

# Karthik Abinav Sankararaman

July 2018

Department of Computer Science  
University of Maryland, College Park

## CONTACT INFORMATION

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## INTERESTS

Algorithms, Machine Learning, Artificial Intelligence, Operations Research

## EDUCATION

**University of Maryland, College Park**

PhD. in Computer Science

**September 2014 - May 2019 (Expected)**

M.S. in Computer Science

**December 2016**

**Advisor:** Dr. Aravind Srinivasan

**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* (Acceptance: 151/597 ~ 25%)
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**)  
(Acceptance: 29/214/645 ~ 5% (of submissions), 15% (of accepted papers))
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**) (Acceptance: 933/3800 ~ 25%)
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*  
(Acceptance: 180/625 ~ 29%)
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* (Acceptance: 155/595 ~ 26%)
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*  
(Acceptance: 76/282 ~ 27%)
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.

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|----------------------------|---|
| RESEARCH<br>EXPERIENCE     | <b>Causal Inference</b> <span style="float: right;"><b>May 2017 - Present</b></span><br><i>Part of this project conducted as a visitor to Indian Institute of Science and Microsoft Research, Bangalore during May-July 2017</i><br><i>Joint work with Navin Goyal, Anand Louis</i><br>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><br><i>University of Maryland, College Park</i><br><i>Joint work with Alex Slivkins</i><br>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><br><i>University of Maryland, College Park</i><br><i>Joint works on multiple projects with Brian Brubach, John Dickerson, Aravind Srinivasan, Pan Xu</i><br>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><br><i>Indian Institute of Technology, Madras</i><br><i>Area of Work: Spectral Graph Theory, Convex Optimization</i><br><i>Joint work with Narayanaswamy N.S.</i>  |
| PROFESSIONAL<br>EXPERIENCE | <b>Privacy in Location Based Services</b> <span style="float: right;"><b>May - July 2013</b></span><br><i>University of Michigan, Ann Arbor</i><br><i>Area of Work: Cyber Security</i><br><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><br><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><br><i>Manager: Shivakumar Vaithyanathan, Mentor: Prithviraj Sen</i><br><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”<br><b>Adobe Inc., San Jose, CA</b> <span style="float: right;"><b>Summer 2015</b></span><br><i>Algorithms Team headed by Anil Kamath; Mentor: Fangpo Wang</i>  |
| TEACHING<br>EXPERIENCE     | <b>Teaching Assistant, University of Maryland</b><br><i>CMSC250 - Discrete Structures (2 sems.), CMSC131- Intro to Programming (2 sems.), CMSC451/651- Advanced Algorithms (4 sems.)</i><br><i>Responsibilities:</i> Guest Lectures, Conducting Discussion Sessions, Office Hours, Grading  |
|                            | <b>Teaching Assistant, Indian Institute of Technology, Madras</b><br><i>Paradigms of Programming</i><br><i>Responsibilities:</i> Grading Programming Assignments  |
| MISCELLANEOUS              | <b>External Reviewer:</b> Transactions on Algorithms (TALG), Networks, Optimization Letters, AA-MAS, EC, NIPS, ICLR<br><b>Graduate Admissions Committee:</b> Department of Computer Science, UMD, 2016, 2017, 2018<br><b>Graduate Executive Council:</b> Secretary 2017<br><b>CATS organizer:</b> 2016-2017<br><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

1. New Algorithms for Online Stochastic Matching
  - IBM Almaden Center, Theory Group
  - IBM Almaden Center, Machine Learning Group
2. Algorithms to Approximate Column-Sparse Packing Problems
  - Symposium on Discrete Algorithms (SODA), 2018
  - Indian Institute of Technology, Madras
3. Combinatorial Semi-Bandits with Knapsacks
  - International Conference on Artificial Intelligence and Statistics (AISTATS), 2018
  - (parts of this work) Indian Institute of Science, Bengaluru
  - Indian Institute of Technology, Madras

# WORKING PAPERS/MANUSCRIPTS

1. “Balancing Relevance and Diversity in Online Matching via Submodularity” — Joint work with John Dickerson, Aravind Srinivasan, Pan Xu  
*Under Review 2018*
2. “Mix and Match: Markov Chains and Mixing Times for Matching in Rideshare” — Joint work with John Dickerson, Aravind Srinivasan, Pan Xu  
*Under Review 2018*
3. “Why is SGD so fast for neural nets and other over-parameterized problems?” — Karthik A Sankararaman\*, Soham De\*, Zheng Xu, Ronny Huang, Tom Goldstein  
*Under Review 2018*
4. “[Online Stochastic Matching: New Algorithms and Bounds](#)” — Joint work with Brian Brubach, Aravind Srinivasan, Pan Xu  
*Under review Algorithmica — Short version previously appeared at ESA-2016*
5. “[Algorithms to Approximate Column-Sparse Packing Problems](#)” — Joint work with Brian Brubach, Aravind Srinivasan, Pan Xu  
*Under review Transactions of Algorithms (TALG) — Short version appeared in SODA-2018*
6. “[Attenuation-based Frameworks for Online Stochastic Matching with Timeouts](#)” — Joint work with Brian Brubach, Aravind Srinivasan, Pan Xu  
*Under review Algorithmica — Short version appeared in AAMAS-2017*