ABISHEK SANKARARAMAN

INTERESTS Machine Learning, Graph Analysis, Randomized Algorithms, Social Networks, Wireless Networks

EDUCATION

The University of Texas at Austin
Ph.D. in Electrical and Computer Engineering Sep. 2013 - Sep 2019

- Thesis: Spatial Stochastic Models for Network Analysis
- Advisor: François Baccelli

Indian Institute of Technology, Madras
B.Tech and M.Tech in Electrical Engineering, Minor in Mathematics
GPA: 9.23/10 Aug 2008 - May 2013

EMPLOYMENT

University of California, Berkeley Berkeley,CA
Postdoctoral Researcher, Advisor: Venkat Anantharam Sep 2019 - Present

Simons Center for Network Mathematics Austin, TX
Graduate Research Assistant. Advisor: François Baccelli Jan 2014-Present

Huawei Research Labs Santa Clara, CA
Data Science Intern. Manager: Hui Zang May - Aug, 2015

RESEARCH PAPERS

Machine Learning

The Gossiping Insert-Eliminate Algorithm for Multi Agent Multi Armed Bandits
Ronshee Chawla*, A. Sankararaman*, Ayalvadi Ganesh and Sanjay Shakkottai
AISTATS 2020 * Equal Contribution

Social Learning in Multi-Agent Multi-Armed Bandit Problem
A. Sankararaman, Ayalvadi Ganesh and Sanjay Shakkottai
ACM SIGMETRICS 2020

ComHapDet: A Spatial Community Detection Algorithm for Haplotype Assembly
A. Sankararaman, Haris Vikalo and François Baccelli
BMC Genomics, 2020. Extended Abstract in ACM CNB-MAC 2019.

Community Detection on Euclidean Random Graphs
A.Sankararaman, Emmanuel Abbe and François Baccelli
ACM-SIAM Symposium on Discrete Algorithms (SODA), 2018.
Full Version in **Information and Inference : A journal of the IMA, 2020.**

Network Modeling and Algorithms

Stability and Scalability of Blockchain Systems
Aditya Gopalan, A. Sankararaman, Anwar Walid and Sriram Vishwanath
ACM SIGMETRICS 2020

Interference Queuing Networks on Grids
A. Sankararaman, François Baccelli and Sergey Foss
Annals of Applied Probability, October 2019, Vol. 29, No. 5, 2929-2987.

Spatial Birth-Death Wireless Networks
A.Sankararaman and François Baccelli
IEEE Transactions on Information Theory, June 2017, 63 (6), 3964-3982.

Performance-Oriented Association in Large Cellular Networks with Technology Diversity
A.Sankararaman, Jeong woo Cho and François Baccelli
International Teletraffic Congress (ITC), 2016.

CSMA k-SIC: A class of distributed MAC protocols and their performance evaluation
A.Sankararaman and François Baccelli
IEEE Conference on Computer Communications (INFOCOM), 2015.

Congestion Control of Smart Distribution Grids using State Estimation
Abishek. S and Balakrishnan Narayanaswamy
IEEE COMSNETS, E6 Workshop, 2013.

PROGRAMMING LANGUAGES

Python, C++

RESEARCH PROJECTS

Multi Agent Bandits and Online Learning

- A model for multiple ad-servers simultaneously serving ads and communicating with each other
- Devised a novel near-optimal algorithm, where agents recommend arms to each other, so that all agents can quickly discover the good arms and not all agents need to play the bad arms
- Theoretically demonstrated that communication constraints across agents do not have a major effect on our algorithm's performance
- Demonstrated performance improvements to standard recommendation techniques, by applying the algorithm to a multi agent movie recommendation task
- Published papers in SIGMETRICS, AISTATS and NeurIPS (Under Submission)

Graph Clustering with Side Information Metadata

- Studied a model of graph clustering, where in addition to the graph, there is metadata about the nodes (for ex. in web graph, there are links giving the graph structure and text content in each web-site giving meta data)
- Devised a novel 'divide and conquer' algorithm to cluster such graph data by using the metadata to divide the problem into nodes that are similar and performing clustering on the local graph
- Mathematically proved that this improved both runtime and accuracy compared to stndard clustering methods that ignores node metadata
- Demonstrated the superiority of our algorithm, as it outperformed state of art in the task of Haplotype Phasing, a central problem in Genmoics
- Published papers in SODA, Information and Inference and BMC Genomics

