

Zuhayer Mahtab

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Summary

Ph.D. candidate with 4+ years of experience modeling and solving linear and non-linear combinatorial optimization problems with transportation and supply chain application areas. Proficient in developing solution heuristics, building simulation models of production processes and machine learning models, and working with real large-scale datasets.

Education

University of Southern California

August 2020 – December 2025

Ph.D. in Industrial and Systems Engineering

Los Angeles, CA

Relevant Coursework: Linear Programming, Network Flow and Combinatorial Optimization, Convex Optimization, Stochastic Systems, Stochastic Optimization, Large Scale Optimization

University of Southern California

August 2022 – May 2024

M.S. in Operations Research Engineering (GPA: 3.97/4.00)

Los Angeles, CA

Relevant Coursework: Machine Learning, Database Systems, Data Mining, Analysis of Algorithms

Bangladesh University of Engineering and Technology

July 2014 – October 2018

B.Sc. in Industrial and Production Engineering (GPA: 3.85/4.00)

Dhaka, Bangladesh

Skills

- **Programming Languages:** Python, Java, R, MySQL
- **Modeling and Solvers:** Gurobi, GAMS, CPLEX, FICO Xpress, Rockwell Arena
- **Machine Learning and Visualization:** Tableau, Scikit-learn, PyTorch, Darts

Work Experience

Research Assistant

Aug. 2021 – Present

University of Southern California

Los Angeles, CA

- Developed a multi-objective **mixed integer quadratic program (MIQP)** model in Gurobi for a carpool rideshare system to minimize the total distance traveled and maximize the passenger service rate.
- Developed a **Branch-and-Price** and **Adaptive Large Neighborhood Search algorithms** using Python and Gurobipy to solve the MIQP ridesharing model, reducing total travel time by 15% and solving a 600 node network exactly within 30 minutes of CPU time (14.3 times faster than Gurobi).
- Built a coordinate descent-based algorithm that can exactly solve a **quadratic programming** model (QCP) while being 79% faster than a commercial solver (Gurobi).
- Designed a multi-objective **stochastic mixed integer programming** model using Gurobi for optimizing the rideshare system with travel time and passenger cancellation uncertainties.
- Developed a Stochastic Average Approximation method with variance reduction techniques that can provide solutions within 18% of the true optimal.
- Designed an efficient heuristic for driver-passenger matching in a real-time large-scale incentivized carpool rideshare system using Python, matching up to 10,000 rideshare requests per hour with drivers in 4 minutes.
- Performed ETL on the New York Taxicab dataset (1 billion+ rows) to construct test instances; filled missing values, performed anomaly detection and data analysis.

Teaching Assistant

Aug. 2021 – Present

University of Southern California

Los Angeles, CA

- Co-taught 65+ students in a graduate data mining course focusing on multivariate time series forecasting and unsupervised learning.
- Co-taught undergraduate courses on supply chain design and planning, focusing on safety stock estimation techniques, workforce optimization, demand forecasting, network design and optimization, inventory planning, and capacity estimation.

Industrial Engineering Intern

Aug. 2017 – Sep. 2017

Akij Food and Beverage Limited

Dhaka, Bangladesh

- Conducted extensive time study and line balancing on fruit and milk packaging lines to achieve a 7.5% improvement in efficiency.
- Performed statistical process control analysis and process capability analysis, identifying critical out-of-control processes and recommending targeted equipment upgrades to improve production stability.
- Developed a simulation model using Rockwell Arena for the entire production process and performed **simulation optimization** using OptQuest to maximize utilization.

Project Experience

- Developed a sales forecasting model for a national grocery store chain using LightGBM, XGBoost, Random Forest, and Holt-Winters method, achieving low RMSE and placing 21st (out of 764 participants) on the Kaggle global leaderboard.
- Developed a framework for anomaly detection in time series using neural networks, achieving a high F-1 score and outperforming all benchmark models.
- Built a voting-ensemble-based framework for predicting customer churn, achieving high prediction accuracy (90%); performed SHAP analysis to analyze feature importance.
- Designed a stochastic mixed integer programming model for a multi-echelon supply chain using GAMS and CPLEX to minimize stockout at all levels and optimally place facility locations and allocate inventory.
- Developed a simulation model using Arena for a complex manufacturing process of a Fortune 500 company, improving OEE across all stages and reducing excessive queue lengths.
- Incorporated Tableau dashboards into a SAP S4/HANA production and procurement planning pipeline to get a live overview of the inventory, revenue, and profits.

Activities & Awards

- Viterbi School Fellowship, University of Southern California, 2020-2021
- Treasurer, Bangladesh Students Association, University of Southern California, 2021-2022
- Social Chair, Bangladesh Students Association, University of Southern California, 2023

Selected Publications (4 of 9)

- **Real-Time Large-Scale Ridesharing**
Mahtab, Z., Dessouky, M. (Working Paper)
- **The Stochastic Rideshare Routing Problem**
Mahtab, Z., Dessouky, M. (Working Paper)
- **The Ridesharing Routing Problem with Flexible Pickup and Drop-off Points**
Mahtab, Z., Dessouky, M. (Under revision at Transportation Research: Part B)
- **A New Multi-Objective Robust Stochastic Optimization Model for Distribution of Relief Goods under Uncertainty.** International Journal of Systems Science: Operations and Logistics, 9(2), 241–262 (2022).
Mahtab, Z., Azeem, A., Ali, S. M., Paul, S. K.