

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: 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
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)
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
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

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
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

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| MISCELLANEOUS | <p>Conference reviewer. EC, NeurIPS, ICLR, AISTats, ICML</p> <p>Journal reviewer. Trans. on Algorithms, Networks, Optimization Letters, JAAMAS, Mathematics of Operations Research, Trans. of Signal Processing</p> <p>Graduate Admissions Committee: Department of Computer Science, UMD, 2016, 2017, 2018</p> <p>Graduate Executive Council: Secretary 2017</p> <p>CATS organizer: 2016-2017</p> <p>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</p> |
| SELECTED TALKS | <ol style="list-style-type: none"> 1. New Algorithms for Online Stochastic Matching <ul style="list-style-type: none"> - IBM Almaden Center, Theory Group - IBM Almaden Center, Machine Learning Group 2. Algorithms to Approximate Column-Sparse Packing Problems <ul style="list-style-type: none"> - Symposium on Discrete Algorithms (SODA), 2018 - Indian Institute of Technology, Madras 3. Bandits with Knapsacks <ul style="list-style-type: none"> - 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 PAPERS/MANUSCRIPTS | <ol style="list-style-type: none"> 1. “Adversarial Bandits with Knapsacks” — Joint work with Nicole Immorlica, Robert Schapire, Alex Slivkins <i>Manuscript 2019</i> 2. “Stability of Linear Structural Equation Model of Causal Inference” — Joint work with Navin Goyal, Anand Louis <i>NeurIPS Workshop on Causality, 2018</i> <i>Under Review UAI 2019</i> 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 <i>NeurIPS Workshop on Integration of Deep Learning Theory, 2018</i> <i>Under Review ICML 2019</i> 4. “Online Stochastic Matching: New Algorithms and Bounds” — Joint work with Brian Brubach, Aravind Srinivasan, Pan Xu <i>Under review Algorithmica — Short version previously appeared at ESA-2016</i> 5. “Algorithms to Approximate Column-Sparse Packing Problems” — Joint work with Brian Brubach, Aravind Srinivasan, Pan Xu <i>Under review/major revision at Transactions of Algorithms (TALG) — Short version appeared in SODA-2018</i> 6. “Attenuation-based Frameworks for Online Stochastic Matching with Timeouts” — Joint work with Brian Brubach, Aravind Srinivasan, Pan Xu <i>Under review Algorithmica — Short version appeared in AAMAS-2017</i> |
| 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. |