Kartikey Sharma

Curriculum Vitae

Room 2105, Zuse Institute Berlin
Berlin, 12167, Germany
✉ *kartikey.sharma@zib.de*
kartikeyrinwa.github.io

Research Interests

Optimization under uncertainty, Machine Learning, Transportation, Surrogate based Optimization, Power Networks

Education

2014 - 2020 **PhD**, *IEMS, Northwestern University, Evanston*, Advisor: Omid Nohadani.
Title: Optimization under Variable Uncertainty

2014 - 2015 **MS**, *IEMS, Northwestern University, Evanston*, *GPA – 3.9*.

2009 - 2014 **MBA**, *Indian Institute of Technology, Roorkee*, *GPA: 9.1/10*.

2009 - 2014 **B.Tech**, *Indian Institute of Technology, Roorkee*, *GPA – 9.1/10*.

Experience

2020 - **Postdoctoral Researcher and Research Area Lead**, Zuse Institute Berlin, Advisor: Sebastian Pokutta.
Worked on topics in Robust Optimization and the both the theoretical and practical aspects of Machine Learning

2015 - 2020 **Research Assistant**, Northwestern University, IL.
Developed robust optimization models for variable uncertainties:
- *Decision Dependent Uncertainty*: Uncertainty sets can depend on decisions made within the problem. I evaluated the complexity of such problems and provided a family of models which improve the computational performance. These models are applicable to transportation, power distribution etc.
- *Connected Uncertainty*: The Uncertainty model in a period can depend on uncertainty realizations from previous periods. I provided reformulations for general robust and distributionally robust problems and evaluated their performance for knapsack and portfolio management problems.
- *Connected Classifier*: I extended the Minimax Probability Machine model to streaming data such that the classifier can adapt to new observations. This has direct applications in credit fraud detection, wind speed detection etc.

2018 **Summer Reserarch Scientist Intern**, Amazon, Seattle, WA.
Developed optimal shipment flow models in the Supply Chain and Optimization Department. Developed a novel optimization model along with a parameter estimation procedure. Delivered evaluations of the final model through simulations on historical data.

2013 **Summer Intern**, Deutsche Bank, Mumbai.
At the Custodial Services Department, worked on processes involved in foreign investment into India. Prepared a Key Operating Procedures manual for the bank's Account Documentation Team.

Awards

George Nemhauser Best Paper Award, 2018, by the IEMS department of Northwestern University

Graduate fellowship by Northwestern's Graduate School, 2019

Journal Publications

[1] Nohadani, O., Sharma, K. *Optimization under Decision Dependent Uncertainty*. **SIAM Journal on Optimization**, 28(2), 1773-1795, 2018

[2] Nohadani, O., Sharma, K. *Optimization under Connected Uncertainty*. **INFORMS Journal on Optimization**, 2022

[3] Kossen, T., Hirzel, M. A., Madai, V. I., Boenisch, F., Hennemuth, A., Hildebrand, K., Pokutta, S., Sharma, K., Hilbert, A., Sobesky, J., Galinovic, I., Khalil, A. A., Fiebach, J. B., and Frey, D. (2021). *Towards sharing brain images: Differentially private TOF-MRA images with segmentation labels using generative adversarial networks*. **Frontiers in Artificial Intelligence**, 5, 2022

[4] Aigner, K., Bärmann, A., Braun, K, Liers, F., Pokutta, S., Schneider, O., Sharma, K., Tschuppik, S. *Data-driven Distributionally Robust Optimization Over Time*. **INFORMS Journal on Optimization**, 2023

[5] Kruser, J., Sharma, K., Holl, J., and Nohadani, O. *Identifying Patterns of Medical Intervention in Acute Respiratory Failure: A Retrospective Observational Study*. **Critical Care Explorations**, 2023

Conference Proceedings

[1] Sharma, K., Hendrych, D., Besançon, M., and Pokutta, S. *Network Design for the Traffic Assignment Problem with Mixed-Integer Frank-Wolfe*. **Proceedings of INFORMS Optimization Society Conference**, 2024

[2] Wäldchen, S., Sharma, K., Zimmer, M., Turan, B., and Pokutta, S. *Merlin-Arthur Classifiers: Formal Interpretability with Interactive Black Boxes*. **Proceedings of International Conference on Artificial Intelligence and Statistics**, 2024

Working Papers

[1] Nohadani, O., Sharma, K. *Fast Robust Classifiers for Streaming Data*. Under Review

[2] Göß, A., Martin, A., Pokutta, S., and Sharma, K. *Norm-induced Cuts: Optimization with Lipschitzian Black-box Functions*. Under Review

[3] Han, E., Sharma, K., Singh, K., and Nohadani, O. *Dynamic Capacity Management for Deferred Surgeries*. In-preparation

Presentations

INFORMS Optimization Society, Houston

INFORMS Annual Meeting 2023, Phoenix

German OR Society Conference 2023, Hamburg

Optimization and Machine Learning Workshop, Waischenfeld

INFORMS Annual Meeting 2022, Indianapolis

DMV Annual Meeting 2022, Berlin

ICCOPT 2022, Bethlehem

Manufacturing Services and Operations Management Conference 2022, Munich

INFORMS Annual Meeting 2021, Anaheim

INFORMS Annual Meeting 2019, Seattle

INFORMS Annual Meeting 2018, Phoenix

ISMP 2018, Bordeaux

INFORMS Annual Meeting 2017, Houston

IFORS 2017, Quebec City

Poster, NEMFEST Workshop 2017, Atlanta

INFORMS Annual Meeting 2016, Nashville

Teaching Experience

Summer 2024	Lecturer for Optimization under Uncertainty at TU Berlin
Winter 2020	Teaching Assistant for Organizational Behavior at NU
Spring 2019	Teaching Assistant for Foundations of Optimization at NU
Winter 2018	Teaching Assistant for Probability at NU
Fall 2015, 2016	Teaching Assistant for Mathematical Programming at NU

Computer skills

Languages	Python, Julia, Java, C++
Software	MATLAB, R, Gurobi, LaTeX

Professional Groups

2022-	Postdoctoral Representative, MATH+
2016-2017	President, Northwestern University INFORMS Chapter
2015-2016	Secretary, Northwestern University INFORMS Chapter

Organization and Outreach

2024	Presenting GPT enabled interactive robot at LNdW at ZIB
2024	Member of the organizing committee of the BMS-BGSMath Junior Meeting in Berlin
2023	Member of the organizing committee of the MATH+ Thematic Einstein Semester in Berlin

Languages

English, Hindi

Relevant Courses

Mathematical Statistics, Mathematical Optimization I&II (Linear and Nonlinear Optimization), Robust Optimization, Stochastic Optimization, Large Scale Optimization, Dynamic Programming, Combinatorial Optimization