Siddharth Prasad

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Education

Carnegie Mellon University — Pittsburgh, PA
Ph.D. in Computer Science — 2019–Current

- Thesis: *Mechanism Design and Integer Programming in the Data Age*
- Advisors: Maria-Florina Balcan and Tuomas Sandholm
- Thesis Committee: Gérard Cornuéjols, Craig Boutilier, and Peter Cramton

California Institute of Technology — Pasadena, CA
B.S. in Mathematics and Computer Science — 2015–2019

- Awarded Bhansali Family Prize in Computer Science for outstanding undergraduate research

Industry Experience

Google Research — Mountain View, CA
Student researcher — June 2022 - Oct. 2022

- Focus: modeling content provider dynamics in recommender systems; Host: Craig Boutilier

Awards

- Best poster award (honorable mention) at Mixed Integer Programming (MIP) workshop — 2024
- Inaugural recipient of the Gibbons-Newell Graduate Fellowship in Artificial Intelligence (CMU) — 2023
- CMU nominee (one of four) for the Google PhD fellowship — 2023
- Voted best poster at CMU YinzOR student conference — 2022
- National Science Foundation Graduate Research Fellowship Honorable Mention — 2020
- Bhansali Family Prize in Computer Science (Caltech) — 2019
- Morgan Ward Prize for Outstanding Original Research in Mathematics (Caltech) — 2016

Paper awards:

- Oral presentation at NeurIPS 2022 (top 2% of submissions)
- Spotlight paper at NeurIPS 2021 (top 3% of submissions)

Publications

[1] M.-F. Balcan, **S. Prasad**, and T. Sandholm, "Bicriteria multidimensional mechanism design with side information", in *Conference on Neural Information Processing Systems (NeurIPS)*, 2023, Acceptance rate 26.1%.

[2] **S. Prasad**, M. Mladenov, and C. Boutilier, "Content prompting: Modeling content provider dynamics to improve user welfare in recommender ecosystems", 2023, In submission.

[3] **S. Prasad**, E. Vitercik, M.-F. Balcan, and T. Sandholm, "New sequence-independent lifting techniques for cutting planes and when they induce facets", 2023, In submission.

[4] M.-F. Balcan, **S. Prasad**, and T. Sandholm, "Maximizing revenue under market shrinkage and market uncertainty", in *Conference on Neural Information Processing Systems (NeurIPS)*, 2022, Acceptance rate 25.6%.

[5] M.-F. Balcan, **S. Prasad**, T. Sandholm, and E. Vitercik, "Improved sample complexity bounds for branch-and-cut", in *International Conference on Principles and Practice of Constraint Programming (CP)*, 2022, Acceptance rate 51.3%.

[6] M.-F. Balcan, **S. Prasad**, T. Sandholm, and E. Vitercik, "Structural analysis of branch-and-cut and the learnability of Gomory mixed integer cuts", in *Conference on Neural Information Processing Systems (NeurIPS)*, 2022, **Oral presentation**, Acceptance rate 2%.

[7] M.-F. Balcan, **S. Prasad**, and T. Sandholm, "Learning within an instance for designing high-revenue combinatorial auctions", in *International Joint Conference on Artificial Intelligence (IJCAI)*, 2021, Acceptance rate 13.7%.

[8] M.-F. Balcan, **S. Prasad**, T. Sandholm, and E. Vitercik, "Sample complexity of tree search configuration: Cutting planes and beyond", in *Conference on Neural Information Processing Systems (NeurIPS)*, 2021, **Spotlight presentation**, Acceptance rate 3%.

[9] M.-F. Balcan, **S. Prasad**, and T. Sandholm, "Efficient algorithms for learning revenue-maximizing two-part tariffs", in *International Joint Conference on Artificial Intelligence (IJCAI)*, 2020, Acceptance rate 12.6%.

[10] F. Echenique and **S. Prasad**, "Incentive compatible active learning", in *Innovations in Theoretical Computer Science Conference (ITCS)*, 2020, Acceptance rate 42.2%.

[11] Z. Chase and **S. Prasad**, "Learning time dependent choice", in *Innovations in Theoretical Computer Science Conference (ITCS)*, 2019, Acceptance rate 32.7%.

(Authors primarily listed in alphabetical order.)

