

# Karthik Abinav Sankararaman

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Department of Computer Science  
University of Maryland, College Park

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## CONTACT INFORMATION

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## INTERESTS

Foundations and Applications of Artificial Intelligence  
**Recent topics:** Sequential Decision Problems (*e.g.*, Online Matching, Multi-armed Bandits, SGD),  
Discrete and Continuous Optimization, Causality

## EDUCATION

**University of Maryland, College Park**  
PhD. in Computer Science      **September 2014 - August 2019 (Expected)**  
M.S. in Computer Science      **December 2016**  
**Dissertation Committee:** Aravind Srinivasan, Alex Slivkins, John Dickerson, Tom Goldstein,  
Furong Huang, Prakash Narayan  
  
**Indian Institute of Technology, Madras**      **August 2010 - July 2014**  
B.Tech Honours in Computer Science and Engineering  
**Minor:** Operations Research

## 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.

## PUBLICATIONS (Authors (mostly) ordered alphabetically by last name)

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

1. “[Online Resource Allocation with Matching Constraints](#)” — Joint work with John Dickerson, Kanthi Sarpatwar, Aravind Srinivasan, Kun-Lung Wu, Pan Xu  
*The 18th International Conference on Autonomous Agents and Multiagent Systems (AAMAS), 2019*
2. “[A Unified Approach to Online Matching with Conflict-Aware Constraints](#)” — Joint work with Hao Cheng, John Dickerson, Yexuan Shi, Aravind Srinivasan, Yongxin Tong, Leonidas Tsepenekas, Pan Xu  
*The 33rd AAAI Conference on Artificial Intelligence (AAAI), 2019*
3. “[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*
4. “[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*  
*Under review Operations Research (OR)*
5. “[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)*
6. “[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)*  
*Under review Transactions on Economics and Computation (TEAC)*
7. “[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*  
*Under review/major revision at Transactions of Algorithms (TALG)*

8. “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*  
*Under review/major revision Algorithmica*
9. “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*  
*Under review Algorithmica*
10. “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*

PROFESSIONAL  
EXPERIENCE

**Microsoft Research New York City, NY** **Summer 2018**

*Mentors: Nicole Immorlica, Rob Schapire, Alex Slivkins*

**IBM Almaden Research Center, San Jose, CA** **Summer 2016**

*Manager: Shivakumar Vaithyanathan, Mentor: Prithviraj Sen*

**Technical Report**—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”

**Adobe Inc., San Jose, CA** **Summer 2015**

*Algorithms Team headed by Anil Kamath; Mentor: Fangpo Wang*

RESEARCH  
EXPERIENCE

**Causal Inference** **May 2017 - Present**

*Part of this project conducted as a visitor to Indian Institute of Science and Microsoft Research, Bangalore during May-July 2017*

*Joint work with Navin Goyal, Anand Louis*

Working on algorithmic problems in theory of causal inference.

**Bandit Algorithms and Online Learning** **August 2016 - Present**

*University of Maryland, College Park*

*Joint work with Alex Slivkins*

Working on Bandit algorithms with global budget constraints.

**Stochastic Optimization, Economics and Algorithms, Discrete Optimization in Machine Learning** **August 2014 - Present**

*University of Maryland, College Park*

*Joint works on multiple projects with Brian Brubach, John Dickerson, Aravind Srinivasan, Pan Xu*

Working on multiple problems such as crowdsourcing algorithms, budgeted allocation and matching problems, sub-modular optimization.

**Algorithms for Maximum Flow, Graph Sparsification and related problems** **Aug 2013 - Aug 2014**

*Indian Institute of Technology, Madras*

*Area of Work: Spectral Graph Theory, Convex Optimization*

*Joint work with Narayanaswamy N.S.*

**Privacy in Location Based Services** **May - July 2013**

*University of Michigan, Ann Arbor*

*Area of Work: Cyber Security*

*Joint work with Yi-Chin Wu, Stéphane Lafortune*

TEACHING  
EXPERIENCE

**Co-instructor, University of Maryland**

*CMSC250H - Discrete Structures (Honors) along with Prof. Bill Gasarch*

*Responsibilities: Designing the syllabus, homework, exams and grading policy. Weekly lecturing.*

## Teaching Assistant, University of Maryland

*CMSC250 - Discrete Structures (2 sems.), CMSC131- Intro to Programming (2 sems.), CMSC451/651- Advanced Algorithms (5 sems.)*

*Responsibilities:* Guest Lectures, Conducting Discussion Sessions, Office Hours, Grading

## Teaching Assistant, Indian Institute of Technology, Madras

*Paradigms of Programming*

*Responsibilities:* Grading Programming Assignments

### MISCELLANEOUS

**Conference reviewer/program committee.** EC, NeurIPS, ICLR, AISTats, ICML, UAI

**Journal reviewer.** Trans. on Algorithms, Networks, Optimization Letters, JAAMAS, Mathematics of Operations Research, Trans. of Signal Processing

**Graduate Admissions Committee:** Department of Computer Science, UMD, 2016, 2017, 2018

**Graduate Executive Council:** Secretary 2017

**Capital Area Theory Seminar organizer:** 2016-2017

**Grants:** 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, AAMAS 2019 Student Scholarship

### 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. Bandits with Knapsacks
  - International Conference on Artificial Intelligence and Statistics (AISTATS), 2018
  - Indian Institute of Science, Bengaluru
  - Indian Institute of Technology, Madras
  - Johns Hopkins Theory Seminar
  - Google Research, NYC

### OTHER PA-

### PERS/MANUSCRIPTS

1. “[Adversarial Bandits with Knapsacks](#)” — Joint work with Nicole Immorlica, Robert Schapire, Alex Slivkins  
*Under Review FOCS 2019*
2. “Stability of Linear Structural Equation Model of Causal Inference” — Joint work with Navin Goyal, Anand Louis  
*NeurIPS Workshop on Causality, 2018*  
*Under Review UAI 2019*
3. “[On the convergence of SGD on neural nets and other over-parameterized problems](#)” — Joint work with Soham De\*, Zheng Xu, Ronny Huang, Tom Goldstein  
*NeurIPS Workshop on Integration of Deep Learning Theory, 2018*  
*Manuscript 2019*

### COLLABORATORS/ CO-AUTHORS

Brian Brubach, Hao Cheng, Mike Curry, Soham De, John Dickerson, Tom Goldstein, Navin Goyal, Ronny Huang, Nicole Immorlica, Stéphane Lafortune, Anand Louis, Kanthi Sarpatwar, Robert Schapire, Prithviraj Sen, Yexuan Shi, Alex Slivkins, Aravind Srinivasan, Yongxin Tong, Leonidas Tsepenekas, Yuhao Wan, Kun-Lung Wu, Yi-Chin Wu, Pan Xu, Zheng Xu

### PROGRAMMING

C++, Python, Java

### REFERENCES

References available on request.