

# Haoran Su

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## EDUCATION

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### New York University

New York, NY

Ph.D. in Transportation Engineering (Data Science and Machine Learning)

expected 12/2021

Thesis Advisors: Li Jin, Ph.D. and Joseph Chow, Ph.D.

Selected Courses: Data Mining, Machine Learning, Deep Learning, Stochastic Modeling

### University of California, Berkeley

Berkeley, CA

M.Sc. in System Engineering

05/2018

Selected Courses: Artificial Intelligence, Dynamic Programming, Statistical Modeling

### University of California, Berkeley

Berkeley, CA

B.Sc. Computer Science

05/2017

B.Sc. Civil Engineering

05/2017

Selected Courses: Data Structure, Algorithms, Computer Architecture, Software Engineering, Database

## TECHNICAL SKILLS

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### 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

## EXPERIENCE

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### C2SMART Center, New York University

New York, NY

Research Assistant

Jan. 2020 - present

- 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.

### Tandon School of Engineering, New York University

New York, NY

Teaching Assistant

Aug. 2018 - Dec. 2019

- 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.

### BUILT Lab, New York University

New York, NY

Research Assistant

06/2018 - 12/2019

- Lead the multimodal commute booking service analysis with Uber Denver through data science approaches.
- Launched a machine learning/deep learning pipeline to model and predict the probability of successful ordering.
- Designed and performed experiments for machine learning approaches and benchmark multinomial logit model.

### Tencent

Shanghai, China

Software Development Engineer Internship

06/2016 - 08/2016

- Developed a web application for Tencent mobile gaming department to monitor price item in-store to alert users.
- Established the backend with MVC framework under RESTful strategies and implemented with Python Flask.

- Integrated Mailgun as mailing API to send/receive emails with users.
- Styled the frontend with HTML5, CSS, JavaScript as well as JQuery etc.
- Deployed into the main Tencent gaming store to provide better user experience.

## RESEARCH

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### Uber-Transit Booking Service Analysis through Machine Learning Approaches

- Conducted data mining and wrangling based on self-designed data schema with users and trip information. Formulated model scope and identified as well as labeled users. Performed feature engineering including PCA and LDA to further reduce dimensionality.
- Applied state-of-the-art classification algorithms including Logistic Regression, Random Forest, SVM, XGBoost and KNN, via built-in and self-developed python packages.
- 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 increases ordering by 30% through revenue management.

### Deep Reinforcement Learning on Emergency Vehicles Coordination in Mixed-autonomy Settings

- 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.

### Survey of Supervised Learning CNN Models on Image Classification

- Reproduced various versions of ResNet, DenseNet, DarkNet(Yolo) and Inception CNNs as well as their combinations to test t1 and t5 accuracy on ImageNet/MNIST dataset. Applied overfitting by adopting early stopping and dropout.
- Developed and verified a new image augmentation method to improve testing accuracy by 2.5%.
- Compared model performance w.r.t training time, GPU usage, classification accuracy etc.

## AWARDS AND CERTIFICATES

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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
Certificate: Deep Reinforcement Learning: Actor-critic Methods	
Certificate: Deep Q Learning in PyTorch	
Certificate: Machine Learning in Python Scikit-learn	

## PUBLICATIONS AND PRESENTATIONS

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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](https://arxiv.org/abs/2003.01025) (Under Revision of Transportation Research Part C: Emerging Technologies)

V2I Connectivity-Based Dynamic Queue-Jump Lane for Emergency Vehicles: A Deep Reinforcement Learning Approach **H Su**, K Shi, L Jin, JYJ Chow arXiv preprint [arXiv:2008.00335](https://arxiv.org/abs/2008.00335) (Submitted to IEEE Intelligent Transportation System Conference)

Guiding and Coordinating for Emergency Vehicles under V2X communication protocols. (Transportation Research Annual Conference 2021)

## LEADERSHIP AND SERVICE

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Reviewer for IEEE Transactions Intelligent Transportation Systems  
 Reviewer for Transportation Research Part C: Emerging Technologies  
 President of Chi Epsilon

2016 - 2017