SURBHI GOEL

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EDUCATION

University of Texas at Austin August 2015 - June 2020
M.S. and PhD in Computer Science
Advisor: Adam Klivans
Thesis: Towards Provably Efficient Algorithms for Learning Neural Networks

Indian Institute of Technology, Delhi July 2011 - May 2015
Bachelor of Technology
Department of Computer Science and Engineering

WORK EXPERIENCE

Microsoft Research, New York NY July 2020 - Present
· *Postdoctoral Researcher*

IAS, Princeton NJ January - May 2020
· *Visiting Graduate Student*

Simons Institute for Theory of Computing, Berkeley CA May - August 2019
· *Research Fellow*

Google, Mountain View CA May - August 2018
· *Research Intern* *Supervisor: Rina Panigrahy*

Dell, Round Rock TX June - August 2017
· *Research Intern*

Google, New York, NY May - August 2016
· *Research Intern* *Supervisor: Natalia Ponomareva*

Google, Mountain View CA May - August 2014
· *Software Engineering Intern* *Supervisor: Neha Jha*

University of Michigan, Ann Arbor MI May - July 2013
· *Research Scholar* *Supervisor: Atul Prakash*

RESEARCH INTERESTS

Theory, Machine Learning

PUBLICATIONS

Surbhi Goel, Adam Klivans, Pasin Manurangsi, Daniel Reichman. *Tight Hardness Results for Learning One-Layer ReLU Networks.* Innovations in Theoretical Computer Science (ITCS) 2021.

Surbhi Goel, Adam, Klivans, Frederic Koehler. *From Boltzmann Machines to Neural Networks and Back Again.* Neural Information Processing Systems (NeurIPS) 2020.

Surbhi Goel, Aravind Gollakota, Adam, Klivans. *Statistical-Query Lower Bounds via Functional Gradients.* Neural Information Processing Systems (NeurIPS) 2020.

Surbhi Goel, Aravind Gollakota, Zhihan Jin, Sushrut Karmalkar, Adam Klivans. *Superpolynomial Lower Bounds for Learning One-Layer Neural Networks using Gradient Descent.* International Conference on Machine Learning (ICML) 2020.

Omar Montasser, **Surbhi Goel**, Ilias Diakonikolas, Nathan Srebro. *Efficiently Learning Adversarially Robust Halfspaces with Noise.* International Conference on Machine Learning (ICML) 2020.

Jessica Hoffmann, Soumya Basu, **Surbhi Goel**, Constantine Caramanis. *Disentangling Mixtures of Epidemics on Graphs.* Short Version: Graph Representation Learning Workshop at Neural Information Processing Systems (NeurIPS) 2019. Full version: International Conference on Machine Learning (ICML) 2020.

Ilias Diakonikolas, **Surbhi Goel**, Sushrut Karmalkar, Adam Klivans, Mahdi Soltanolkotabi. *Approximation Schemes for ReLU Regression.* Conference on Learning Theory (COLT) 2020.

Surbhi Goel. *Learning Ising and Potts Models with Latent Variables.* International Conference on Artificial Intelligence and Statistics (AISTATS) 2020.

Surbhi Goel, Sushrut Karmalkar, Adam Klivans. *Time/Accuracy Trade-offs for Learning a ReLU with respect to Gaussian Marginals.* Neural Information Processing Systems (NeurIPS) 2019 [Spotlight Presentation].

Surbhi Goel, Daniel Kane, Adam Klivans. *Learning Ising Models with Independent Failures.* Conference on Learning Theory (COLT) 2019.

Surbhi Goel, Adam Klivans. *Learning Neural Networks with Two Nonlinear Layers in Polynomial Time.* Short version: Deep Learning Bridging Theory and Practice Workshop, Neural Information Processing Systems (NeurIPS) 2017. Full version: Conference on Learning Theory (COLT) 2019.

Surbhi Goel, Adam Klivans, Raghu Meka. *Learning One Convolutional Layer with Overlapping Patches.* International Conference on Machine Learning (ICML) 2018 [Full Oral].

Surbhi Goel, Adam Klivans. *Eigenvalue Decay Implies Polynomial-Time Learnability for Neural Networks.* Neural Information Processing Systems (NeurIPS) 2017.

Surbhi Goel, Varun Kanade, Adam Klivans, Justin Thaler. *Reliably Learning ReLU in Polynomial Time.* Short Version: Workshop on Optimization for Machine Learning, Neural Information Processing Systems (NeurIPS) 2016 [Oral Presentation]. Full Version: Conference on Learning Theory (COLT) 2017.

