

# Shipra Agrawal

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DATE	December 10, 2020
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RESEARCH INTERESTS	Sequential decision making under uncertainty, Multi-armed bandits, Reinforcement learning, Online learning, Online optimization, Game theory, Prediction markets.
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EDUCATION	<b>Stanford University</b> , Stanford, CA <i>Ph.D., Computer Science</i> Sep 2006 - June 2011 <ul style="list-style-type: none"><li>• Thesis title: “Optimization under uncertainty: Bounding the correlation gap”</li><li>• Advisor: Yinyu Ye, Management Science and Engineering (MS&amp;E)</li></ul> <b>Indian Institute of Science</b> , Bangalore, India <i>M.E., Computer Science and Automation</i> Aug 2002 - Apr 2004 <b>M.B.M. Engineering College</b> , Jodhpur, India <i>B.E., Computer Science and Engineering</i> Aug 1998 - Apr 2002
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EMPLOYMENT	<b>Columbia University</b> , New York, NY Assistant Professor Sep 2015 - present Cyrus Derman Assistant Professor of Industrial Engineering and Operations Research Affiliate, Department of Computer Science Affiliate, Data Science Institute <b>Amazon</b> , Seattle, WA Amazon Scholar (Consultant) Jan 2019 - present <b>Google</b> , New York, NY Consultant Sep 2017 - Nov 2017 <b>Microsoft Research (MSR)</b> , Bangalore, India Researcher Jul 2013 - Aug 2015 <b>Microsoft Research (MSR)</b> , Bangalore, India Postdoctoral researcher Aug 2011 - Jun 2013 <b>IBM Almaden Research Center</b> , San Jose, CA Research Intern Jun 2008 - Sep 2008 <b>Bell Labs Alcatel-Lucent</b> , Bangalore, India Member of Research Staff Dec 2004 - Aug 2006 <b>Yahoo! Software India Pvt. Ltd.</b> , Bangalore, India Software Engineer Aug 2004 - Dec 2004
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(In all the publications listed below, the author ordering is alphabetical and indicates equal contribution, except when the first author is indicated by \*)

### Journal publications

1. **S. Agrawal**, V. Avadhanula, V. Goyal, A. Zeevi, “MNL-Bandit: A Dynamic Learning Approach to Assortment Selection”. *Operations Research*, 67(5):1209-1502 (2019).  
- Conference version in *ACM conference on Economics and Computation (EC)* 2016
2. **S. Agrawal**, N. R. Devanur, “Bandits with Global Convex Constraints and Objective”. *Operations Research* 67(5):1486-1502 (2019).  
- Invited to the special issue of ACM Transactions on Economics and Computation (TEAC) featuring selected papers from EC 2014 (invitation declined).  
- Conference version in *ACM conference on Economics and Computation (EC)* 2014
3. **S. Agrawal**, “Recent Advances in Multiarmed Bandits for Sequential Decision Making”, INFORMS TutORials in Operations Research, Operations Research & Management Science in the Age of Analytics, Pages 167–188, October 2019.
4. **S. Agrawal**, N. Goyal, “Near-optimal regret bounds for Thompson Sampling”. *Journal of the ACM (JACM)*, Volume 64 Issue 5, October 2017.
5. **S. Agrawal**, Z. Wang, and Y. Ye, “A Dynamic Near-Optimal Algorithm for Online Linear Programming”. *Operations Research* 62:876-890 (2014).
6. **S. Agrawal**, Y. Ding, A. Saberi, and Y. Ye, “Price of Correlations in Stochastic Optimization”. *Operations Research* 60:243-248 (2012).  
- Conference version in *ACM-SIAM Symposium on Discrete Algorithms SODA’10*
7. **S. Agrawal**, E. Delage, M. Peters, Z. Wang, and Y. Ye, “A Unified Framework for Dynamic Prediction Market Design” *Operations Research* 59:3:550–568 (2011).  
- Conference version in *ACM conference on Economics and Computation (EC)* 2009
8. **S. Agrawal**, N. Megiddo, and B. Armbruster, “Equilibrium in Prediction Markets with Buyers and Sellers”. *Economic Letters* 109:46-49 (2010).
9. **S. Agrawal**, J.R. Haritsa, and B. A. Prakash, “FRAPP: A Framework for High-Accuracy Privacy-Preserving Mining”. *Data Mining and Knowledge Discovery Journal* 18:101-139 (2009).
10. **S. Agrawal**, C. N. Kanthi, K. V. M. Naidu, J. Ramamirtham, R. Rastogi, S. Satkin, and A. Srinivasan, “Monitoring Infrastructure for Converged Networks and Services”. *Bell Labs Technical Journal* 12(2): 63-77 (2007).

