

Sevin Mohammadi

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<u>EXPERTISE</u>	Data Science Probabilistic Machine Learning Bayesian Learning Predictive Analytics Reinforcement Learning Sequential Data Modeling	
<u>EDUCATION</u>	Columbia University, NY, GPA: 4.06/4.00 (Jan '20 to Dec '24) Ph.D. in Engineering <i>Thesis:</i> Probabilistic Machine Learning for Travel Time and Trajectory Modeling and Decision-making.	
	University of Tennessee Knoxville, TN, GPA: 3.9/4.0 (Aug '17 to Dec '19) M.S. in Engineering <i>Project:</i> “Study of Driving Volatility in Connected and Cooperative Vehicle Systems” funded by NSF.	
<u>SKILLS</u>	Programming: Python, SQL, R Data Science Libraries: NumPy, Pandas, GeoPandas, Scikit-learn, TensorFlow, Pytorch, PyMC3 Others: Git, Shell	
<u>COURSEWORK</u>	Bayesian Machine Learning Causal Inference for Data Science Statistical Inference Uncertainty & Risk Data Analysis & Modeling Signal Processing & Noise Deep Learning Reinforcement Learning Infrastructure Systems Optimization Transportation Analytics & Logistics Big Data in Transportation	
<u>EXPERIENCE</u>	Center for Smart Streetscapes, Researcher & Student Leadership Council (Aug '23 to present) Geospatial Data Science & Deep Learning <ul style="list-style-type: none">Engineered a Transformer-based surrogate model with a Sequence-to-Sequence architecture, inspired by LLMs, to match noisy GPS trajectories to digital road maps.Delivered an 85% accuracy, surpassing 77% accuracy of state-of-the-art rule-based models.	
	Institution Representative <ul style="list-style-type: none">Promoted Center for Smart Streetscapes by organizing events & communicating its mission to public.	
	Smart Cities Research Center, Researcher (Jan '20 to Aug '23) Data Analytics & Simulation <ul style="list-style-type: none">Developed probabilistic data analytics for improving ambulance response in NYC.The model is now up and running with FDNY, reducing ambulance response times up to 133 seconds.Developed predictive model for learning spatial and temporal properties of ambulance and taxi travel times using Hierarchical Bayesian learning.Developed predictive model for ambulance travel time using Bayesian Neural Networks.Developed model outperformed NGBoost and Random Forest.Designed a heuristic ambulance dispatching policy, evaluated with discrete event simulation.Proved myopicness of greedy policy with reinforcement learning in particular Q-learning agent.The designed heuristic obtained superior performance over classic greedy policy.	
	Center for Transportation Research, Researcher (Aug '18 to Dec '19) Data-driven Analysis of Human Driving Behavior <ul style="list-style-type: none">Discovered empirical evidence of social interactions among drivers affecting microscopic driving behavior through the analysis of 151 million rows of time series data.Identified correlations of environmental factors with such behavior using a random parameter binary logit model.	

JOURNAL
PUBLICATIONS

- [1] **S. Mohammadi**, A. Smyth, "Surrogate Modeling of Trajectory Map-matching in Urban Road Networks using Transformer Seq2seq Model," IEEE Intelligent Transportation Systems, *revision submitted*, 2024.
- [2] **S. Mohammadi**, A. Olivier, A. Smyth, "Dynamic penalty-based dispatching decision-making for improved EMS response in urban environments: a heuristic approach," Sustainable Cities and Society, *under review*, 2024.
- [3] **S. Mohammadi**, A. Olivier, A. Smyth, "Probabilistic Prediction of Trip Travel Time and its variability using Hierarchical Bayesian Learning," Journal of Risk and Uncertainty in Engineering Systems, 2023.
- [4] A. Olivier, **S. Mohammadi**, A. Smyth, "Bayesian Neural Networks with Physics-Aware Regularization For Travel Time Modeling from Imbalanced Data," Computer-Aided Civil Infrastructure Engineering, 2023.
- [5] A. Olivier, M. Adams, **S. Mohammadi**, A. Smyth, "Data Analytics for Improved Closest Hospital Suggestion for EMS Operations in NYC," Sustainable Cities and Society, 2022.
- [6] E. L. de Larrea, H. Lam, E. Sanabria, J. Sethuraman, **S. Mohammadi**, A. Olivier, A. Smyth et al., "Simulating NYC Hospital Load Balancing During COVID-19," IEEE: Winter Simulation Conference, 2021.
- [7] E. Sanabria, H. Lam, E. L. de Larrea, J. Sethuraman, **S. Mohammadi**, A. Olivier, A. Smyth et al., "Short-term Adaptive Emergency Call Volume Prediction," IEEE: Winter Simulation Conference, 2021.
- [8] **S. Mohammadi**, R. Arvin, et al., "The Role of Drivers' Social Interactions in their Driving Behavior: Empirical Evidence and Implication for Traffic Flow," Transportation Research Part F: Traffic Psychology & Behavior, 2021.
- [9] A. Khattak, I. Mahdinia, **S. Mohammadi**, A. Mohammadnazar, B. Wali, "Big Data Generated by Connected and Automated Vehicles for Safety Monitoring, Assessment and Improvement," arXiv: Computers and Society, 2019.

PRESENTATIONS

- [1] "Dynamic Penalty-based Dispatching for Optimal EMS Response Times: A Heuristic Approach," INFORMS Annual Meeting, Washington, Seattle, 2024.
- [2] "Enhancing Smart City Mobility on Urban Road Networks with Neural Network-Based Map-Matching of GPS Trajectory Data," Columbia University Data Science Day, New York City, 2023.
- [3] "Optimizing Ambulances Hospital Transports in New York City," Columbia University Data Science Day, New York City, 2021.
- [4] "Social Influence on Driver Decisions Using Modeling and Gossip Algorithms," Transportation Research Board Annual Meeting, Washington, DC, 2019.

AWARDS

- INFORMS Doing Good with Good O.R. Student Paper Competition **Finalist**, 2021
- Recipient of the New York Women in Transportation Leonard Braun Memorial Scholarship (\$5000), 2022
- Selected for the Morgan Stanley Quantitative Finance Women's Ph.D. Mentorship Program, 2022
- Multiple NSF Conference Travel Awards

MENTORSHIP

- Mentor of MY Streetscape 2023 Summer School for high school students:
 - Eunice Yanes, will be majoring in Engineering Physics at Fordham University
 - Christopher Grullon, currently a freshman at Columbia University Engineering
Project title: Designing Safe Urban Traffic Intersections for Cyclists.
- Mentor of Columbia University 2023 Summer Undergraduate Research Experience Fellow:
 - Marylyn Carrillo, currently a senior student at the University of California, Los Angeles
Project title: **Manhattan in Motion: Visualizing Delivery Vehicle Crash Density for Safer Urban Mobility.**

OUTREACH,
VOLUNTEERING
& SERVICES

- Student Leadership Council for the Center for Smart Streetscapes, year 2023-24
- Girls' Science Day Volunteer at Columbia University, Spring 2023
- Vice President of Women's Transportation Seminar at UTK, Fall 2019
- Social Director of the Institute of Transportation Engineers at UTK, Spring 2019