 2017
Reviewer for IEEE Transactions on Intelligent Transportation Systems	
Reviewer for Transportation Research Part C: Emerging Technologies	