Shivam Gupta

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EDUCATION	**University of Texas at Austin (UT Austin)**	Aug 2018 – Present
	Ph.D. in Computer Science (Advisor: Eric Price)	
	University of Illinois at Urbana-Champaign (UIUC)	May 2018
	B.S. in Computer Science, Minor in Mathematics	

INTERESTS Diffusion Models, Large Language Models, Machine Learning, Statistics, related topics

EXPERIENCE

Google DeepMind — *San Francisco, CA*
Student Researcher — May 2024 – Present
- Working on leveraging meta-optimization techniques to fine-tune Large Language Models (LLMs)

Massachusetts Institute of Technology — *Cambridge, MA*
Visiting Student — Jun 2023 – Aug 2023
- Worked on proving sharper rates for high-probability mean estimation

University of California, Berkeley — *Berkeley, CA*
Visiting Student Researcher — Aug 2022 – May 2023
- Developed theory for diffusion models, and wrote experiments to improve understanding
- Developed new mean and location estimation algorithms

Sigma Computing, Inc. — *San Francisco, CA*
Research Intern — May 2022 – Aug 2022
- Worked on designing and implementing anomaly detection algorithms for various datasets

University of Wisconsin, Madison — *Madison, WI*
Research Intern — May 2020 – Aug 2020
- Studied gradient descent algorithms to robustly estimate the mean of a high-dimensional Gaussian
- Wrote experiments for outlier-robust sparse estimation in Python and Numpy

Jane Street — *New York, NY*
Software Developer Intern — May 2016 – Aug 2016
- Wrote server code to employ state machine replication to send and receive data via RPCs
- Developed a market data parser in OCaml

Bloomberg L.P. — *New York, NY*
R&D Intern — May 2015 – Aug 2015
- Developed real-time system for Bloomberg Terminal to track messages between services in C++

PAPERS

12. **Uncovering the Bias in Diffusion-based Posterior Sampling Methods**
Shivam Gupta, Brett Levac, Jon Tamir, Eric Price
In submission to NeurIPS 2024

11. **Faster Diffusion-based Sampling with Randomized Midpoints: Sequential and Parallel**
Shivam Gupta, Linda Cai, Sitan Chen
In submission to NeurIPS 2024

10. **Improved Sample Complexity Bounds for Diffusion Model Training**
Shivam Gupta, Aditya Parulekar, Eric Price, Zhiyang Xun
In submission to NeurIPS 2024

9. **Diffusion Posterior Sampling is Computationally Intractable**
Shivam Gupta, Ajil Jalal, Aditya Parulekar, Eric Price, Zhiyang Xun
International Conference on Machine Learning (ICML) 2024

8. **Beyond Catoni: Sharper Rates for Heavy-Tailed and Robust Mean Estimation**
Shivam Gupta, Samuel B. Hopkins, Eric Price
Conference on Learning Theory (COLT) 2024

7. **Minimax-Optimal Location Estimation**
Shivam Gupta, Jasper C.H. Lee, Eric Price, Paul Valiant
Neural Information Processing Systems (NeurIPS) 2023

6. **Finite-Sample Symmetric Mean Estimation with Fisher Information Rate**
Shivam Gupta, Jasper C.H. Lee, Eric Price
Conference on Learning Theory (COLT) 2023

5. **High-dimensional Location Estimation via Norm Concentration for Subgamma Vectors**
Shivam Gupta, Jasper C.H. Lee, Eric Price
International Conference on Machine Learning (ICML) 2023

4. **Finite-Sample Maximum Likelihood Estimation of Location**
Shivam Gupta, Jasper C.H. Lee, Eric Price, Paul Valiant
Neural Information Processing Systems (NeurIPS) 2022

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

OTHER EXPERIENCE	**Research with Prof. Andreas Klockner (UIUC)**	Aug 2014 –May 2017

- Developed and implemented mesh-refinement algorithms (in Python and using NumPy) to iteratively refine and coarsen meshes while preserving connectivity information.
- Developed theory to explain the algorithms.

Eventifier - Software Engineer Intern   May 2014–Jul 2014

- Developed system to stream Twitter data related to particular topics and classify them as positive/negative using NLP.

Freelance Programming   May 2014–Aug 2014

- Developed Android app for scholarship database company

Game Development   Jan 2013-Aug 2014

- Developed a game engine in C++ and SDL with entity management and rendering functionality
- Developed several game prototypes using the engine
- Initiated organization of Global Game Jam in 2013 for the first time in India (still occurring annually as of 2024)

SELECTED AWARDS

- C.W. Gear Outstanding Undergraduate Student Award 2018
- Conference Travel Grant 2018 (for travel to AAMAS)
- 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 6th in 2017, 4th in 2016
- Represented India in SEARCC Software Competition 2013, Colombo, Sri Lanka, and placed 3rd
- Placed 2nd 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

SKILLS

- *Languages:* Python, C/C++, Java, OCaml, Haskell, JavaScript
- *Software and Libraries:* PyTorch, JAX, TensorFlow, NumPy, SciPy, Mathematica, LaTeX

REVIEWING	SODA 2021, 2024; NeurIPS 2023, 2024; ITCS 2024; ALT 2024, 2025 (PC member); ICLR 2024; ICML 2024, TF2M@ICML 2024; AAAI 2025 (PC member)

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

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