Sudhan Bhattarai

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Professional Summary

Data Science and Operations Research professional with expertise in optimization, statistical analysis, and machine learning. Skilled in developing data-driven decision-making frameworks and using advanced modeling techniques to enhance efficiency and resilience in dynamic environments. Proficient in Python, Gurobi, and building predictive models from historical data to solve complex business challenges.

Education

Ph.D. in Industrial Engineering, *Clemson University,* Clemson, SC *2021 – 2025*

M.S. in Industrial Engineering, *Colorado State University-Pueblo,* Pueblo, CO *2019 – 2021*

B.E. in Industrial Engineering, *Tribhuvan University,* Kathmandu, Nepal *2012 – 2016*

Experience

Clemson University — Clemson, SC

Graduate Research Assistant & PhD Candidate *Jan. 2022 – Present*

- Implemented scalable decomposition-based algorithms for **large-scale stochastic optimization**.
- **Processed and analyzed large datasets**, conducting `statistical analysis, modeling` and `hypothesis testing`.
- Performed in-depth `results analysis and visualization` to extract managerial insights for strategic decision-making.
- Built and optimized decision models in `Python` and `Gurobi` for logistics and resource allocation.
- Utilized high-performance parallel computing to accelerate large-scale optimization tasks.

Graduate Teaching Assistant *Aug. 2021 – Dec. 2021*

- **Mentored** students and provided academic support in Industrial Applications of Probability and Statistics.

Colorado State University-Pueblo — Pueblo, CO

Graduate Assistant & MS Candidate *Aug. 2019 – May 2021*

- Developed optimization models for workforce scheduling and routing **to improve operational efficiency**.
- Designed and tuned machine learning models (Regression, Decision Trees, Gradient Boosting) using `scikit-learn`.
- Implemented deep learning models (DNN, CNN, RNN) using `TensorFlow` and `Keras` for healthcare analytics.

Teaching Instructor *Aug. 2020 – Dec. 2020*

- Delivered lectures for Introduction to Engineering, fostering student engagement and improving learning outcomes.

Selected Projects

Clemson University — Clemson, SC

Multi-Stage Stochastic Optimization with Rolling Forecasts *Feb. 2025 – Ongoing*

- Developing stochastic optimization models that **leverage real-time forecasts** to improve decision-making.
- Modeling rolling forecasts using a Martingale time-series approach to enable **robust, data-driven decisions**.

Data-Driven Stochastic Optimization for Logistics Networks *Jan. 2024 – Jan. 2025*

- Designed a distributionally robust optimization framework to **improve out-of-sample performance**.

- Developed data-driven stochastic optimization models to incorporate varying levels of risk measures.
- Approximated true stochastic models using `Kernel Regression`, integrating it into logistics optimization.
- Provided **actionable managerial insights** based on diverse data availability scenarios.
- Achieved up to a **20% reduction** in logistics network costs using a data-driven optimization approach.

Stochastic Programming for Humanitarian Logistics Networks *Jan. 2022 – Jan. 2024*

- Developed **adaptive decision policies** for disaster relief logistics under uncertain demand conditions.
- Built a **data-driven optimization framework** using real-world case studies of hurricanes Florence and Ian.
- Integrated `autoregressive time-series` models into stochastic optimization to **improve decision-making**.
- Achieved up to **33% cost savings** compared to myopic decision policies by implementing adaptive policies.
- Developed logistics models with uncertain horizons, yielding **47% cost savings** over myopic policies.

Colorado State University-Pueblo **Pueblo, CO**

Multi-Objective Workforce Scheduling and Routing *Aug. 2019 – May 2021*

- Formulated and optimized home healthcare nurse scheduling and routing as a `Mixed-Integer Program (MIP)`.
- Developed a **Pareto-optimal solution framework** to balance profitability, nurse satisfaction, and patient outcomes.

Technical Skills

- **Programming:** Python (advanced skills in `pandas`, `numpy`, `matplotlib`, `seaborn`, `scipy`), R
- **Optimization & Simulation Software:** Gurobi Optimization Solver, Arena Simulation
- **Mathematical Modeling & Algorithms:** Linear Programming, Mixed-Integer Programming, Stochastic Programming, Convex Optimization, Markov Decision Processes, Dynamic Programming, Benders' Decomposition, Stochastic Dual Dynamic Programming, Value and Policy Iteration, Reinforcement Learning
- **Data Analysis:** Preprocessing & Exploratory Analysis, Statistical Modeling, Hypothesis Testing, Descriptive and Inferential Statistics, Data Visualization, Time Series Modeling (Autoregressive Models), Demand Forecasting
- **Machine Learning:** `Scikit-learn` (Regression, Classification, Clustering), `TensorFlow` (Deep Learning, Neural Networks)
- **High-Performance Computing:** SLURM job scheduling on Linux, SSH-based cluster computing

Honors

INFORMS Student Chapter, Clemson University **Clemson, SC**

President *Aug. 2022 – May 2023*

- Led events, including orientation sessions, conference preparation seminars, and K-12 outreach programs.
- Chapter awarded *Magna Cum Laude* at INFORMS Annual Meeting, 2023.

Presentations

- **Invited Session Presenter** at *INFORMS Annual Meeting 2024* **Seattle, WA**
- **Community Committee Choice Session Presenter** at *INFORMS Annual Meeting 2023* **Phoenix, AZ**
- **Contributed Session Presenter** at *IISE Annual Conference 2023* **New Orleans, AZ**
- **Community Session Presenter** at *INFORMS Annual Meeting 2022* **Indianapolis, IN**

Selected Publications

- **Bhattarai, Sudhan**, and Yongjia Song. "Multistage stochastic programming for integrated network optimization in hurricane relief logistics and evacuation planning." Networks 85.1 (2025): 3-37. https://doi.org/10.1002/net.22249
- **Bhattarai, Sudhan**, and Yongjia Song. "Integrated Hurricane Relief Logistics and Evacuation Planning under Forecast Uncertainty: A Case Study for Hurricane Florence." Proceedings of the IISE Annual Conference & Expo 2023. https://par.nsf.gov/biblio/10428837
- **Bhattarai, Sudhan**, Yaneth Correa-Martinez, and Leonardo Bedoya-Valencia. "A multi-objective home healthcare routing problem." International Journal of Healthcare Management 16.2 (2023): 311-325. https://doi.org/10.1080/20479700.2022.2102111