

Vatsal Sharan

CONTACT INFORMATION	SAL 220, 941 Bloom Walk, Los Angeles, CA 90089	e-mail: vsharan@usc.edu
APPOINTMENTS	University of Southern California <i>Assistant Professor,</i> <i>Department of Computer Science</i>	Fall 2021 – present
	Massachusetts Institute of Technology <i>Norbert Wiener Postdoctoral Associate,</i> <i>Institute for Data, Systems & Society</i>	2020 – 2021
EDUCATION	Stanford University <i>Ph.D. in Electrical Engineering</i> <i>Advisor: Gregory Valiant, Dept. of Computer Science</i>	2014 – 2020
	Indian Institute of Technology Kanpur <i>B.Tech. in Electrical Engineering</i>	2010 – 2014
DISTINCTIONS	<ul style="list-style-type: none">• Amazon Research Award• NSF CAREER Award• Amazon Research Award• Best Paper Award at 35th Conference on Learning Theory (COLT)• Norbert Wiener Postdoctoral Fellowship, MIT• Outstanding reviewer at ICML'19, NeurIPS'21• Invited to China Theory Week, Tsinghua University• Director's Gold Medal for best all-round performance and leadership in graduating class, IIT Kanpur• Best Final Year Project in Electrical Engineering, IIT Kanpur• Honda Young Engineer and Scientist Award	<div>2024</div> <div>2023</div> <div>2022</div> <div>2022</div> <div>2020</div> <div></div> <div>2018</div> <div>2014</div> <div>2014</div> <div>2013</div>
SELECTED PUBLICATIONS	(many papers have alphabetical author ordering)	
	<ol style="list-style-type: none">Stability and Group Fairness in Ranking with Uncertain Predictions Siddhartha Devic, Aleksandra Korolova, David Kempe, Vatsal Sharan <i>International Conference on Machine Learning (ICML) 2024</i> <i>Symposium on Foundations of Responsible Computing (FORC 2024)</i>Regularization and Optimal Multiclass Learning Julian Asilis, Siddhartha Devic, Shaddin Dughmi, Vatsal Sharan, Shang-Hua Teng <i>Conference on Learning Theory (COLT) 2024</i>Fairness in Matching under Uncertainty Siddhartha Devic, David Kempe, Vatsal Sharan, Aleksandra Korolova <i>International Conference on Machine Learning (ICML) 2023</i> <i>ACM Conference on Equity & Access in Algorithms, Mechanisms, & Optimization (EAAMO'23)</i>NeuroSketch: A Neural Network Method for Fast and Approximate Evaluation of Range Aggregate Queries Sepanta Zeighami, Vatsal Sharan, Cyrus Shahabi <i>ACM Special Interest Group on Management of Data Conference (SIGMOD) 2023</i>	

5. **Efficient Convex Optimization Requires Superlinear Memory**
Annie Marsden, Vatsal Sharan, Aaron Sidford, Gregory Valiant
Conference on Learning Theory (COLT), 2022 (Best Paper Award)
Invited to IJCAI 2023 Sister Conference Notable Paper Track
6. **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
7. **Multicalibrated Partitions for Importance Weights**
Parikshit Gopalan, Omer Reingold, Vatsal Sharan, Udi Wieder
Algorithmic Learning Theory (ALT), 2022
8. **Omnipredictors**
Parikshit Gopalan, Adam Tauman Kalai, Omer Reingold, Vatsal Sharan, Udi Wieder
Innovations in Theoretical Computer Science (ITCS), 2022
9. **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
10. **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
11. **PIDForest: Anomaly detection via Partial Identification**
Parikshit Gopalan, Vatsal Sharan, Udi Wieder
Neural Information Processing Systems (NeurIPS) 2019 (Spotlight presentation)
12. **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
13. **Memory-sample Tradeoffs for Linear Regression with Small Error**
Vatsal Sharan, Aaron Sidford, Gregory Valiant
Symposium on the Theory of Computing (STOC) 2019
14. **Recovery Guarantees for Quadratic Tensors with Limited Observations**
Hongyang Zhang, Vatsal Sharan, Moses Charikar and Yingyu Liang
Artificial Intelligence & Statistics (AISTATS) 2019
15. **A Spectral View of Adversarially Robust Features**
Shivam Garg, Vatsal Sharan, Brian Zhang, Gregory Valiant
Neural Information Processing Systems (NeurIPS) 2018 (Spotlight presentation)
16. **Efficient Anomaly Detection via Matrix Sketching**
Vatsal Sharan, Parikshit Gopalan, Udi Wieder
Neural Information Processing Systems (NeurIPS) 2018
17. **Prediction with a Short Memory**
Vatsal Sharan, Sham Kakade, Percy Liang, Gregory Valiant
Symposium on the Theory of Computing (STOC) 2018
18. **Sketching Linear Classifiers over Data Streams**
Kai Sheng Tai, Vatsal Sharan, Peter Bailis, Gregory Valiant
ACM SIGMOD Conference on Management of Data (SIGMOD) 2018
19. **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