### Journal papers under review

- **S. Agrawal**, R. Jia, “Learning in Structured MDPs with Convex Cost Functions: improved regret bounds for inventory management”. *Operations Research*. Minor revision.
- **S. Agrawal**, J. Sethuraman, X. Zhang, “On Optimal Ordering in the Optimal Stopping Problem”, Submitted to *Operations Research*.
- **S. Agrawal**, V. Avadhanula, V. Goyal, A. Zeevi, “Thompson Sampling for the MNL-Bandit”, Submitted to *Mathematics of Operations Research*.
- **S. Agrawal**, R. Jia, “Optimistic Posterior Sampling for Reinforcement Learning: worst-case regret bounds”, Submitted to *Mathematics of Operations Research*.
- T. Kocák\*, M. Valko, R. Munos, **S. Agrawal**, “Spectral Thompson Sampling”. *Journal of Machine Learning Research*. Accepted conditional on minor revision.

**Peer-reviewed conference papers (not superseded by journal publications)**

11. Y. Tang\*, **S. Agrawal**, Y. Faenza, “Reinforcement Learning for Integer Programming: Learning to Cut”. *International Conference on Machine Learning (ICML)* 2020.
12. **S. Agrawal**, J. Sethuraman, X. Zhang, “On Optimal Ordering in the Optimal Stopping Problem”, *ACM conference on Economics and Computation (EC)* 2020.
13. Y. Tang\*, **S. Agrawal**, “Discretizing Continuous Action Space for On-Policy Optimization”, *AAAI Conference on Artificial Intelligence (AAAI)*, 2020.
14. **S. Agrawal**, R. Jia, Learning in structured MDPs with Convex Cost Functions: improved regret bounds for inventory management. *ACM conference on Economics and Computation (EC)* 2019.
15. **S. Agrawal**, M. Shadravan, C. Stein, “Submodular Secretary Problem with Shortlists”, *Innovations in Theoretical Computer Science (ITCS)*, 2019.
16. **S. Agrawal**, C. Daskalakis, V. Mirrokni, B. Sivan, “Robust Repeated Auctions under Heterogeneous Buyer Behavior”, *ACM conference on Economics and Computation (EC)*, 2018
17. **S. Agrawal**, V. Mirrokni, M. Zadimoghaddam, “Proportional Allocation: Simple, Distributed, and Diverse Matching with High Entropy”, *International conference on Machine Learning (ICML)*, 2018.
18. C. Pike-Burke\*, **S. Agrawal**, S. Grunewalder, C. Szepesvari, “Bandits with Delayed, Aggregated Anonymous Feedback”, *International conference on Machine Learning (ICML)*, 2018.
19. Y. Tang\*, **S. Agrawal**, “Exploration by Distributional Reinforcement Learning”, *International Joint Conference on Artificial Intelligence (IJCAI)*, 2018.
20. **S. Agrawal**, V. Avadhanula, V. Goyal, A. Zeevi, “Thompson Sampling for the MNL-Bandit”, *Conference in Learning Theory (COLT)* 2017.
21. **S. Agrawal**, R. Jia, “Optimistic Posterior Sampling for Reinforcement Learning: worst-case regret bounds”, *Neural Information Processing Systems (NeurIPS)*, 2017  
- Spotlight paper: ~4% of 3240 submissions.
22. **S. Agrawal**, N. R. Devanur, “Linear Contextual Bandits with Knapsacks”. *Neural Information Processing Systems (NeurIPS)*, 2016.
23. **S. Agrawal**, N. R. Devanur, L. Li, “Contextual Bandits with Knapsacks”. *Conference on Learning Theory (COLT)*, 2016.
24. **S. Agrawal**, N. R. Devanur, “Fast Algorithms for Online Stochastic Convex Programming”. *ACM-SIAM Symposium on Discrete Algorithms (SODA)*, 2015.  
- Invited to the special issue of ACM Transactions on Algorithms featuring selected papers from SODA 2015 (invitation declined).
25. T. Kocák\*, M. Valko, R. Munos, **S. Agrawal**, “Spectral Thompson Sampling”. *AAAI Conference on Artificial Intelligence (AAAI)*, 2014.
26. **S. Agrawal**, N. Goyal, “Thompson Sampling for Contextual Bandits with Linear Payoffs”. *International Conference on Machine Learning (ICML)*, 2013.
27. **S. Agrawal**, N. Goyal, “Further Optimal Regret Bounds for Thompson Sampling”, *International Conference on Artificial Intelligence and Statistics (AISTATS)*, 2013.
28. **S. Agrawal**, N. Goyal, “Analysis of Thompson Sampling for the Multi-armed Bandit Problem”. *Conference on Learning Theory (COLT)*, 2012.
29. **S. Agrawal**, Z. Wang, and Y. Ye, “Parimutuel Betting on Permutations”. *International Workshop On Internet And Network Economics (WINE)*, 2008.

