Rajiv Sambharya

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Education

Princeton University, School of Engineering and Applied Science, Princeton, NJ *May 2024*
- P.h.D. in Operations Research and Financial Engineering
- 3.87 Cumulative GPA

University of California-Berkeley, College of Engineering, Berkeley, CA *May 2018*
- M.S. in Electrical Engineering and Computer Science
- 3.66 Cumulative GPA

University of California-Berkeley, College of Engineering, Berkeley, CA *May 2017*
- B.S. in Electrical Engineering and Computer Science
- 3.72 Cumulative GPA

Publications

- **Preprints**
  A. Askari, G. Negiar, R. Sambharya, L. El Ghaoui. May 2018. "Lifted Neural Networks." arxiv.org/abs/1805.01532
- **Master's thesis/workshop**
  R. Sambharya, A. Askari, G. Negiar, L. El Ghaoui. "Recurrent Lifted Neural Networks." *Workshop on Modern Trends in Nonconvex Optimization for Machine Learning. The 35th International Conference on Machine Learning, Stockholm.* June 2018. url: https://drive.google.com/file/d/15xT_w7spmG5tVKHdeOpIWDkiRQ9EuWr3/view

Research Experience

- **Data-driven Optimization Research** *December 2020 - present*
  Prof. Bartolomeo Stellato, Princeton University, NJ (advisor)
  Investigated methods to solve semidefinite programs quickly using machine learning
  Used differentiable optimization to conduct end-to-end learning
- **Optimization Research** *January 2017 - September 2018*
  Prof. Laurent El Ghaoui, University of California-Berkeley, CA
  Explored lifted neural networks: an alternative, more flexible framework to neural networks
  Developed methods for a cluster-aware recommendation system for natural language processing
  Adapted the lifted neural network framework to apply to recurrent neural networks
  Applied sketching to lifted neural network subproblems to increase the speed
- **Electricity Grid Research** *May 2020 - December 2020*
  Prof. Ronnie Sircar, Princeton University, NJ
  Investigated methods to incorporate risk into the day-ahead market clearing in electricity grids
  Aimed to prepare markets for an increase in stochastic, renewable energy production
  Applied financial tool of tranching to endogenously determine optimal market parameters

Teaching

- Princeton University, *ORF 307: Optimization* *Spring 2021*
  Head Assistant in Instruction: Lead weekly discussions, graded, held office hours, created course content
- Princeton University, *ORF 455: Energy and Commodities Markets* *Fall 2020*
  Assistant in Instruction: Lead weekly discussions, graded, held office hours

Work Experience

- **Machine Learning Engineering** *July 2018 - July 2019*
  Linc Global, Sunnyvale, CA
  Designed and implemented machine learning methods to solve Natural Language Processing problems
  Implemented software end-to-end that was rolled out to millions of shoppers
  Created a machine learning solution to the intent classification problem
- **Software Engineering Intern** *June 2016 - August 2016*
  Amazon.com, Seattle, WA
  Developed infrastructure for alternate routing in the Amazon Maps API

Projects

- **Deep reinforcement learning techniques:** Programmed various RL techniques such as behavioral cloning, policy gradient methods, Q learning, and model-based learning
- **Implemented AlphaGo Zero:** Generalized Google's famous AlphaGo Zero algorithm to work on a variety of games
- **Machine learning techniques:** Implemented a variety of machine learning techniques with high classification accuracy from scratch including neural networks, multivariate Gaussians, regressions, decision trees, clustering, and PCA
- **Automatic panorama stitch:** Programmed an algorithm to automatically stitch several pictures of a scene into a single image
- **Autonomous mobile robot:** Developed a physical maze-solving robot
- **CPU:** Implemented a 32-bit double-cycle processor in Logisim according to MIPS assembly language. Built all stages of the processor: instruction fetch, register files, arithmetic and logic unit, memory, and write back.

Relevant Graduate Coursework

Computational Control Theory, Convex and Conic Optimization, Linear and Nonlinear Optimization, Mean Field Games, Stochastic Calculus, Probability Theory, Statistical Foundations of Data Science, Statistical Theory and Methods, Hybrid Systems, Deep Reinforcement Learning, Theoretical Statistics, Linear System Theory, Computer Vision, Combinatorial Algorithms and Data Structures

Relevant Undergraduate Coursework

Optimization Models, Time Series Analysis, Machine Learning, Artificial Intelligence, Efficient Algorithms and Intractable Problems, Robotics, Image Manipulation and Computational Photography, Probability and Random Processes, Database Systems, Operating Systems, Interpretation of Systems and Signals, Microelectronic Circuits, Machine Structures, Discrete Mathematics and Probability Theory, Linear Algebra and Differential Equations, and Multivariable Calculus

Extra-Curricular Activities

- **Ultimate Frisbee Captain for Cal Men's Ultimate** *May 2016 - May 2017*
  Lead the team athletically, logistically, and socially to compete with the best colleges in the nation
- **Berkeley Engineers and Mentors** *August 2013 – May 2014*
  Encouraged disadvantaged high school students from the Bay Area to pursue STEM fields and higher order education by exhibiting the applied side of science

Skills

- Well-versed in Python, Numpy, Tensorflow, Matlab
- Proficient in MIPS, SQL, SolidWorks, AutoCAD, Java, C, Android
- Tools: Git, LaTeX, UNIX/Linux, ROS, AWS GPU resources