

# Shivam Gupta

shivamgupta@utexas.edu

EDUCATION	<b>University of Texas at Austin (UT Austin)</b> Ph.D. in Computer Science (Advisor: Eric Price)	Aug 2018 – Present
	<b>University of Illinois at Urbana-Champaign (UIUC)</b> B.S. in Computer Science, Minor in Mathematics	May 2018
INTERESTS	Theory for Diffusion Models, Machine Learning, Statistics, related topics	
EXPERIENCE	<b>Massachusetts Institute of Technology</b> Visiting Student (Host: Sam Hopkins) <ul style="list-style-type: none"><li>Worked on proving sharper rates for high-probability mean estimation</li></ul>	Cambridge, MA Jun 2023 – Aug 2023
	<b>University of California, Berkeley</b> Visiting Student Researcher <ul style="list-style-type: none"><li>Developed theory for diffusion models, and wrote experiments to improve understanding</li><li>Developed new mean and location estimation algorithms</li></ul>	Berkeley, CA Aug 2022 – May 2023
	<b>Sigma Computing, Inc.</b> Research Intern <ul style="list-style-type: none"><li>Worked on designing and implementing anomaly detection algorithms for various datasets</li></ul>	San Francisco, CA May 2022 – Aug 2022
	<b>University of Wisconsin, Madison</b> Research Intern (Host: Ilias Diakonikolas) <ul style="list-style-type: none"><li>Studied gradient descent algorithms to robustly estimate the mean of a high-dimensional Gaussian</li><li>Wrote experiments for outlier-robust sparse estimation in Python and Numpy</li></ul>	Madison, WI May 2020 – Aug 2020
	<b>Jane Street</b> Software Developer Intern <ul style="list-style-type: none"><li>Wrote server code to employ state machine replication to send and receive data via RPCs</li><li>Developed a market data parser in OCaml</li></ul>	New York, NY May 2016 – Aug 2016
	<b>Bloomberg L.P.</b> R&D Intern <ul style="list-style-type: none"><li>Developed real-time system for Bloomberg Terminal to track messages between services in C++</li></ul>	New York, NY May 2015 – Aug 2015
	<b>Posterior Sampling for Diffusion models</b> (with Eric Price, others) <ul style="list-style-type: none"><li>Proving lower bounds and working on algorithms for posterior sampling for diffusion models given noisy linear measurements – Paper in Preparation</li></ul>	Oct 2023 – Present
	<b>Sharper Rates for Heavy-Tailed Estimation</b> (w/ Eric Price, Sam Hopkins) <ul style="list-style-type: none"><li>Proving sharper bounds for heavy-tailed and robust mean estimation – Paper in preparation</li></ul>	Mar 2023 – Present
	<b>8. Sample-Efficient Training for Diffusion</b> Shivam Gupta, Aditya Parulekar, Eric Price, Zhiyang Xun <i>In submission</i>	
	<b>7. Minimax-Optimal Location Estimation</b> Shivam Gupta, Jasper C.H. Lee, Eric Price, Paul Valiant <i>Neural Information Processing Systems (NeurIPS) 2023</i>	
	<b>6. Finite-Sample Symmetric Mean Estimation with Fisher Information Rate</b> Shivam Gupta, Jasper C.H. Lee, Eric Price <i>Conference on Learning Theory (COLT) 2023</i>	
	<b>5. High-dimensional Location Estimation via Norm Concentration for Subgamma Vectors</b> Shivam Gupta, Jasper C.H. Lee, Eric Price <i>International Conference on Machine Learning (ICML) 2023</i>	
	<b>4. Finite-Sample Maximum Likelihood Estimation of Location</b> Shivam Gupta, Jasper C.H. Lee, Eric Price, Paul Valiant <i>Neural Information Processing Systems (NeurIPS) 2022</i>	
CURRENT PROJECTS		
PAPERS		

### 3. Outlier-Robust Sparse Estimation via Non-Convex Optimization

Yu Cheng, Ilias Diakonikolas, Rong Ge, Shivam Gupta, Daniel Kane, Mahdi Soltanolkotabi  
*Neural Information Processing Systems (NeurIPS) 2022*

### 2. Sharp Constants in Uniformity Testing via the Huber Statistic

Shivam Gupta, Eric Price  
*Conference on Learning Theory (COLT) 2022*

### 1. Nash Equilibrium Computation in Resource Allocation Games

Shivam Gupta, Ruta Mehta  
*International Conference on Autonomous Agents and Multiagent Systems (AAMAS) 2018*

## SELECTED AWARDS

- C.W. Gear Outstanding Undergraduate Student Award 2018
- Horace and Kate King Wu International Undergraduate Scholarship 2018
- Illinois Engineering Achievement Scholarship 2017
- NTT Data, Inc., Scholarship 2015, 2016
- Franz Hohn and J.P. Nash Scholarship 2015 (for research in scientific computing)
- Perfect score in the Indian National Olympiad in Informatics, and selected as one of 26 students in India to attend the International Olympiad in Informatics training camp 2014
- ACM ICPC Mid-Central Regional: Team placed 6<sup>th</sup> in 2017, 4<sup>th</sup> in 2016
- Represented India in SEARCC Software Competition 2013, Colombo, Sri Lanka, and placed 3<sup>rd</sup>
- Placed 2<sup>nd</sup> in Dropbox Open programming contest 2015 at UIUC
- Won Bloomberg CodeCon Challenge and invited to CppCon 2015 in Bellevue, Washington
- Won 3Red Trading Tech Challenge in 2015 and 2016 and invited to Chicago

## TALKS

- **Sample-Efficient Training for Diffusion** November 2023  
IFML Workshop on Generative AI, UT Austin
- **A Finite-Sample Theory for Mean Estimation with Fisher Information Rate** October 2023  
MIT Algorithms and Complexity Seminar
- **A Finite-Sample Theory for Mean Estimation with Fisher Information Rate** October 2023  
CMU Theory Lunch
- **Finite-Sample Symmetric Mean Estimation with Fisher Information Rate** July 2023  
Conference on Learning Theory, Bangalore, India

## TEACHING

### At UT Austin:

- *Teaching Assistant*, Sublinear Algorithms (CS 395T) Fall 2020
- *Teaching Assistant*, Introduction to Algorithms (CS 331) Spring 2019
- *Teaching Assistant*, Machine Learning (CS 395T) Summer 2019, Fall 2019
- *Teaching Assistant*, Elements of Data Analytics (CS 329E) Spring 2019
- *Teaching Assistant*, Elements of Computer Programming (CS 303E) Fall 2018

### At UIUC:

- *Course Assistant*, Introduction to Algorithms (CS 374) Spring 2018
- *Grader*, Algorithms II (CS 473) Spring 2018

## SKILLS

- *Languages*: C/C++, Python, Java, OCaml, Haskell, JavaScript
- *Software and Libraries*: NumPy, SciPy, PyTorch, Mathematica,  $\text{\LaTeX}$

## REVIEWING

SODA 2021, 2024; NeurIPS 2023; ITCS 2024; ALT 2024; ICLR 2024; ICML 2024

## RELEVANT COURSES

Probability and Stochastic Processes, Learning Theory, Coding Theory, Theoretical Statistics, Randomized Algorithms, Markov Chains and Mixing Time, Approximation Algorithms, Combinatorial Mathematics, Numerical Linear Algebra, Wireless Networking