

# Karthik Abinav Sankararaman

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Department of Computer Science  
University of Maryland, College Park

## CONTACT INFORMATION

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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.
- 14th and 16th position in ICPC Mid-Atlantic regionals 2014 and ICPC Asia-Amritapuri regionals 2013 respectively.

## SELECTED PUBLICATIONS

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

1. “[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*
2. “[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)*
3. “[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)*
4. “[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*
5. “[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*
6. “[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*
7. “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.

RESEARCH EXPERIENCE	<b>Causal Inference</b> <span style="float: right;"><b>May 2017 - Present</b></span> <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>Bandit Algorithms and Online Learning</b> <span style="float: right;"><b>August 2016 - Present</b></span> <i>University of Maryland, College Park</i> <i>Joint work with Alex Slivkins</i> Working on Bandit algorithms with global budget constraints.
	<b>Stochastic Optimization, Economics and Algorithms, Discrete Optimization in Machine Learning</b> <span style="float: right;"><b>August 2014 - Present</b></span> <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>Algorithms for Maximum Flow, Graph Sparsification and related problems</b> <span style="float: right;"><b>Aug 2013 - Aug 2014</b></span> <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>
PROFESSIONAL EXPERIENCE	<b>Privacy in Location Based Services</b> <span style="float: right;"><b>May - July 2013</b></span> <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>Microsoft Research New York City, NY</b> <span style="float: right;"><b>Summer 2018</b></span> <i>Mentors: Nicole Immorlica, Rob Schapire, Alex Slivkins</i>
	<b>IBM Almaden Research Center, San Jose, CA</b> <span style="float: right;"><b>Summer 2016</b></span> <i>Manager: Shivakumar Vaithyanathan, Mentor: Prithviraj Sen</i> <i>Remote Collaboration Fall 2016/Spring 2017.</i>
	<b>Technical Report</b> —Karthik Abinav Sankararaman, Prithviraj Sen, Marina Danilevsky, Sanjiv R Das, Seoyoung Kim, Rajasekhar Krishnamurthy, Shivakumar Vaithyanathan “Financial Time-Series Nowcasting with LSTM’s and Imperfect Information”
TEACHING EXPERIENCE	<b>Adobe Inc., San Jose, CA</b> <span style="float: right;"><b>Summer 2015</b></span> <i>Algorithms Team headed by Anil Kamath; Mentor: Fangpo Wang</i>
	<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:</i> Guest Lectures, Conducting Discussion Sessions, Office Hours, Grading
	<b>Teaching Assistant, Indian Institute of Technology, Madras</b> <i>Paradigms of Programming</i> <i>Responsibilities:</i> Grading Programming Assignments
MISCELLANEOUS	<b>External Reviewer:</b> Transactions on Algorithms (TALG), Networks, Optimization Letters, AA-MAS, EC, NIPS, ICLR <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. Combinatorial Semi-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> </ul> </li> </ol>
WORKING PAPERS/MANUSCRIPTS	<ol style="list-style-type: none"> <li>1. “Adversarial Bandits with Knapsacks” — Joint work with Nicole Immorlica, Robert Schapire, Alex Slivkins <i>To be submitted to STOC 2019</i></li> <li>2. “Stability of Linear Structural Equation Model of Causal Inference” — Joint work with Navin Goyal, Anand Louis <i>To be submitted to AISTats 2019</i></li> <li>3. “Online Resource Allocation in Matching-type problems” — Joint work with John Dickerson, Kanthi K Sarpatwar, Aravind Srinivasan, Kun-Lung Wu, Pan Xu <i>Under Review AAAI 2019</i></li> <li>4. “Balancing Relevance and Diversity in Online Matching via Submodularity” — Joint work with John Dickerson, Aravind Srinivasan, Pan Xu <i>Under Review AAAI 2019</i></li> <li>5. “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>Under Review AAAI 2019</i></li> <li>6. “Why is SGD so fast for neural nets and other over-parameterized problems?” — Karthik A Sankararaman*, Soham De*, Zheng Xu, Ronny Huang, Tom Goldstein <i>In preparation for ICML 2019</i></li> <li>7. “<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>8. “<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>9. “<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	<p>Brian Brubach, Mike Curry, Soham De, John Dickerson, Tom Goldstein, Navin Goyal, Ronny Huang, Nicole Immorlica, Stéphane Lafortune, Anand Louis, Kanthi K Sarpatwar, Robert Schapire, Prithviraj Sen, Alex Slivkins, Aravind Srinivasan, Yuhao Wan, Kun-Lung Wu, Yi-Chin Wu, Pan Xu, Zheng Xu</p>