Vatsal Sharan

CONTACT INFORMATION

SAL 220, 941 Bloom Walk,
Los Angeles, CA 90089

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APPOINTMENTS

University of Southern California
Assistant Professor,
Department of Computer Science **Fall 2021 – present**

Massachusetts Institute of Technology
Norbert Weiner Postdoctoral Associate,
Institute for Data, Systems & Society **2020 – 2021**

EDUCATION

Stanford University
Ph.D. in Electrical Engineering **2014 – 2020**
Advisor: Gregory Valiant, Dept. of Computer Science

Indian Institute of Technology Kanpur
B.Tech. in Electrical Engineering **2010 – 2014**

SELECTED PUBLICATIONS

(most papers have alphabetical author ordering)

1. **NeuroSketch: A Neural Network Method for Fast and Approximate Evaluation of Range Aggregate Queries**
   Sepanta Zeighami, Vatsal Sharan, Cyrus Shahabi
   ACM Special Interest Group on Management of Data Conference (SIGMOD) 2023

2. **Efficient Convex Optimization Requires Superlinear Memory**
   Annie Marsden, Vatsal Sharan, Aaron Sidford, Gregory Valiant
   Conference on Learning Theory (COLT), 2022 (Best Paper Award)

3. **Efficient Gradient Methods for Objectives with Multiple Scales**
   Jon Kelner, Annie Marsden, Vatsal Sharan, Aaron Sidford, Gregory Valiant, Honglin Yuan
   Conference on Learning Theory (COLT), 2022

4. **Multicalibrated Partitions for Importance Weights**
   Parikshit Gopalan, Omer Reingold, Vatsal Sharan, Udi Wieder
   Algorithmic Learning Theory (ALT), 2022

5. **Omnipredictors**
   Parikshit Gopalan, Adam Tauman Kalai, Omer Reingold, Vatsal Sharan, Udi Wieder
   Innovations in Theoretical Computer Science (ITCS), 2022

6. **Modular versus Monolithic Task Formulations in Neural Networks Learning**
   Atish Agarwala, Abhimanyu Das, Brendan Juba, Rina Panigrahy, Vatsal Sharan, Xin Wang, Qiuyi Zhang
   International Conference on Learning Representations (ICLR) 2021

7. **Sample Amplification: Increasing Dataset Size even when Learning is Impossible**
   Brian Axelrod, Shivam Garg, Vatsal Sharan, Gregory Valiant
   International Conference on Machine Learning (ICML) 2020

8. **PIDForest: Anomaly detection via Partial Identification**
   Parikshit Gopalan, Vatsal Sharan, Udi Wieder
   Neural Information Processing Systems (NeurIPS) 2019 (Spotlight presentation)

9. **Fast and Accurate Low-Rank Factorization of Compressively-Sensed Data**
   Vatsal Sharan, Kai Sheng Tai, Peter Bailis, Gregory Valiant
   International Conference on Machine Learning (ICML) 2019

10. **Memory-sample Tradeoffs for Linear Regression with Small Error**
Vatsal Sharan, Aaron Sidford, Gregory Valiant
Symposium on the Theory of Computing (STOC) 2019

11. **Recovery Guarantees for Quadratic Tensors with Limited Observations**
Hongyang Zhang, Vatsal Sharan, Moses Charikar and Yingyu Liang
Artificial Intelligence & Statistics (AISTATS) 2019

12. **A Spectral View of Adversarially Robust Features**
Shivam Garg, Vatsal Sharan, Brian Zhang, Gregory Valiant
Neural Information Processing Systems (NeurIPS) 2018 (Spotlight presentation)

13. **Efficient Anomaly Detection via Matrix Sketching**
Vatsal Sharan, Parikshit Gopalan, Udi Wieder
Neural Information Processing Systems (NeurIPS) 2018

14. **Prediction with a Short Memory**
Vatsal Sharan, Sham Kakade, Percy Liang, Gregory Valiant
Symposium on the Theory of Computing (STOC) 2018