IoT and Blockchain Networks Performance Analysis

- Propsoed and analyzed stochastic models to assess scalability of common spectrum access protocols
- Developed novel mathematical tools to analyze such large scale interacting stochastic networks
- Published papers in Annals of Applied Probability, Transactions on Information Theory, SIGMETRICS, INFOCOM and ITC

Churn Prediction of a Cellular Network Customers

- Worked as a data-science intern at Huawei.
- Developed machine learning prediction models for predicting user churn of a cell-phone provider
- The features used in the model were call frequency, message and browsing frequency, browsing volume and centrality in the call graph data
- Model used downstream to target offering new services to customers that may churn

GRADUATE COURSEWORK

Machine Learning : Large Scale Optimization, Deep Learning (Coursera), Convolutional and Sequence Models (Coursera), Statistical Learning Theory, Online Learning

Mathematics : Real Analysis, Abstract Algebra, Probability, Stochastic Processes, Mixing Times, Statistics, Estimation, Control, Coding Theory

Algorithms : Randomized Algorithms, Network Algorithms, Random Graphs

Awards

- Student Leadership Award, UT Austin, 2018.
- Conference Travel Awards - ACM SODA 2018, NeurIPS 2018, Stochastic Networks 2016, 2018
- DAAD WISE Scholar, 2011

Teaching and Mentorship

Teaching Assistant, *Advanced Probability - Inference and Learning* — Spring 2018
Teaching Assistant, *Probability and Stochastic Processes (Graduate)* — Fall 2018
Duties include holding office hours, setting homework and exam problems.

Undergraduate Student Mentor - *Mixing Times for Random Walks on Groups* — Spring 2018
Research supervisor for an undergraduate student project in the Mathematics Department

Invited and Contributed Talks

- *Interference Queuing Networks on Grids*
  Talk at INFORMS Applied Probability Society, Brisbane, Australia. — Jul 2019
  Talk at UNC-Chapel Hill Probability Seminar, Chapel Hill, NC. — Feb 2019
  Talk at Austin-TAMU Probability Seminar, Austin, TX. — May 2018
  Talk at Heriot-Watt University, Edinburgh UK — Feb 2018

- *Community Detection on Euclidean Random Graphs*
  Talk at AMS Special Session on Stochastic Spatial Models, at the 2020 Joint Mathematics Meeting, Denver CO — Jan 2020
  Talk at MIT Research Laboratory of Electronics, Cambridge MA — Dec 2018
  Talk at University of Massachusetts, Amherst, MA — Dec 2018
  Talk at Indian Institute of Technology Madras, Chennai — Jan 2018
  Talk at ACM-SIAM SODA Conference, New Orleans, LA — Jan 2018
  Talk at The University of Texas at Austin — May 2017

- *Spatial Birth Death Process on the Continuum*
  Talk at Indian Institute of Technology Madras, Chennai — Jan 2017
  Talk at Princeton University — Nov 2016
  Talk at Allerton Conference on Communication Control and Computing — Oct 2016
  Talk at INRIA - Ecole Normale Supérieure, Paris — Sep 2016

- *Technology Diversity - A Framework for Base Station Association in Large Cellular Networks*
  Talk at 28th, International Teletraffic Congress (ITC-28), Würzburg, Germany — Sep 2016

- *CSMA k-SIC: A Class of MAC Protocols*
  Talk at IEEE INFOCOM, Hong Kong — May 2015

Professional Services

- Reviewer for Journal of Applied Probability (JAP), — 2019-2020
- Organizer for Random Structures Seminar at UT Austin Math dept. — 2017-2019
- Reviewer for IEEE ISIT (International Symposium on Information Theory) — 2019
- Reviewer for Queueing Systems Journal — 2019
- Reviewer for ACM-SIAM SODA (Symposium on Discrete Algorithms) — 2019
- Reviewer for IEEE FOCS (Foundations of Computer Science) — 2018
- Reviewer for SpaSWIN (Spatial Stochastic Models for Wireless Networks) — 2018
- Reviewer for Performance Evaluation — 2017
- Reviewer for IEEE Transactions on Information Theory — 2016-2019
- Reviewer for IEEE Transactions on Wireless Communications — 2015-2019