30. **S. Agrawal**, K.V.M. Naidu, and R. Rastogi, “Diagnosing Link-Level Anomalies Using Passive Probes”. *IEEE Conference on Computer Communications (INFOCOM)*, 2007.
31. **S. Agrawal**, S. Deb, K.V.M. Naidu, and R. Rastogi, “Efficient Detection of Distributed Constraint Violations”. Short paper. *International Conference on Data Engineering (ICDE)*, 2007.
32. **S. Agrawal**, P.P.S. Narayan, J. Ramamirtham, R. Rastogi, M. Smith, K. Swanson, and M. Thottan, “VoIP Service Quality Monitoring using Active and Passive Probes”. *International Conference on COMMunication System softWARE and MiddlewaRE (COMSWARE)*, 2006.
33. **S. Agrawal**, J.R. Haritsa, “A Framework for High-Accuracy Privacy-Preserving Mining”. *International Conference on Data Engineering (ICDE)*, 2005.
34. **S. Agrawal**, V. Krishnan, and J.R. Haritsa, “On Addressing Efficiency Concerns in Privacy-Preserving Mining”. *International Conference on Database Systems for Advanced Applications (DASFAA)*, 2004.

### Working papers

- **S. Agrawal**, **S. Yin**, A. Zeevi, “Learning to Price under the Bass Model for Dynamic Demand”, Manuscript.
- **S. Agrawal**, E. Balkanski, V. Mirrokni, B. Sivan, “Dynamic First Price Auctions Robust to Heterogeneous Buyers”, Manuscript arXiv:1803.00494.
- **S. Agrawal**, Navin Goyal, “Thompson Sampling for Linear Contextual Bandits”, To be submitted to *Journal of Machine Learning Research*.
- **S. Agrawal**, C. Daskalakis, V. Mirrokni, B. Sivan, “Robust Repeated Auctions under Heterogeneous Buyer Behavior”. To be submitted to *Management Science*.

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CITATION INFORMATION	All	Since 2015
Citations	3408	2723
h-index	22	19
i10-index	33	29

Source: Google Scholar

Profile page: <https://scholar.google.co.in/citations?hl=en&pli=1&user=qzIHMEEAAAJ>

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### AWARDS AND HONORS

- Cyrus Derman Assistant Professorship of Industrial Engineering and Operations Research, Columbia University (effective January 1, 2020 through December 31, 2022).
- NSF CAREER Award 2019-2023.
- Google Faculty Research Award 2017-2018.
- Amazon Faculty Research Award 2017-2018.
- Honorable mention, INFORMS Junior Faculty Interest Group (JFIG) prize 2017.
- Selected as an inaugural member of the ACM Future of Computing Academy (FCA). Announced April 2017.
- Microsoft India Chairman’s Collaborators Award 2014 for ‘*successful collaboration across Microsoft subsidiaries to deliver real impact*’.
- Honorable mention, COSP student paper prize 2010.