15. **Sketching Linear Classifiers over Data Streams**
Kai Sheng Tai, Vatsal Sharan, Peter Bailis, Gregory Valiant
ACM SIGMOD Conference on Management of Data (SIGMOD) 2018

16. **Moment-Based Quantile Sketches for Efficient High Cardinality Aggregation Queries**
Edward Gan, Jialin Ding, Kai Sheng Tai, Vatsal Sharan, Peter Bailis
Conference on Very Large Data Bases (VLDB) 2018

17. **Learning Overcomplete HMMs**
Vatsal Sharan, Sham Kakade, Percy Liang, Gregory Valiant
Neural Information Processing Systems (NeurIPS) 2017

18. **Orthogonalized Alternating Least Squares: A Theoretically Principled Tensor Factorization Algorithm for Practical Use**
Vatsal Sharan, Gregory Valiant
International Conference on Machine Learning (ICML) 2017

Internships

Google Research, Mountain View *(with Rina Panigrahy)* Summer 2019

VMware Research, Palo Alto *(with Parikshit Gopalan)* Summer 2017

Distinctions

- NSF CAREER Award 2023
- Amazon Research Award 2022
- Best Paper Award at 35th Conference on Learning Theory (COLT) 2022
- Norbert Wiener Postdoctoral Fellowship, MIT 2020
- Outstanding reviewer at ICML'19, NeurIPS'21
- Invited to China Theory Week, Tsinghua University 2018
- Director's Gold Medal for best all-round performance and leadership in graduating class, IIT Kanpur 2014
- Best Final Year Project in Electrical Engineering, IIT Kanpur 2014
- Honda Young Engineer and Scientist Award 2013

Students

PhD students

Bhavya Vasudeva (started Fall'21)
Siddartha Devic (started Fall'21, joint with Aleksandra Korolova)
Julian Asilis (started Fall'22)
Deqing Fu (started Fall'22, joint with Robin Jia and Mahdi Soltanolkotabi)

UG students
Natalie Abreu (graduating in Fall'23)
Kameron Shahabi (graduating in Fall'24)
Devin Martin (intern in Summer'22, mentored by Bhavya Vasudeva)

Teaching at USC

Theory of Machine Learning: Fall'21
Machine Learning: Fall'22
Computational Perspectives on the Frontiers of Learning: Spring'23

High-school outreach

High-school students hosted in the summer (in collaboration with USC Viterbi K-12 Center)
Jayron Martinez (Summer'22, mentored by Siddartha Devic)
Luke Pratt (Summer'22, mentored by Bhavya Vasudeva)

Talks for high-school students

Fair & Robust Artificial Intelligence
- As part of USC SHINE program for high-schoolers, June 2022
- Los Angeles County Office of Education (LACOE) CS speaker series, February 2023

Selected Talks & Seminars

Sample Amplification: Increasing Dataset Size even when Learning is Impossible
- Neurips Machine Learning with Guarantees Workshop, December 2019
- Simons Institute, Learning in High Dimensions Program, September 2020
- Learning Theory Mentoring Workshop, February 2021

Memory-sample Tradeoffs for Continuous Optimization and Learning
- Google Research, Mountain View, August 2019
- Cornell ORIE Young Researchers Workshop, October 2019
- University of Washington Theory Lunch, October 2019
- NYU Theory Seminar, November 2019
- EPFL Theory Seminar, November 2019
- Northwestern Junior Theorists Workshop, November 2019
- MIT Theory Lunch, October 2020

Prediction with a Short Memory
- Google Mountain View Algorithms TechTalk, March 2018
- China Theory Week, Tsinghua University, September 2018
- ETH Zurich Institute for Theoretical Studies, November 2019

Orthogonalized ALS: Theoretically Principled Tensor Factorization for Practical Use
- SIAM Annual Meeting, Portland, July 2018