# VINIT RANJAN

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## EDUCATION

**Princeton University** *Princeton, NJ* *Aug 2020 - Present*
Ph.D. in Operations Research & Financial Engineering
Advisor: B. Stellato
Thesis: "Data-driven Algorithm Verification and Design for Real-time Optimization"

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

## RESEARCH INTERESTS

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

## PUBLICATIONS

- **V. Ranjan**, B. Stellato. "Large Scale Performance Verification of Fixed-point Optimization Algorithms." *(In preparation.)*
- J. Park, **V. Ranjan**, B. Stellato. "Data-driven Analysis of First-order Methods via Distributionally Robust Optimization." *(In preparation.)*
- **V. Ranjan**, J. Park, S. Gualandi, A. Lodi, B. Stellato. "Exact Verification of First-Order Methods via Mixed-Integer Linear Programming ." *arXiv preprint: 2412.11330*. Code resposi-tory. (First round review in *SIAM Journal on Optimization*.)
- **V. Ranjan**, B. Stellato. "Verification of First-Order Methods for Parametric Quadratic Optimization." *arXiv preprint: 2403.03331*. Code repository. (Second round review in *Mathematical Programming*.)
- **V. Ranjan**, J. Ryang, and A. Xue. "Time to Leave the Louvre: A Computational Network Analysis." *The Journal of Undergraduate Mathematics and Its Applications*, 40.2-3 (2019), pp. 135-160.
- 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*, 23 (2018), paper no. 80, pp. 10. doi:10.1214/18-ECP182.
- **V. Ranjan**, J. Ryang, and K. Zhang. "An Analysis of the Impact of Self-Driving Cars on Traffic Conditions." *SIAM Undergraduate Research Online*, 11 (2018). doi:10.1137/17S015768.

## AWARDS

### Research Awards

- Princeton Workshop on Optimization, Learning, and Control, **Best Poster Award**, Jul 2024.
- Carnegie Mellon Sports Analytics Conference, Reproducible Research Competition, **2nd place**, Oct 2018. Joint work with: A. Ghadiyaram, S. Silwal, and R. Shah.

### Mathematical Modeling Awards

- 2019 Consortium for Mathematics and Its Applications (COMAP), Mathematical Contest in Modeling/Interdisciplinary Contest in Modeling (MCM/ICM), **Outstanding solution** (top 7 of 5000+ for chosen problem). Earned the **Leonard Euler Award** for excellence in modeling and $10000 **COMAP scholarship.**

- 2018 COMAP MCM/ICM, **Meritorious Solution** (top 15%).
- 2017 COMAP MCM/ICM, **Finalist Solution** (top 11 of 1500+ for chosen problem).

**Duke Academic Awards**

- **Karl Menger Award** for excellence in mathematical competitions. May 2017, 2019.
- **Dean's List** for earning a top GPA during the respective semester. Earned in Fall 2017, Spring 2018, and with distinction for Fall 2016, Spring 2017, Spring 2019.

## PROFESSIONAL EXPERIENCE

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

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

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

## RESEARCH EXPERIENCE

**Graduate Research**

Algorithm Verification and Design for Real-time Optimization
*Professor: B. Stellato* — *Jan 2021 - Present*

**Undergraduate Research**

Point Clouds and Geometric Algorithms — *May 2018 - Aug 2018, Jan 2020 - June 2020*
*Mentors: E. Wolf and C. Eckman at Lineage Logistics*

Online Admission Control Algorithms — *Jan 2018 - May 2018*
*Professor: D. Panigrahi*

Machine Learning Applications — *Aug 2017 - May 2018*
*Professor: L. Carin*

Probability and Stochastic Processes — *May 2017 - Aug 2017*
*Professors: R. Durrett, M. Junge, and J. Nolen*

**Talks**

- "Performance Verification of First Order Methods for Parametric Quadratic Optimization."

  *International Symposium of Mathematical Programming*, (Jul 2024).

  *INFORMS Annual Meeting*, (Oct 2022, 2023, 2024).

  *International Conference on Continuous Optimization*, (Jul 2022).
- "Pace and Space: An Alternative Measure of NBA Shooting Prowess." *Carnegie Mellon Sports Analytics Conference*, (Oct 2018).

**Poster Presentations**

- "Verification of First-Order Methods for Parametric Quadratic Optimization." *Princeton Workshop on Optimization, Learning, and Control*, (Jun 2024).
- "Pace and Space: An Alternative Measure of NBA Shooting Prowess." *MIT Sloan Sports Analytics Conference*, (May 2019).

## TEACHING EXPERIENCE

**Graduate Assistant in Instruction**

Responsibilities include: Teaching precept sections (25+ students), hosting office hours, and designing assignments/exams.

Graduate Optimization *Fall 2023*
*Professor: I. Akrotirianakis*

Optimization *Spring 2022, 2023, 2024*
*Professor: B. Stellato*

- Course material and code on Github.
- Appointed as Head Assistant in Instruction during the Spring 2024 term.

Optimal Learning *Fall 2021*
*Professor: M. Soner*

**Undergraduate Teaching Assistant**

Discrete Mathematics for Computer Science *Fall 2017, 2018, 2019*
*Professor: B. Donald*

- Appointed as Head Undergraduate Teaching Assistant during the Fall 2019 term.

Discrete Mathematics for Computer Science *Spring 2019*
*Professor: D. Panigrahi*

Intro to Operating Systems *Spring 2019*
*Professor: A. Lebeck*

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

## TECHNICAL SKILLS

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