Sevin Mohammadi

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Expertise

Data Science | **Predictive Machine Learning** | **Statistical Analysis** | **Quantitative Research**

Education

Columbia University, Ph.D. in Smart Cities, New York, NY 2020-2024

Thesis: Geospatial probabilistic machine learning for analyzing urban vehicular mobility patterns With decision-making application; GPA: 4.06/4.00.

University of Tennessee Knoxvill, M.Sc. in Transportation Science, Knoxville, TN; GPA: 3.90/4.00. 2017-2019

Amirkabir University of Technology, M.Sc. in Computational Hydrodynamics, Tehran 2012-2015

K. N. Toosi University of Technology, B.Sc. in Civil Engineering, Tehran 2008-2012

Coursework

Signal Processing & Noise | Infrastructure Systems Optimization | Transportation Analytics & Logistics | Causal Inference for Data Science | Uncertainty & Risk | Big Data in Transportation | Data Analysis & Modeling | Statistical Inference | Bayesian Machine Learning | Deep Learning | Reinforcement Learning

Professional Experience

Columbia University in the City of New York, *Smart Cities Lab and Center for Smart Streetscape*

- *Associate Researcher* Jan 2025- Jun 2025
  - Developed a dynamic, penalty-based **decision-making system** for EMS dispatch optimization, integrating **supply-demand** quantification with **data science**, **heuristic policies**, and **probabilistic simulation** to enhance response times in high-demand urban areas.
- *Graduate Researcher, Teaching Assistant, and Student Leadership Council* Jan 2020- Dec 2024
  - Developed **NLP-enabled** trajectory analysis using **Transformer architecture**, integrating **context-aware deep learning** and **geospatial analytics** for accurate path inference in urban road networks.
  - Designed a **probabilistic framework** for travel time **prediction** using **Bayesian regression with random parameters**, enhancing uncertainty quantification and **risk assessment** in transportation systems.
  - Applied **Bayesian neural networks with physics-aware regularization** to model travel time variability, addressing data imbalances and improving predictive accuracy in transportation analytics.
  - Developed a **probabilistic decision-making toolbox** for hospital recommendation, successfully deployed by the Fire Department of New York, transforming data analyses into actionable insights.

The University of Tennessee, Knoxville, *Center for Transportation Research*

- *Graduate Researcher and Teaching Assistant* Aug 2018- Dec 2019
  - Identified correlations between environmental factors and driving behavior by applying **data mining** to large mobility **time series** and developing a **random parameter binary logit model** for **predictive analysis**.

Skills

Programming: Python, SQL, R | **DS:** NumPy, Pandas, GeoPandas, Scikit-learn, NetworkX, TensorFlow, Pytorch, PyMC3 | **Others:** Git, Shell | **Soft:** Critical Thinking, Active Learning, Communication, Adaptability.

Journal Publications

[1] S. Mohammadi, A. Smyth, "NLP-enabled trajectory map-matching in urban road networks using Transformer seq2seq model," IEEE Intelligent Transportation Systems, *revision submitted*, 2025.

[2] S. Mohammadi et al., "Dynamic penalty-based dispatching decision-making for improved EMS response in urban environments: a heuristic approach," Frontiers in Future Transportation, *under review*, 2025.

[3] S. Mohammadi et al., "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 et al., "Bayesian neural networks with physics-aware regularization for travel time modeling from imbalanced data," Computer-Aided Civil Infrastructure Engineering, 2023.

[5] A. Olivier et al., "Data analytics for improved closest hospital suggestion for EMS operations in NYC," Sustainable Cities and Society, 2022.

[6] E. L. de Larrea et al., "Simulating NYC hospital load balancing during COVID-19," IEEE: WSC, 2021.

[7] E. Sanabria et al., "Short-term adaptive emergency call volume prediction," IEEE: WSC, 2021.

[8] S. Mohammadi et al., "The role of drivers' social interactions in their driving behavior: empirical evidence and implications for car-following and traffic flow," TR Part F: Traffic Psychology and Behavior, 2021.

Awards

- Columbia University Academic Award for full tuition, research and teaching assistantships 2020-2024
- INFORMS Doing Good with Good O.R. student paper competition finalist 2021
- Morgan Stanley Women in Quantitative Finance Mentorship Program 2022
- The New York City Women in Transportation Leonard Braun Memorial Scholarship 2022
- University of Tennessee Academic Award for full tuition, research and teaching assistantships 2017-2019