PREPRINTS

Naman Agarwal, **Surbhi Goel**, Cyril Zhang. *Acceleration via Fractal Learning Rate Schedules.*

OTHER MANUSCRIPTS

Surbhi Goel, Rina Panigrahy. *Learning Two layer Networks with Multinomial Activation and High Thresholds.*

Simon Du, **Surbhi Goel**. *Improved Learning of One-hidden-layer Convolutional Neural Networks with Overlaps.*

Matthew Jordan, Naren Manoj, **Surbhi Goel**, Alexandros Dimakis. *Quantifying Perceptual Distortion of Adversarial Examples.*

TEACHING EXPERIENCE

University of Texas at Austin Spring 2016
· *Course: Distributed Computing (Hons.)* *Teaching Assistant*

University of Texas at Austin Fall 2015
· *Course: Data Structures* *Teaching Assistant*

Indian Institute of Technology Delhi Spring 2015
· *Course: Data Structures* *Teaching Assistant*

TALKS

Computational Complexity of ReLU Regression 2021
· *The Multifaceted Complexity of Machine Learning Workshop at IMSI [virtual]*

Computational Complexity of Learning Neural Networks over Gaussian Marginals 2020
MIC Seminar at NYU [virtual]
Algorithms Seminar at Duke University [virtual]
ML Theory Seminar at Harvard University [virtual]
ARC Colloquium at Georgia Tech [virtual]
IDEAL Seminar at TTIC [virtual]
TOC Colloquium at MIT [virtual]
· *SILO Seminar at UW-Madison [virtual]*

Learning Ising and Potts Models with Latent Variables 2020
· *International Conference on Artificial Intelligence and Statistics (AISTATS) [virtual]*

Approximation Schemes for ReLU Regression 2020
Conference on Learning Theory (COLT) [virtual]
· *Deep Learning Program Reunion at Simons Institute [virtual]*

Provably Efficient Algorithms for Learning Neural Networks 2020
Microsoft Research New York
Microsoft Research New England
· *Microsoft Research Redmond*

Time/Accuracy Tradeoffs for Learning a ReLU wrt Gaussian Marginals 2019
· *Neural Information Processing Systems (NeurIPS) 2019*

Exploring Surrogate Losses for Learning Neural Networks 2019
· *TTIC Young Researcher Seminar Series*

Efficiently Learning Simple Neural Networks 2019
· *Rising Star in ML Talk at University of Maryland Institute for Advanced Computer Studies*

Learning Neural Networks with Two Nonlinear Layers in Polynomial Time 2019
· *Conference on Learning Theory (COLT)*

Learning Ising Models with Independent Failures
Conference on Learning Theory (COLT)
· *Research Fellows Talk at Simons Institute*

Efficiently Learning Simple Convolutional Networks 2018
· *China Theory Week*

Learning One Convolutional Layer with Overlapping Patches 2018
Google Research Theory Reading Group
· *International Conference on Machine Learning (ICML)*

Reliably Learning the ReLU in Polynomial Time 2016-17
Conference on Learning Theory (COLT)
· *OPT-ML Workshop at Neural Information Processing Systems (NeurIPS)*

PROGRAM COMMITTEE

2021 Algorithmic Learning Thoery (ALT)

REVIEWING

2020	IEEE Transactions on Information Theory
2020	Symposium on Discrete Algorithms (SODA)
2020	Foundations of Computer Science (FOCS)
2019	International Conference on Machine Learning (ICML) (top 5%)
2019/20	International Conference on Learning Representations (ICLR)
2019/20	Symposium on Theory of Computing (STOC)
2018/19/20/21	Conference on Learning Theory (COLT)
2018/20	Neural Information Processing Systems (NeurIPS) (top 30%)

SERVICE

2020-Present	One World Machine Learning Seminar Series	Co-organizer
2021-Present	Learning Theory Alliance	Co-founder
2021	ALT 2021 Learning Theory Mentorship Workshop	Co-organizer

ACHIEVEMENTS

2019	Rising Stars in ML
2019	Rising Stars in EECS
2019	The University of Texas at Austin Graduate Dean's Prestigious Fellowship Supplement
2019	J.P. Morgan AI PhD Fellowship
2019	Simons-Berkeley Research Fellowship for Foundations of Deep Learning program.
2018	The University of Texas at Austin Graduate Continuing Bruton Fellowship
2017	The University of Texas at Austin Graduate School Summer Fellowship
2016-19	Professional Development Award for travel to conferences
2015	ICIM Stay Ahead Award for Undergraduate Thesis
2015	Suresh Chandra Memorial Trust Award for Undergraduate Thesis
2011-15	Aditya Birla Scholarship awarded to 12 students from all over India
2011	OPJEM Scholarship awarded to 1 out of 850 students in the batch
2011	All India Rank 37 (second in girls) in IITJEE among 450,000 students
2010-11	National Mathematics Olympiad finalist, IMO training camp attendee
2010-11	KVPY Fellowship awarded to 250 from all over India pursuing science