

Ananya Parashar

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EDUCATION

- **Columbia University** New York, NY
Doctor of Philosophy in Industrial Engineering and Operations Research *Aug 2024 - Present*
 - **Advisor:** Agostino Capponi
 - **Graduate Coursework:** Diffusion Models for Generative AI and Reinforcement Learning, Stochastic Modeling
- **Princeton University** Princeton, NJ
Bachelor of Science in Engineering in Operations Research and Financial Engineering *Aug. 2020 - May. 2024*
 - **GPA:** 3.903/4.00
 - **Certificates:** Applied Mathematics, Computer Science, Finance
 - **Graduate Coursework:** Advanced Algorithm Design (A+), Statistical Foundations of Data Science, Modern Statistics, Linear and Nonlinear Optimization, Probability Theory, Fundamentals of Deep Learning (A+), Stochastic Calculus
 - **Undergraduate Coursework:** Financial Mathematics, Differential Equations, Optimal Learning, Regression and Applied Time Series, Optimization (A+), Combinatorics (A+), Convex Optimization (A+)
 - **Awards:** Tau Beta Pi, Sigma Xi

RESEARCH EXPERIENCE

- **Representations for Generalization** Princeton, NJ
Advised by: Benjamin Eysenbach *Jun 2024 - Aug 2024*
 - Developed learned representations for goal-conditioned RL policies to improve generalization to unseen goals in continuous control environments, using both end-to-end training and contrastive learning techniques
- **Graphon Games for Optimal Investment in a Competitive Market** – [paper] Princeton, NJ
Senior Thesis - Advised by: Ludovic Tangpi *Sep 2023 - Apr 2024*
 - Extended market model to include individualized weights and solved by deriving the HJB equation then proving existence of a Nash Equilibrium
 - Proved stability of the optimal solution then simulated to compare to prior results
- **Mean Field Games for Optimal Investment** – [paper] Princeton, NJ
Advised by: Ludovic Tangpi *Jan 2023 - May 2023*
 - Derived solutions to the optimal investment problem, where each agent seeks to outperform a relative metric in a continuous time setting, using stochastic optimal control techniques and mean field games
- **Merton's Portfolio Problem** – [paper] Princeton, NJ
Advised by: Ludovic Tangpi *Sep 2022 - Jan 2023*
 - Solved Merton's portfolio problem for CARA and CRRA utilities, with and without consumption of wealth

ACADEMIC FINAL PROJECTS

- **A Simple Framework for Intrinsic Reward-Shaping for RL using LLM Feedback** – [github] [paper]
Advised by: Sanjeev Arora
 - Developed an LLM-based framework for generating and refining intrinsic reward functions in RL agents
 - Devised methods to incorporate reward-shaping feedback in RL algorithms, including tabular and deep Q-learning
 - Demonstrated the superiority of LLM-informed approach over traditional methods on gym-retro environments
- **Prophet Inequalities for Subadditive Combinatorial Auctions** – [arxiv]
Advised by: Matthew Weinberg and Huacheng Yu
 - Surveyed constructive posted price mechanisms achieving state of the art $O(\log \log m)$ and $O(\log m)$ bounds
 - Presented new work on the existence of a constant factor prophet inequality

WORK EXPERIENCE

- **Citi Bank** New York, NY
Quantitative Analysis Intern *Jun 2023 – Aug 2023*
 - Developed and deployed a dashboard for the Cross Product Margin team to seamlessly view and modify historical stress scenario shocks in live production
 - Designed dynamic user-friendly graphical representation of historical shocks by factor, streamlining users' data validation process
- **Deutsche Bank** New York, NY
Sales & Trading Intern *Jun 2022 – Aug 2022*
 - Pitched and defended a high yield bond (CCC+) to senior traders using micro-level analysis of the company's financials as well as macro trends in the rising interest rate world
 - Examined live commercial real estate and securitization deals, conducting return analysis to determine pricing and spreads

TEACHING

- **Princeton University** Princeton, NJ
Teaching Assistant *Jan 2021 – Present*
 - COS435: Introduction to Reinforcement Learning - Teaching Assistant (Spring 24)
 - COS445: Economics and Computation - Grader (Spring 24)
 - COS398: Theoretical and Empirical Analysis of Streaming Algorithms - Teaching Assistant (Spring 23)
 - COS340: Reasoning About Computation - Teaching Assistant (Fall 21)
 - COS226: Algorithms and Data Structures - Precept Assistant (Spring 21)

TECHNICAL SKILLS

- **Languages:** Python, R, JAVA
- **Frameworks/Libraries:** Git, TeX, NumPy, Pandas, TensorFlow, Pytorch

EXTRACURRICULARS

JR Center for Public Policy & Finance | AI @ Princeton | The Daily Princetonian | Princeton Bhangra