	<p>20. Learning Overcomplete HMMs Vatsal Sharan, Sham Kakade, Percy Liang, Gregory Valiant <i>Neural Information Processing Systems (NeurIPS) 2017</i></p> <p>21. Orthogonalized Alternating Least Squares: A Theoretically Principled Tensor Factorization Algorithm for Practical Use Vatsal Sharan, Gregory Valiant <i>International Conference on Machine Learning (ICML) 2017</i></p>	
INTERNSHIPS	<p>Google Research, Mountain View (<i>with Rina Panigrahy</i>) Summer 2019</p> <p>VMware Research, Palo Alto (<i>with Parikshit Gopalan</i>) Summer 2017</p>	
STUDENTS	<p>PhD students Bhavya Vasudeva (started Fall'21) Siddhartha Devic (started Fall'21, co-advised with Aleksandra Korolova) Julian Asilis (started Fall'22) Deqing Fu (started Fall'22, co-advised with Robin Jia) Devansh Gupta (started Fall'23, co-advised with Meisam Razaviyayn) Spandan Senapati (started Fall'23, co-advised with Haipeng Luo) Tianyi Zhou (started Fall'23)</p> <p>Undergraduate students Dutch Hansen Anish Jayant Natalie Abreu (graduated in Fall'23, now Ph.D. student at Harvard) Aditya Prased (graduated in Fall'24, will start as Ph.D. student at the University of Chicago) Kameron Shahabi (graduated in Fall'24, will start as Ph.D. student at the University of Washington) Devin Martin (intern in Summer'22, mentored by Bhavya Vasudeva)</p>	
TEACHING AT USC	<p>Theory of Machine Learning: Fall'21, Fall'23 Machine Learning: Fall'22, Spring'24 Computational Perspectives on the Frontiers of Learning: Spring'23</p>	
OUTREACH	<p>Learning Theory Alliance (LeT-All), Workshop Committee - Organized day-long virtual mentoring workshop on “Day-to-day life of an ML/theory researcher” on June 4 2024, attended by around 300 students. - Organized day-long virtual mentoring workshop on “Communicating your research” on October 26 2023, attended by around 200 students.</p> <p>High-school students hosted in the summer (in collaboration with USC Viterbi K-12 Center) Janna Audrey Doratan (Summer'24, mentored by Devansh Gupta) Angela Zhuang (Summer'23, mentored by Julian Asilis) Jayron Martinez (Summer'22, mentored by Siddhartha Devic) Luke Pratt (Summer'22, mentored by Bhavya Vasudeva)</p> <p>Talks for high-school students <i>Fair & Robust Artificial Intelligence</i> - As part of USC SHINE program for high-schoolers, June 2022 - Los Angeles County Office of Education (LACOE) CS speaker series, February 2023</p>	
INVITED TALKS & SEMINARS	<p><i>Transformers Learn Higher-Order Optimization Methods for In-Context Learning</i> - USC Symposium on Frontiers of Generative AI in Science and Society, March 2024 - Information Theory and Applications, San Diego, February 2024</p> <p><i>Memory as a Lens to Understand Efficient Learning and Optimization</i> - Workshop on Computational/Statistical Gaps in Learning & Optimization, UCLA, February 2024 - Indian Institute of Technology, Delhi, December 2023 - University of Maryland, College Park, September 2023 - Microsoft Research, NYC, September 2023</p>	

From Anomaly Detection to Robust ML: Multicalibration as an Algorithmic Paradigm

- Amazon Research, Palo Alto, July 2023

Fairness in Matching under Uncertainty

- Information Theory and Applications, San Diego, February 2023

Sample Amplification: Increasing Dataset Size even when Learning is Impossible

- USC Probability Seminar, October 2023

- Learning Theory Alliance Mentoring Workshop, February 2021

- Simons Institute, Learning in High Dimensions Program, September 2020

- Neurips Machine Learning with Guarantees Workshop, December 2019

Memory-sample Tradeoffs for Continuous Optimization and Learning

- MIT Theory Lunch, October 2020

- NYU Theory Seminar, November 2019

- EPFL Theory Seminar, November 2019

- Northwestern Junior Theorists Workshop, November 2019

- University of Washington Theory Lunch, October 2019

- Cornell ORIE Young Researchers Workshop, October 2019

- Google Research, Mountain View, August 2019

Prediction with a Short Memory

- ETH Zurich Institute for Theoretical Studies, November 2019

- China Theory Week, Tsinghua University, September 2018

- Google Mountain View Algorithms TechTalk, March 2018

Orthogonalized ALS: Theoretically Principled Tensor Factorization for Practical Use

- SIAM Annual Meeting, Portland, July 2018