Teaching and Academic Service

Guest Lectures

- Two lectures on mechanism design for the course "Foundations of Learning, Game Theory, and Their Connections" 2023, 2024

Teaching Assistantships

At CMU:

- Foundations of Learning, Game Theory, and Their Connections (10-422) 2024
- Graduate Artificial Intelligence (15-780) 2023

At Caltech:

- Algorithmic Economics (CS/Ec 149) 2019
- Graduate Complexity Theory (CS 151) 2019
- Introduction to Algorithms (CS 38) 2017
- Decidability and Tractability (CS 21) 2017
- Transition to Mathematical Proofs (Ma 0) 2017, 2018

Service

- Instructor for OurCS 2022, a research workshop at CMU for undergraduate women in computer science. Led a one-day session on voting theory and mechanism design.
- Mentor for CMU Graduate Application Support Program, a program to help PhD applicants with fewer resources available or from underrepresented backgrounds with their applications. Gave detailed feedback on students' statements of purpose and helped the program organizers improve and refine the review criteria given to mentors.
- Mentor for CMU Undergraduate AI Mentorship program, a program to help undergraduates get acquainted with AI research and graduate school (2022, 2023).
- Organizer of CS PhD mentorship group meetings for first-year PhD students in the computer science department (2022, 2023).
- Member of CMU Computer Science Department PhD admissions committee (2021-2022).
- Organizer of "Seminal theoretical research in economics, AI, and machine learning" reading group (2023).
- Conference and journal reviewing: EC (2019), ICML (2022 - top 10% of reviewers, 2023, 2024), NeurIPS (2022, 2023), AAAI (2024), ICLR (2024), Journal of Machine Learning Research, Theory of Computing Systems.

Selected Talks

- "New Sequence-Independent Lifting Techniques for Cutting Planes and When They Induce Facets"; CMU CS Theory Lunch, 2024.
- "Content Prompting: Modeling Content Provider Dynamics to Improve User Welfare in Recommender Ecosystems"; RecSys Workshop on Causality, Counterfactuals, & Sequential Decision Making (CONSEQUENCES), 2023. (Oral presentation; given to top 7 out of 15 accepted papers.)
- "Bicriteria Multidimensional Mechanism Design with Side Information"; Marketplace Innovation Workshop (MIW), 2023, CMU Artificial Intelligence Seminar Series, 2023.
- "Tree Search Configuration: Cutting Planes and Beyond"; INFORMS Annual Meeting, 2022.
- "Within-Instance Mechanism Design"; INFORMS Annual Meeting, 2022.
- "Learning to Cut in Integer Programming"; CMU CS Theory Lunch, 2022.
- "Learning Across and Within Instances for Mechanism Design"; CMU CS Theory Lunch, 2021.

Selected Coursework

- Carnegie Mellon University
  - Graduate Algorithms, Graduate Artificial Intelligence, Advanced Topics in Machine Learning Theory, Integer Programming, Advanced Topics in Mechanism Design, Graduate Computer Networks, Types and Programming Languages
- Caltech
  - *CS coursework*: Relational Databases, Database System Implementation, Algorithmic Economics, Graduate Complexity Theory, Communication Complexity, Machine Learning and Data Mining, Learning Systems, Advanced Topics in Machine Learning: Deep Probabilistic Models.
  - *Mathematics coursework*: Group Theory, Ring Theory, Field Theory, Real Analysis, Measure Theory, Complex Analysis, General and Algebraic Topology, Differential Geometry, Differential Topology, Model Theory, Computability Theory, Probability Theory, Descriptive Set Theory, Geometric Incidences, Game Theory.

Past Experience

Summer Undergraduate Research Fellow — Caltech
Advisor: Federico Echenique — Summer 2018

- Focus: learnability of economic models of choice; models of incentive compatible active learning

Research Assistant Caltech
Advisor: Alexander Kechris Summer 2017

- Focus: descriptive set theory and its applications to combinatorics

Summer Undergraduate Research Fellow Caltech
Advisor: Adam Sheffer Summer 2016

- Focus: problems in discrete geometry involving enumerating crossing-free graphs

Ross Mathematics Program The Ohio State University
Counselor Summer 2015

- Mentored four students in undergraduate-level number theory and abstract algebra and graded their homework sets.

Other (older) Projects

- Walks on Primes in Imaginary Quadratic Fields 2014
  - Computationally progressed a generalization of the open Gaussian Moat problem to quadratic fields. Processed large data sets of primes and used Java Topology Suite for Delaunay triangulation. Preprint available at: http://arxiv.org/abs/1412.2310