

# Jain, Shweta – CV

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## Research Interests

Randomized and approximation algorithms, parameterized algorithms, graph mining, and algorithms for massive data.

## Research Vision

*To design algorithms for big data, especially graph algorithms, that have provable guarantees and work well on real-world instances.*

## Current Appointment

2021-            Postdoc, University of Utah, Salt Lake City (Advisor: [Prof. Blair D. Sullivan](#))

## Past Appointment

2020-2021    Postdoc, University of Illinois, Urbana-Champaign (Advisor: [Prof. Hanghang Tong](#))

## Education

2014–2020    Ph.D., Computer Science, University of California, Santa Cruz  
Thesis: [Counting cliques in real-world graphs](#) (Advisor: [Prof. Seshadhri Comandur](#))

2012–2013    M.S., Computer Science, University of Chicago

2005–2009    B.E., Computer Engineering, Pune Institute of Computer Technology (PICT)

## Select Honors and Awards

2021            Awarded the [Computing Innovation Fellowship](#) by the CRA and the CCC.

2021            Awarded the [SIGKDD Best Dissertation Award - Runner-Up](#). Awarded to the 2<sup>nd</sup> most innovative and impactful dissertation in Data Science, internationally.

2020            CSE Best Dissertation Award, UCSC, 2020

2020            Best Paper Award at WSDM, 2020. Awarded to the Best Research Paper from among 615 submitted papers.

2020            EECS Rising Star, Berkeley, 2020

2019            Best Poster Award, Foundations of Data Science Workshop, GeorgiaTech, Atlanta

2018            BSOE Dissertation Year Fellowship, 2018-19

2017            Best Paper Award at WWW, 2017. Awarded to the Best Research Paper from among >1000 submitted papers.

2014            UC Santa Cruz Regents' Fellowship, 2014

## Publications and Preprints

- [1] **Jain, S.**, Mizutani, Y., Sullivan, B. D., An Exponentially Smaller Kernel for Exact Weighted Clique Decomposition. In SIAM Conference on Applied and Computational Discrete Algorithms (ACDA), 2023.
- [2] **Jain, S.**, Tong, H., YACC: A Framework Generalizing TuránShadow for Counting Large Cliques. In SIAM International Conference on Data Mining (SDM), 2022.
- [3] **Jain, S.**, Behera, B., Seshadhri, C., Improved FPT bounds for finding maximal dense subgraphs in  $c$ -closed graphs. In Innovations in Theoretical Computer Science (ITCS), 2022.
- [4] **Jain, S.**, Seshadhri, C., The power of pivoting for exact clique counting. In Proceedings of the 13th ACM International Conference on Web Search and Data Mining (WSDM), 2020. **Winner of Best Paper Award.**
- [5] **Jain, S.**, Seshadhri, C., Provably and Efficiently Approximating Near-cliques using Turán Shadow: PEANUTS. In The Web Conference (formerly WWW), 2020.
- [6] Nassar, H., Gleich, D., Benson, A., **Jain, S.** and Kennedy, C., Using cliques with higher-order spectral embeddings improves graph visualizations. In The Web Conference (formerly WWW), 2020.
- [7] Eden, T., **Jain, S.**, Pinar, A., Ron D., Seshadhri, C., Provable and practical approximations for the degree distribution using sublinear graph samples. In The Web Conference (formerly WWW), 2018.
- [8] **Jain, S.**, Seshadhri, C., A Fast and Provable Method for Estimating Clique Counts Using Turán’s Theorem. In 26th International Conference on World Wide Web (WWW), 2017. **Winner of Best Paper Award.**
- [9] Kadekodi, S., **Jain, S.**, Taking Linux Filesystems to the Space Age: Space Maps in Ext4. In Ottawa Linux Symposium, 2010.

## Service

Program Committees: SDM 2021, CIKM 2021, WWW 2021, ESA 2022, WWW 2022

External Reviewer: TKDE 2019, TKDD 2019, Algorithmica 2019, TKDD 2020, TKDE 2020, TWEB 2020, DAMI 2020, TWEB 2021, PVLDB 2021, SEA 2023

## Work Experience

- 2016            **Summer Intern, Sandia National Labs**, Livermore, CA (Mentor: Ali Pinar)  
Developed an algorithm for estimating the degree distribution of a graph by simulating edge sampling using vertex sampling. Paper published at The Web Conference, 2018.
  
