Navish Kumar

navish.kumar@unibas.ch

Google Scholar

Github

Education

Sept 2022 – present
PhD in Optimization for Machine Learning.
Department of Mathematics and Computer Science, University of Basel, Switzerland

July 2017 – July 2022
Master of Science (with integrated Bachelor's) in Economics | Degree.
Indian Institute of Technology (IIT) Kharagpur, Kharagpur-721302, West Bengal

Research Publications

Published

1. Rajesh Kannan, M., Kumar, N., & Pragada, S. (2022). Normalized laplacians for gain graphs. *American Journal of Combinatorics*. https://ajcombinatorics.org/Volume1/V1.02.pdf
2. Schrader, M. C., Kumar, N., Collignon, N., Astefanoaei, M. S., Sørig, E., Yoon, S., Xu, K., & Srivastava, A. (2022). Modelling the performance of delivery vehicles across urban micro-regions to accelerate the transition to cargo-bike logistics. *NeurIPS 2022 Workshop on Tackling Climate Change with Machine Learning*. https://www.climatechange.ai/papers/neurips2022/100
3. Rajesh Kannan, M., Kumar, N., & Pragada, S. (2021). Bounds for the extremal eigenvalues of gain laplacian matrices. *Linear Algebra and its Applications*. https://doi.org/10.1016/j.laa.2021.05.009
4. Mathew, B., Kumar, N., Goyal, P., & Mukherjee, A. (2020). Interaction dynamics between hate and counter users on twitter, 116–124, Proceedings of the 7th ACM IKDD CoDS and 25th COMAD, Association for Computing Machinery, New York, NY, USA. https://doi.org/10.1145/3371158.3371172

Skills

Programming	Python, MATLAB, PySpark, SQL[1], GeoPandas.
Applied Maths	Matlab, CVXOPT, Networkx, PyGSP, IBM-Qiskit.
ML/DL/NLP Libraries	Pytorch, NLTK, BeautifulSoup.

[1] beginner

Industry Projects

July 2022 – Present

IT University of Copenhagen | Green Last Mile | Remote + Copenhagen

Last Mile logistics for Cargo Bikes: https://www.climatechange.ai/papers/neurips2022/100

- Developing data-driven tools to allow for high-fidelity simulation of hybrid (vans+cargo-bikes) fleet-operation under real-world settings to enable key stakeholders to run feasibility studies towards optimizing and diversifying their fleet composition in a cost-effective manner.

Research Internships

May 2022 – Aug 2022

User Interface Group | Aalto University | Finland

Design AI:

- Worked on the software development of a figma plugin which is an end-to-end pipeline (comprised of figma user interfaces (UI), proto buffer API, kubernetes and docker containers) for providing suggestions and fixes to the designers to improve their designs.
- This work included front end development using React JS for the UI as well as back end coding of logic for correcting design violations when compared against Google material design violation rules.

Dec 2020 – Feb 2021

Institute of Mathematics for Industry | Kyushu University, Japan

Adaptive Stochastic Algorithms for PCA: https://bit.ly/3uNoXBc *(unpublished)*

- Proposed a novel adaptive algorithm, viz. ASAP, a hybrid algorithm formed from vanilla Oja's method and the Adam algorithm for streaming principal component analysis (PCA) Problem in stochastic and increasing batch size setting.

May 2019 – July 2019

Institute for Informatics | University of Bergen, Norway

Low-rank Matrix completion: https://bit.ly/3gj3iKU *(unpublished)*

- Worked on developing algorithms for Matrix completion and Matrix Rigidity problem over finite-fields $GF(p)$ and real fields.

Research Visits/Collaborations

May 2021 – Aug 2021

Seminar for Applied Mathematics | ETH Zürich, Switzerland

Deep Neural Networks and Scientific Computing: (PPTs || Report)

- Worked on studying and improving training of ordinary differential equation based formulation of recurrent neural networks by integrating attention mechanisms and running experimental trials.

Dec 2019 (1 month)

Quantum Lab | Shanghai University, China

Optimization and Quantum Computing:

- Worked on understanding iterative optimization methods that can gain speedup using the framework and tools from quantum Computing.

Scholastic Achievements

- **Knowledge2Action Academy:** Selected in K2A acdemy that aims at different forms of knowledge outputs for different Sustainable Development Goals (SDGs) actors that can be communicated through a wide array of tools and skills.

- **ThinkSwiss Research Scholarship:** Received for my research visit to ETH Zürich, Switzerland.