

# Karthik Abinav Sankararaman

November 2018

Department of Computer Science  
University of Maryland, College Park

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## CONTACT INFORMATION

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College Park, MD - 20742  
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## INTERESTS

Foundations and Applications of Artificial Intelligence  
**Recent topics:** Online Learning, Online Algorithms, Discrete and Continuous Optimization, Randomized Algorithms, Causal Inference.

## EDUCATION

**University of Maryland, College Park**  
PhD. in Computer Science      **September 2014 - May 2019 (Expected)**  
M.S. in Computer Science      **December 2016**  
**Committee:** Aravind Srinivasan, Alex Slivkins, John Dickerson  
  
**Indian Institute of Technology, Madras**      **August 2010 - July 2014**  
B.Tech Honours in Computer Science and Engineering  
**GPA:** 9.01/10  
**Minor:** Operations Research  
**Thesis:** Maximum Flow Problem in Undirected Graphs  
**Advisor:** Dr. N.S. Narayanaswamy

## HONORS

- Selected as a *Future Faculty Fellow* UMD, 2018
- **Dean's Fellowship:** University of Maryland, 2014, 2015
- Recipient of the *S.N. Bose Scholarship* 2013 given to **top 50** Indian students.
- Awardee of the *National Talent Search Examination(NTSE)* Scholarship.

## SELECTED PUBLICATIONS

(**Authors  
ordered  
alphabetically by  
last name unless  
specified by \*  
which indicates  
primary  
author(s) by  
contribution**)

1. “[Balancing Relevance and Diversity in Online Matching via Submodularity](#)” — Joint work with John Dickerson, Aravind Srinivasan, Pan Xu  
*The 33rd AAAI Conference on Artificial Intelligence (AAAI), 2019*
2. “[Matching Workers to Tasks in Crowdsourcing Platforms: Two-Sided Online Matching](#)” — Joint work with John Dickerson, Aravind Srinivasan, Pan Xu  
*The 17th International Conference on Autonomous Agents and Multiagent Systems (AAMAS), 2018*
3. “[Combinatorial Semi-Bandits with Knapsacks](#)” — Joint work with Alexandrs Slivkins  
*The 21st International Conference on Artificial Intelligence and Statistics (AISTats), 2018 — (Invited for Oral Presentation)*
4. “[Allocation Problems in Ride-Sharing Platforms: Online Matching with Offline Reusable Resources](#)” — Joint work with John Dickerson, Aravind Srinivasan, Pan Xu  
*The 32th AAAI Conference on Artificial Intelligence (AAAI), 2018 — (Invited for Oral Presentation)*
5. “[Algorithms to Approximate Column-Sparse Packing Problems](#)” — Joint work with Brian Brubach, Aravind Srinivasan, Pan Xu  
*The 29th Annual ACM-SIAM Symposium on Discrete Algorithms (SODA), 2018*
6. “[Attenuation-based Frameworks for Online Stochastic Matching with Timeouts](#)” — Joint work with Brian Brubach, Aravind Srinivasan, Pan Xu  
*The 16th International Conference on Autonomous Agents and Multiagent Systems (AAMAS), 2017*
7. “[New Algorithms, Better Bounds, and a Novel Model for Online Stochastic Matching](#)” — Joint work with Brian Brubach, Aravind Srinivasan, Pan Xu  
*The 24th Annual European Symposium on Algorithms (ESA), 2016*
8. “Ensuring Privacy in Location-Based Services: An Approach Based on Opacity Enforcement” — Joint work with Yi-Chin Wu, Stéphane Lafortune  
*The 14th International Workshop of Discrete Event Systems (WODES), 2014*

N.B.:  
CONFERENCES ARE  
THE PRIMARY  
VENUES OF  
PUBLICATION IN  
COMPUTER  
SCIENCE.