- 2013            **Visiting Pre-doctoral Fellow, Northwestern University** (Mentor: Prof. Jason Hartline)  
Studied the structural properties of revenue-optimal mechanisms for a multi-dimensional unit-demand agent, including variants with supply and allocation constraints.
  
- 2011–2012    **Associate Engr., Oneirix Engineering Labs Pvt. Ltd.**, Pune, India (Mentor: Udayan Kanade)  
As part of the Computer Science Research Group, work included simulating optical phenomena including scattering and fluorescence using the Monte Carlo method, writing a nonlinear static equilibrium solver and performing spline based shape optimization of mechanical parts, and creating tools to manipulate huge image datasets in real time.

## Teaching Assistance

- 2015 CMPS101, Algorithms and Abstract Data Types, University of California, Santa Cruz
- 2017 CMPS12B/M, Introduction to Data Structures, University of California, Santa Cruz

## Students Mentored

Balaram Behera, senior year, University of California, Santa Cruz  
Andrew Fraser, Arvinda Kanchana Ruwanpathirana, Benjamin Eagar, Fangfei Lan, Frost Mitchell, Ph.D. students, University of Utah

## Invited Talks

- 2022 Putting Parameterization into Practice - Poster presentation at the NITRD 30th Anniversary Symposium
- 2022 FPT Algorithms for Finding Near-Cliques in  $c$ -Closed Graphs, Paper Presentation at ITCS, 2022
- 2021 Counting Cliques in Real-World Graphs - Talk at the University of Utah
- 2021 Counting Cliques in Real-World Graphs - Talk at the SIGKDD Dissertation Award Ceremony
- 2021 Counting Cliques in Real-World Graphs - Talk at IDEA Lab, University of Illinois, Urbana-Champaign
- 2020 Counting Cliques in Real-World Graphs - Talk at CS4Math, Harvard
- 2020 Counting Cliques in Real-World Graphs - Talk at Algorithms and Complexity Seminar, MIT
- 2020 Counting Cliques in Real-World Graphs - Talk at Theory Lunch, Carnegie Mellon University
- 2020 Counting Cliques in Real-World Graphs - Talk at Theory Lunch, GeorgiaTech
- 2020 Counting Cliques in Real-World Graphs - Talk at Meta (Formerly Facebook)
- 2020 Counting Cliques in Real-World Graphs - Talk at Amazon
- 2020 Counting Cliques in Real-World Graphs - Talk at RelationalAI
- 2020 Counting Cliques in Real-World Graphs - Talk at Microsoft Research, India
- 2020 Counting Near-Cliques using the TuránShadow - Paper presentation at WWW, 2020
- 2020 The Power of Pivoting for Exact Clique Counting - Paper presentation at WSDM, 2020
- 2019 An  $O(3^{\frac{n}{3}})$  algorithm for clique counting - Student talk at Theory of Computing Associated - Silicon Valley (TOCA-SV) at Google
- 2019 Estimating degree distribution - Talk at Stanford Theory Lunch
- 2018 Turán Shadow and its Extensions - Talk at Purdue University
- 2018 Applications of Sampling in Graphs - Talk at LIP6, Sorbonne University, Paris, France
- 2018 Estimating Degree Distribution - Paper presentation at The Web Conference (formerly WWW)
- 2018 Estimating Degree Distribution - Student talk at Theory of Computing Associated - Silicon Valley (TOCA-SV) at Google
- 2018 Clique Counting - Talk at Oneirix Engineering Labs
- 2017 Clique Counting - Student talk at Theory of Computing Associated - Silicon Valley (TOCA-SV) at Google
- 2017 Clique Counting - Paper presentation at the International Conference on World Wide Web (WWW)
- 2017 Clique Counting - Poster presentation at Symposium on the Theory of Computing (STOC)
- 2016 Clique Counting - Student talk at Women in Theory (WIT)