AKHILESH SONI

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Career Summary

4^{th} year Ph.D. student with expertise in mathematical optimization and machine learning.

Education

University of Wisconsin Madison *August 2023 (expected)*
Ph.D. in Industrial & Systems Engineering (Operations Research)
Thesis: "Discrete optimization methods for scheduling and matrix completion"

University of Wisconsin Madison *May 2022*
M.S. in Computer Science, GPA: 3.82/4.0

University of Wisconsin Madison *December 2019*
M.S. in Industrial & Systems Engineering, GPA: 3.69/4.0

Indian Institute of Technology (IIT) Dhanbad, India *May 2017*
B.Tech. in Mechanical Engineering, GPA: 9.32/10

Work Experience

University of Wisconsin Madison

- *Research Assistant*
  Collaboration with ExxonMobil Corporation *2018-2020*
  - Developed a mixed-integer programming based rolling horizon framework for crew scheduling in an unconventional oil field development.
  - The proposed approach yields a solution at the daily time-scale by solving a sequence of coarser time-scale MILP problems.

  Collaboration with American Family Insurance *2020-Present*
  - Developed Mixed Integer Subspace Selector with Dynamic Subspace Generation framework (MISS-DSG) for the subspace clustering with missing data problem.
  - Integrated subspace generation and clustering in a single, unified optimization framework without requiring any hyperparameter tuning.
- *Teaching Assistant* *Sprong, 2020*
  - ISyE 323: Operations Research-Deterministic Modeling

Amazon.com

- *Research Scientist Intern, Group: Modeling and Optimization* *June 2021-Aug 2021*
  - Graph neural net based learning approach for reducing search space of a network design model based on mixed integer programming.
- *Research Scientist Intern, Group: Modeling and Optimization* *May 2020-Aug 2020*
  - Developed a regional decomposition based solution approach for large scale mixed integer network design model using existing state-of-the art methods.

Schneider National

- *Supply Chain Engineering Intern* *June 2019-Aug 2019*
  - Developed a cost forecasting model to predict carrier freight rates in spot market in USA.

Publications

- Soni, A., Linderoth, J., Luedtke, J., Pimentel-Alarcón, D. (2021) Integer Programming Approaches To Subspace Clustering With Missing Data, *OPT2021: 13th Annual Workshop on Optimization for Machine Learning, NeurIPS*
- Soni, A., Linderoth, J., Luedtke, J., Rigterink,F. (2020) Mixed-Integer Linear Programming for Scheduling Unconventional Oil Field Development, *Optimization and Engineering*

Conference Presentation

Mixed Integer Programming Workshop

- Integer programming approach to high rank matrix completion *May 2021*
- Mixed Integer Programming for Unconventional Oil Field Development. *May 2020*

INFORMS Optimization Society

- Integer programming approach to subspace clustering with missing data *March 2022*

NeurIPS
Optimization and Machine Learning workshop

- Integer programming approach to subspace clustering with missing data *December 2021*

Technical Strengths and Software Skills

- Mathematical Programming, Large scale and data driven optimization, Predictive Analytics, Transportation Modeling, Machine Leaarning, Network Optimization, Time-series forecasting
- Java, Python, Julia, AMPL, Emacs, Matlab, Gurobi, SQL, PyTorch, UNIX, Version Control, LaTeX

Graduate Coursework

- *Industrial & Systems Engineering*: Intro to optimization, Linear optimization, Integer optimization, Nonlinear programming, Engineering models for supply chain, Stochastic modeling, Machine learning in action, Simulation modeling, Dynamic programming, Stochastic programming
- *Computer Science/ Maths*: Intro to algorithms, Matrix methods in machine learning, Real analysis, Intro to combinatorial optimization, Mathematical foundations of machine learning

Academic Achievements

- Spotlight presentation, Optimization and machine learning workshop, NeurIPS, 2021
- Travel grant for mixed integer programming workshop, 2021
- Recipient of Vinod K & J. Gail Sahney Scholarship at UW-Madison, 2020
- Recipient of Mitacs Fellowship to intern at University of Windsor, Canada, 2016

Service

- Reviewer: Annals of Operations Research
- President of INFORMS UW-Madison Chapter, 2021-2022

References

- Prof. Jeff Linderoth, Indutrial & Systems Engineering, UW-Madison, linderoth@wisc.edu
- Prof. Jim Luedtke, Indutrial & Systems Engineering, UW-Madison, jim.luedtke@wisc.edu