PROFESSIONAL EXPERIENCE	<b>Microsoft Research New York City, NY</b> <i>Mentors: Nicole Immorlica, Rob Schapire, Alex Slivkins</i>	<b>Summer 2018</b>
	<b>IBM Almaden Research Center, San Jose, CA</b> <i>Manager: Shivakumar Vaithyanathan, Mentor: Prithviraj Sen</i> <i>Remote Collaboration Fall 2016/Spring 2017.</i>	<b>Summer 2016</b>
	<b>Technical Report</b> — <i>Karthik Abinav Sankararaman, Prithviraj Sen, Marina Danilevsky, Sanjiv R Das, Seoyoung Kim, Rajasekhar Krishnamurthy, Shivakumar Vaithyanathan</i> “Financial Time-Series Nowcasting with LSTM’s and Imperfect Information”	
RESEARCH EXPERIENCE	<b>Adobe Inc., San Jose, CA</b> <i>Algorithms Team headed by Anil Kamath; Mentor: Fangpo Wang</i>	<b>Summer 2015</b>
	<b>Causal Inference</b> <i>Part of this project conducted as a visitor to Indian Institute of Science and Microsoft Research, Bangalore during May-July 2017</i> <i>Joint work with Navin Goyal, Anand Louis</i> Working on algorithmic problems in theory of causal inference.	<b>May 2017 - Present</b>
	<b>Bandit Algorithms and Online Learning</b> <i>University of Maryland, College Park</i> <i>Joint work with Alex Slivkins</i> Working on Bandit algorithms with global budget constraints.	<b>August 2016 - Present</b>
	<b>Stochastic Optimization, Economics and Algorithms, Discrete Optimization in Machine Learning</b> <i>University of Maryland, College Park</i> <i>Joint works on multiple projects with Brian Brubach, John Dickerson, Aravind Srinivasan, Pan Xu</i> Working on multiple problems such as crowdsourcing algorithms, budgeted allocation and matching problems, sub-modular optimization.	<b>August 2014 - Present</b>
	<b>Algorithms for Maximum Flow, Graph Sparsification and related problems</b> <i>Indian Institute of Technology, Madras</i> <i>Area of Work: Spectral Graph Theory, Convex Optimization</i> <i>Joint work with Narayanaswamy N.S.</i>	<b>Aug 2013 - Aug 2014</b>
TEACHING EXPERIENCE	<b>Privacy in Location Based Services</b> <i>University of Michigan, Ann Arbor</i> <i>Area of Work: Cyber Security</i> <i>Joint work with Yi-Chin Wu, Stéphane Lafortune</i>	<b>May - July 2013</b>
	<b>Teaching Assistant, University of Maryland</b> <i>CMSC250 - Discrete Structures (2 sems.), CMSC131- Intro to Programming (2 sems.), CMSC451/651- Advanced Algorithms (5 sems.)</i> <i>Responsibilities: Guest Lectures, Conducting Discussion Sessions, Office Hours, Grading</i>	
	<b>Teaching Assistant, Indian Institute of Technology, Madras</b> <i>Paradigms of Programming</i> <i>Responsibilities: Grading Programming Assignments</i>	
MISCELLANEOUS	<b>External Reviewer:</b> Transactions on Algorithms (TALG), Networks, Optimization Letters, AA-MAS, EC, NIPS, ICLR, AISTats, ICML <b>Graduate Admissions Committee:</b> Department of Computer Science, UMD, 2016, 2017, 2018 <b>Graduate Executive Council:</b> Secretary 2017 <b>CATS organizer:</b> 2016-2017 <b>Grants:</b> FOCS 2016 Travel Award, UMD CS Travel Award (2017), SODA 2018 Travel Award, Goldhaber Travel Award (2018), ICSSA Travel Award (2018), AISTats 2018 Travel Grant	

SELECTED TALKS	<ol style="list-style-type: none"> <li>1. New Algorithms for Online Stochastic Matching <ul style="list-style-type: none"> <li>- IBM Almaden Center, Theory Group</li> <li>- IBM Almaden Center, Machine Learning Group</li> </ul> </li> <li>2. Algorithms to Approximate Column-Sparse Packing Problems <ul style="list-style-type: none"> <li>- Symposium on Discrete Algorithms (SODA), 2018</li> <li>- Indian Institute of Technology, Madras</li> </ul> </li> <li>3. Bandits with Knapsacks <ul style="list-style-type: none"> <li>- International Conference on Artificial Intelligence and Statistics (AISTATS), 2018</li> <li>- (parts of this work) Indian Institute of Science, Bengaluru</li> <li>- Indian Institute of Technology, Madras</li> <li>- Johns Hopkins Theory Seminar</li> </ul> </li> </ol>
OTHER PAPERS/MANUSCRIPTS	<ol style="list-style-type: none"> <li>1. “Adversarial Bandits with Knapsacks” — Joint work with Nicole Immorlica, Robert Schapire, Alex Slivkins <i>Under Review STOC 2019</i></li> <li>2. “Stability of Linear Structural Equation Model of Causal Inference” — Joint work with Navin Goyal, Anand Louis <i>NIPS Workshop on Causality, 2018</i> <i>Under Review AISTATS 2019</i></li> <li>3. “Mix and Match: Markov Chains and Mixing Times for Matching in Rideshare” — Joint work with Mike Curry, John Dickerson, Aravind Srinivasan, Yuhao Wan, Pan Xu <i>Manuscript</i></li> <li>4. “On the convergence of SGD on neural nets and other over-parameterized problems” — Karthik A Sankararaman*, Soham De*, Zheng Xu, Ronny Huang, Tom Goldstein <i>NIPS Workshop on Integration of Deep Learning Theory, 2018</i></li> <li>5. “<a href="#">Online Stochastic Matching: New Algorithms and Bounds</a>” — Joint work with Brian Brubach, Aravind Srinivasan, Pan Xu <i>Under review Algorithmica — Short version previously appeared at ESA-2016</i></li> <li>6. “<a href="#">Algorithms to Approximate Column-Sparse Packing Problems</a>” — Joint work with Brian Brubach, Aravind Srinivasan, Pan Xu <i>Under review Transactions of Algorithms (TALG) — Short version appeared in SODA-2018</i></li> <li>7. “<a href="#">Attenuation-based Frameworks for Online Stochastic Matching with Timeouts</a>” — Joint work with Brian Brubach, Aravind Srinivasan, Pan Xu <i>Under review Algorithmica — Short version appeared in AAMAS-2017</i></li> </ol>
COLLABORATORS/ CO-AUTHORS	Brian Brubach, Mike Curry, Soham De, John Dickerson, Tom Goldstein, Navin Goyal, Ronny Huang, Nicole Immorlica, Stéphane Lafortune, Anand Louis, Robert Schapire, Prithviraj Sen, Alex Slivkins, Aravind Srinivasan, Leonidas Tsepenekas, Yuhao Wan, Yi-Chin Wu, Pan Xu, Zheng Xu
PROGRAMMING	C++, Python, Java
REFERENCES	Available on Request.