Vinit Ranjan

PhD Candidate
Princeton University

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Education

Princeton University — Princeton, NJ
PhD in Operations Research & Financial Engineering — Aug 2020 - Present
- Thesis: "Data-driven Algorithm Verification and Design for Real-time Optimization"
- Supervision: Prof. B. Stellato

Duke University — Durham, NC
B.S. in Computer Science, Mathematics — Aug 2016 - Dec 2019
- Minor in Financial Economics
- Graduation Honors: Magna Cum Laude, GPA: 3.929/4.00

Research Interests

- Algorithm verification and design for real-time decision making.
- Machine learning to accelerate optimzation algorithms.
- Applications in fast real-time optimzation, including portfolio optimization and control of high-speed autonomous systems.

Professional Experience

Quantbot Technologies — New York, NY
Quantitative Research Intern — May 2023 - Aug 2023

Google Health Research Team — Palo Alto, CA
Software Engineering Intern — May 2019 - Aug 2019

Lineage Logistics — San Francisco, CA
Research Intern — May 2018 - Aug 2018, Jan 2020 - Jun 2020

Research Experience

Princeton University — Princeton, NJ
PhD Research — Jan 2021 - Present
- Project: "Algorithm Verification and Design for Real-Time Optimization"
- Supervision: B. Stellato

Quantbot Technologies — New York, NY
Quantitative Research Intern — May 2023 - Aug 2023
- Project: "Feature Selection Methods via Accelerated Convex Optimization and Machine Learning Schemes"
- Supervision: R. Der and L. Tang

Lineage Logistics — San Francisco, CA
Research Intern — May 2018 - Aug 2018, Jan 2020 - Jun 2020
- Project: "Geometric Algorithms for Point Cloud Filtering"
- Supervision: E. Wolf and C. Eckman

Duke University Computer Science Department — Durham, NC
Undergraduate Student Researcher — Aug 2017 - May 2018
- Project: "Machine Learning Applications in Healthcare"
- Supervision: L. Carin

Princeton, April 9, 2025

Duke University Mathematics Department Durham, NC
Undergraduate Student Researcher May 2017 - Aug 2017
- Project: "Block Size in Geometric(p)-biased Permutations"
- Supervision: R. Durrett, M. Junge, and J. Nolen

Awards

- Best Poster Award Jul 2024
  Princeton Workshop on Optimization, Learning, and Control
- Karl Menger Award (2x Recipient) May 2017, May 2019
  Duke University Mathematics Department for excellence in mathematical competitions
- Leonard Euler Prize (COMAP Scholarship, $10,000) May 2019
  2019 Consortium for Mathematics and Its Applications (COMAP), Mathematical/Interdisciplinary Contest in Modeling (MCM/ICM), ***Outstanding solution*** *(top 7 out of 5000+)*
- Reproducible Research Competition, 2nd place Oct 2018
  Carnegie Mellon Sports Analytics Conference
- Meritorious Solution May 2018
  Top 15% solution in 2018 COMAP MCM/ICM
- Finalist Solution May 2017
  Top 11 of 1500+ in 2017 COMAP MCM/ICM
- Duke University Dean's List Multiple semesters
  For earning a top GPA, earned with distinction in Fall 2016, Spring 2017, Spring 2019, and additionally in Fall 2017, Spring 2018.

Publications

Preprints

[P4] **V. Ranjan** and B. Stellato, "Algoverify: A python toolbox for verification of first-order methods," e-print: `Working`.
In preparation.

[P3] J. Park, **V. Ranjan**, and B. Stellato, "Data-driven analysis of first-order methods via distributionally robust optimization," e-print: `Working`.
In preparation.

[P2] **V. Ranjan**, J. Park, S. Gualandi, A. Lodi, and B. Stellato, "Exact verification of first-order methods via mixed-integer linear programming," *arXiv e-prints*, Dec. 2024. arXiv: `2412.11330`.
First round review in *SIAM Journal on Optimization.*
Code respository.

[P1] **V. Ranjan** and B. Stellato, "Verification of first-order methods for parametric quadratic optimization," *arXiv e-prints*, Mar. 2024. arXiv: `2403.03331`.
Second round review in *Mathematical Programming.*
Code respository.

Journal articles

[J3] **V. Ranjan**, J. Ryang, and A. Xue, "Time to leave the louvre: A computational network analysis," *The Journal of Undergraduate Mathematics and Its Applications*, vol. 40, no. 2-3, pp. 135–160, 2019.

[J2] I. Cristali, **V. Ranjan**, J. Steinberg, E. Beckman, R. Durrett, M. Junge, and J. Nolen, "Block size in geometric(p)-biased permutations," *Electronic Communications in Probability*, vol. 23, 2018.

[J1] **V. Ranjan**, J. Ryang, and K. Zhang, "An analysis of the impact of self-driving cars on traffic conditions," *SIAM Undergraduate Research Online*, vol. 11, 2018.

Teaching Experience

Princeton University, Graduate Assistant in Instruction — Fall 2021 - Present

Undergraduate Optimization — Spring 2022, 2023, 2024
- Course material and code on Github.
- Appointed **Head** Assistant in Instruction during the Spring 2024 term.

Graduate Optimization — Fall 2023
- Professor: I. Akrotirianakis

Optimal Learning — Fall 2021
- Professor: M. Soner

Duke University, Undergraduate Teaching Assistant — Fall 2017 - Fall 2019

Discrete Mathematics for Computer Science — Fall 2017, 2018, 2019
- Professor: B. Donald
- Appointed as **Head** Undergraduate Teaching Assistant during the Fall 2019 term.

Intro to Operating Systems — Spring 2019
- Professor: A. Lebeck

Intro to Design/Analysis of Algorithms — Spring 2018
- Professor: D. Panigrahi

Selected Invited Talks

- INFORMS Annual Meeting (Session Chair), *Seattle*, WA — Oct 2024
- International Symposium of Mathematical Programming, *Montreal*, Canada — Jul 2024
- INFORMS Annual Meeting, *Phoenix*, AZ — Oct 2023
- INFORMS Annual Meeting, *Indianapolis*, IN — Oct 2022
- International Conference on Continuous Optimization, *Lehigh University*, PA — Jul 2022
- Sports Analytics Conference, *Carnegie Mellon University*, PA — Oct 2018

Technical Skills

- **Programming:** Python, R, Java, C/C++
- **Software:** Git, SLURM, LaTeX

Princeton, April 9, 2025