Harshay Shah

Pre-doctoral Research Fellow
Microsoft Research India

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Research Interests

- Foundations of robust and reliable machine learning
- Understanding deep learning phenomena through theory and experiments
- Principled and practical algorithms for modern learning paradigms

Education

University of Illinois, Urbana-Champaign (UIUC) 2014 - 2019
B.S. in Computer Science and Statistics GPA 3.97/4.00
Summa Cum Laude (top 3%) and Highest Departmental Distinction

Papers

The Pitfalls of Simplicity Bias in Neural Networks
Harshay Shah, Kaustav Tamuly, Aditi Raghunathan, Prateek Jain, and Praneeth Netrapalli
Advances in Neural Information Processing Systems (**NeurIPS 2020**)
ICML Workshop on Uncertainty and Robustness in Deep Learning (**ICML UDL 2020**)
[pdf] [poster] [code] [talk]

Growing Attributed Networks through Local Processes
Harshay Shah, Suhansanu Kumar, and Hari Sundaram
Proceedings of the World Wide Web Conference (**WWW 2019**)
[pdf] [poster] [code] [blog post]

Number of Connected Components in a Graph: Estimation via Counting Patterns
Ashish Khetan, Harshay Shah, and Sewoong Oh
Manuscript, arXiv:1812.00139 (2018)
[pdf] [code]

Awards and Honors

CRA Outstanding Undergraduate Researcher, Honorable Mention [link] 2019
One of 77 undergraduate students in US and Canada recognized for research potential in computer science

C.W. Gear Outstanding Undergraduate Student Award [link] 2019
One of two undergraduate students at UIUC recognized for demonstrated interest in computer science research

UIUC Undergraduate Conference Travel Grant [link] 2019
Received travel funds to present my work at the World Wide Web (WWW) conference

IMC Trading Scholarship [link] 2018
One of two undergraduate students at UIUC to receive the merit-based scholarship

James N. Snyder Memorial Award [link] 2018
One of three undergraduate students at UIUC recognized for academic merit

Experience

Microsoft Research India — Bangalore, India
Research Fellow in the Machine Learning & Optimization Group — July 2019 – Present
Advisors: Dr. Praneeth Netrapalli and Dr. Prateek Jain

Simplicity bias: Empirically and theoretically characterized the prevalence of implicit simplicity bias in SGD-trained neural networks. Analyzed the adverse effects of extreme simplicity bias on generalization and robustness. Demonstrated the ineffectiveness of adversarial training and vanilla ensembles in mitigating the pitfalls of simplicity bias.

Feature attributions: Currently working towards reliably evaluating the fidelity of gradient-based feature attributions and understanding the effect of adversarial training and input gradient regularization on feature attributions.

Koyejo Lab at UIUC — Champaign, IL
Undergraduate Researcher — July 2018 – May 2019
Advisor: Prof. Oluwasanmi Koyejo

Multi-scale networks: Generalized the Kronecker Graph Product Model (KPGM) to infer structural properties of multi-scale brain networks. Derived distributions over KPGM graph statistics in terms of model parameters and resolution. Empirically analyzed the effect of network resolution on the structure of multi-scale brain networks.

Coordinated Science Laboratory at UIUC — Champaign, IL
Undergraduate Researcher — May 2017 – December 2019
Advisor: Prof. Sewoong Oh

Learning from comparisons: Augmented the Multinomial Logit model to robustly learn latent user-item preferences from partially corrupted pairwise comparisons using a low-rank plus sparse approach. Established an upper bound on the sample complexity of the proposed low-rank plus sparse estimator.

Graph algorithms: Extended EigenAlign, a spectral graph matching algorithm using projected power iteration and analyzed its performance using correlated Erdős–Rényi graphs. Evaluated the performance of a motif-based spectral approach to estimate the number of connected components in partially observed undirected graphs.

Crowd Dynamics Lab at UIUC — Champaign, IL
Undergraduate Researcher — July 2016 – May 2018
Advisor: Prof. Hari Sundaram

Network growth: Developed an interpretable network growth model based on random walks that unifies link formation phenomena and individual resource constraints to jointly preserve global structural properties and local attribute mixing patterns of real-world attributed networks.

Akuna Capital — Chicago, IL
Software Engineering Intern — May 2015 – July 2015

Trading infrastructure: Developed modules to transfer financial instruments across databases, update metadata of queried instruments, and harness synthetic financial data for unit-testing purposes.

Relevant Coursework

Mathematical Statistics (Graduate)	Machine Learning	Numerical Methods
Nonlinear Optimization (Graduate)	Natural Language Processing	Statistical Computing
Algorithms & Models of Computation	Network Analysis (Graduate)	Data Structures

Miscellany

External reviewer for NeurIPS 2020 • Sub-reviewer for ALT 2020 • Co-organizer of the Machine Learning reading group at Microsoft Research India • Volunteer at HackIllinois • Member of the ICPC group at UIUC