

Soham Phade

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EDUCATION

University of California, Berkeley

2015 - present

Ph.D. candidate in Electrical Engineering and Computer Sciences

Indian Institute of Technology, Bombay

2011 - 2015

B.Tech in Electrical Engineering (with Honors) and Minor in Computer Science

WORK EXPERIENCE

Research Scientist, Salesforce

2021 - present

Manager: Stephan Zheng

Topics: Reinforcement Learning, Multi-Agent Modeling, Climate Change

Graduate Student Researcher, UC Berkeley

2015 - 2021

Advisor: Prof. Venkat Anantharam

Topics: Game Theory, Network Economics, Market Design, Resource Allocation and Pricing, Cloud Computing, Decision Theory, Behavioral Economics

Applied Scientist Intern, Amazon

Summer 2019

Team: Machine Intelligence and Decision Analytics, Amazon AI and Search

Mentors: Prof. Inderjit Dhillon, Daniel N. Hill, Kedarnath Kolluri

Topics: Session-Aware Search Recommendations, Extreme Multi-Label Classification, Reinforcement Learning, Q-Learning

PUBLICATIONS

S. Phade and V. Anantharam (2021). “Learning in Games with Cumulative Prospect Theoretic Preferences.” *Dynamic Games and Applications*, 1-42.

S. Phade and V. Anantharam (2019). “Optimal Resource Allocation over Networks via Lottery-Based Mechanisms.” *International Conference on Game Theory for Networks*, pp. 51–70. Springer, Cham. (**Best Paper Award**)

S. Phade and V. Anantharam (2019). “On the Geometry of Nash and Correlated Equilibria with Cumulative Prospect Theoretic Preferences.” *Decision Analysis* 16(2), 142-156.

S. Phade and V. Borkar (2017). “A Distributed Boyle-Dykstra-Han Scheme.” *SIAM journal on optimization* 27(3), pp.1880-1897

V. Gupta, S. Phade, T. Courtade, K. Ramchandran (2020). “Utility-Based Resource Allocation and Pricing for Serverless Computing.” *Under review*. arXiv:2008.07793

S. Phade and V. Anantharam (2020). “Black-Box strategies and Equilibrium in Games with Cumulative Prospect Theory Preferences.” *Under review*. arXiv:2004.09592

V. Muthukumar, S. Phade, A. Sahai (2020). “On the Impossibility of Convergence of Mixed Strategies with No-Regret Learning.” *Under review*. arXiv:2012.02125

S. Phade and V. Anantharam (2020). “Mechanism Design with CPT Players: A General Framework and the Revelation Principle.” arXiv:2101.08722

RESEARCH EXPERIENCE

Ph.D. Thesis, UC Berkeley

2015 - present

Title: Behavioral Network Economics

Advisor: Prof. Venkat Anantharam

Used sophisticated behavioral models from psychology, decision theory, and learning theory to design mechanisms and algorithms better aligned with human interaction and welfare.

Designed *lottery-based mechanisms* for optimal resource allocation and pricing in network and scheduling problems. Applied it to *communication networks* and *cloud computing services* giving provably better results. Verified these results using simulations.

Proposed novel notions of equilibrium relevant for game-theoretic models with agents having *cumulative prospect theory* (CPT) preferences. CPT is one of the leading models for *decision making under uncertainty and risk*.

Established results with significant implications to the design of *auctions*, *matching markets*, and *e-commerce platforms* when agents show behavioral features like biases and heuristics.

Proposed a *novel solution concept* for n -player balanced cooperative games. It has applications to distributing reward, revenue, or budget allocations in collaborative environments, such as academic collaborations, joint ventures, etc.

Established results on the convergence properties of the action play in repeated games when players adopt *no-regret learning* based strategies. It provides alternative explanations for equilibrium concepts from a behavioral and evolutionary perspective.

Bachelor's Thesis, IIT Bombay

2014 - 2015

Title: A Distributed Boyle-Dykstra-Han Scheme

Advisor: Prof. Vivek Borkar

Proposed a provably convergent distributed variant of the Boyle-Dykstra-Han scheme for projecting on the intersection of a finite family of convex sets. Useful for taking projections in *distributed constrained optimization* tasks.

TEACHING EXPERIENCE

CS70: Discrete Mathematics and Probability Theory

Fall 2019

Graduate Student Instructor, UC Berkeley

EE226A: Random Processes in Systems

Fall 2017

Graduate Student Instructor, UC Berkeley

Math205: Complex Analysis

Fall 2013

Teaching Assistant, IIT Bombay

SERVICE ACTIVITIES

Reviewer: IEEE Transactions on Control of Network Systems

Student Reviewer for Graduate Admissions: EECS Department at UC Berkeley, Fall 2018, Fall 2019, Fall 2020, and Fall 2021.

Mentoring: International Mathematics Olympiad aspirants from India.

AWARDS AND ACHIEVEMENTS

Best Paper Award at GameNets, 2019

Undergraduate Research Award, IITB, 2015

IUSSTF Viterbi-India Program Scholarship, USC, 2014

National Board of Higher Education Nurture Scholarship, TIFR, 2012

All India Rank 65 in IIT JEE, 2011

Best Solution Award at International Mathematics Olympiad Training Camp, HBCSE, 2010

SKILLS

Programming languages & Software: Python, C, C++, PyTorch, Matlab, Mathematica

Selected Courses: Combinatorial Algorithms and Data Structure, Optimization, Computer Vision, Image Processing, Graph Theory, Game Theory, Advanced Probability, Stochastic Processes, Dynamical Systems, Queuing Theory, Signals and Systems, Statistical Learning Theory, Coding Theory, Information Theory, Functional Analysis.

PRESENTATIONS

9th EAI International Conference on Game Theory for Networks, GameNets 2019, April 25-26, Paris.
“Optimal Resource Allocation over Networks via Lottery-Based Mechanisms.”

The 29th International Conference on Game Theory, Stony Brook University July 16 - 20, 2018.
“Learning in Games with Cumulative Prospect Theoretic Preferences.”

55th Annual Allerton Conference on Communication, Control, and Computing, Allerton Oct. 4 - 6, 2017. “On the Geometry of Nash and Correlated Equilibria with Cumulative Prospect Theoretic Preferences.”

REFERENCES

Venkat Anantharam

Professor, EECS, UC Berkeley
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Thomas Courtade

Professor, EECS, UC Berkeley
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Inderjit Dhillon

Vice President and Distinguished Scientist
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Kannan Ramchandran

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Vivek Borkar

Professor, EE, IIT Bombay
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Daniel Hill

Senior Scientist at Amazon Search
daniehil@amazon.com