Abhin Shah

MIT abhin02.github.io abhin@mit.edu

Education

Massachusetts Institute of Technology (MIT) *2018—*
Ph. D., in Electrical Engineering and Computer Science *CGPA: 5.00/5.00*
Advisors: *Prof. Devavrat Shah & Prof. Gregory W. Wornell*

Indian Institute of Technology, Bombay (IIT Bombay) *2014—2018*
Bachelor of Technology in Electrical Engineering (with Honours) *CGPA: 9.61/10.00*
Minor in Computer Science

Research Interests

My research develops theory and methods for trustworthy and robust machine learning using ideas from causal inference, algorithmic fairness, differential privacy, compression, and high-dimensional statistics.

Selected Awards And Achievements

Presidential Graduate Fellowship, MIT *2018-19*

Undergraduate Research Award 01 for exemplary contribution towards research, IIT Bombay. *2017*

Institute Academic Prize for excellent academic performance in the junior year, IIT Bombay *2017*

Best project for social cause at Technical, Research, and Development Exposition, IIT Bombay *2015*

All India Rank 126 out of 1.4 million, IIT Joint Entrance Exam (Advanced) *2014*

Bronze medal, 32nd Annual Mathematics Olympiad, IIT Bombay *2013*

National Talent Search Scholarship, Government of India *2010-18*

Internship Experience

Google Research (with Johannes Ballé, Lucas Theis, and Peter Kairouz) *Summer 2021*

IBM Research (with Kush Varshney, Kartik Ahuja, Karthikeyan Shanmugam, Dennis Wei, and Amit Dhurandhar) *Summer 2020*

EPFL, Switzerland (with Prof. Michael Gastpar) *Summer 2017*

Pre-Prints & Working Papers

P1. **Abhin Shah**, Raaz Dwivedi, Devavrat Shah, Gregory W. Wornell, "On counterfactual inference with unobserved confounding", *NeurIPS Workshop on Causality for Real-world Impact (CML4Impact)*, 2022 (full version to be submitted to Annals of Statistics)

P2. **Abhin Shah**, Devavrat Shah, Gregory W. Wornell, "On Computationally Efficient Learning of Exponential Family Distributions", *under review at Stochastic Systems*

Conference Publications

($\star$ denotes equal contribution

C1. **Abhin Shah***, Yuheng Bu*, Joshua Ka-Wing Lee, Subhro Das, Rameswar Panda, Prasanna Sattigeri, Gregory W. Wornell, "Selective Regression Under Fairness Criteria", *International Conference on Machine Learning, (ICML)*, 2022

C2. **Abhin Shah**, Wei-Ning Chen, Johannes Ballé, Peter Kairouz, Lucas Theis, "Optimal Compression of Locally Differentially Private Mechanisms", *International Conference on Artificial Intelligence and Statistics (AISTATS)*, 2022

C3. **Abhin Shah**, Karthikeyan Shanmugam, Kartik Ahuja, "Finding Valid Adjustments under Non-ignorability with Minimal DAG Knowledge", *International Conference on Artificial Intelligence and Statistics (AISTATS)*, 2022

C4. **Abhin Shah**, Devavrat Shah, Gregory W. Wornell, "A Computationally Efficient Method for Learning Exponential Family Distributions", *Conference on Neural Information Processing Systems (NeurIPS)*, 2021.

C5. **Abhin Shah**, Kartik Ahuja, Karthikeyan Shanmugam, Dennis Wei, Kush Varshney, Amit Dhurandhar, "Treatment Effect Estimation using Invariant Risk Minimization", *IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, 2021.

C6. **Abhin Shah**, Devavrat Shah, Gregory W. Wornell, "On learning Continuous Markov Random Fields", *International Conference on Artificial Intelligence and Statistics (AISTATS)*, 2021 **(Oral)**

C7. **Abhin Shah**, Nikhil Karamchandani, Suhas Diggavi, "Coded Caching: Global vs Local Content Popularity", *Canadian Workshop on Information Theory, (CWIT)*, 2019

C8. Su Li, **Abhin Shah**, Michael Gastpar, "Cooperative Data Exchange with Weighted Cost based on Basis Construction", *Annual Allerton Conference on Communication, Control, and Computing (Allerton)*, 2017

Journal Publications

J1. **Abhin Shah**, Sai Vinjanampathy, Bhaskaran Muralidharan, "Classical information driven quantum dot thermal machines", *Annals of Physics*, 2018

Softwares & Methodologies

S1. **Abhin Shah**, Yuheng Bu, Joshua Ka-Wing Lee, Subhro Das, Rameswar Panda, Prasanna Sattigeri, Gregory W. Wornell. *Python repository "Selective Regression Under Fairness Criteria"* (link).

S2. **Abhin Shah**, Karthikeyan Shanmugam, Kartik Ahuja. *Python repository "Finding Valid Adjustments under Non-ignorability with Minimal DAG Knowledge"* (link).

S3. **Abhin Shah**, Wei-Ning Chen, Lucas Theis, Peter Kairouz, Johannes Ballé. *Python repository "Optimal Compression of Locally Differentially Private Mechanisms"* (link).

S4. **Abhin Shah**, Kartik Ahuja, Karthikeyan Shanmugam, Dennis Wei, Kush Varshney, Amit Dhurandhar. *Python repository "Treatment effect estimation using invariant risk minimization"* (link).

Research Talks

T1. On counterfactual inference with unobserved confounding, *LIDS and Stata tea talk, MIT* *November 2022*

T2. Selective Regression Under Fairness Criteria, *International Conference on Machine Learning, (ICML), Baltimore* *July 2022*

T3. Optimal Compression of Locally Differentially Private Mechanisms, *International Conference on Artificial Intelligence and Statistics (AISTATS), Virtual* *March 2022*

T4. Finding Valid Adjustments under Non-ignorability with Minimal DAG Knowledge, *International Conference on Artificial Intelligence and Statistics (AISTATS), Virtual* *March 2022*

T5. Selective Regression Under Fairness Criteria, *Jane Street Symposium, Virtual* *January 2022*

T6. A Computationally Efficient Method for Learning Exponential Family Distributions, *Conference on Neural Information Processing Systems (NeurIPS), Virtual* *December 2021*

T7. Optimal Compression of Locally Differentially Private Mechanisms, *Federated Research Group, Google Research, Virtual* *August 2021*

T8. Optimal Compression of Locally Differentially Private Mechanisms, *Neural Compression Group, Google Research, Virtual* *August 2021*

T9. Finding Valid Adjustments under Non-ignorability with Minimal DAG Knowledge, *Brain Causality Group, Google Research, Virtual* *July 2021*

T10. Finding Valid Adjustments under Non-ignorability with Minimal DAG Knowledge, *Causality and Machine Learning group, Microsoft Research, Virtual* *July 2021*

T11. Treatment Effect Estimation using Invariant Risk Minimization, *IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), Virtual* *June 2021*

T12. On learning Continuous Markov Random Fields, *International Conference on Artificial Intelligence and Statistics (AISTATS), Virtual* *March 2021*

T13. Treatment Effect Estimation using Invariant Risk Minimization, *IBM Research, Virtual* *August 2020*

Poster Presentations

C1. Selective Regression Under Fairness Criteria, *International Conference on Machine Learning, (ICML), Baltimore* *July 2022*

C2. Optimal Compression of Locally Differentially Private Mechanisms, *International Conference on Artificial Intelligence and Statistics (AISTATS), Virtual* *March 2022*

C3. Finding Valid Adjustments under Non-ignorability with Minimal DAG Knowledge, *International Conference on Artificial Intelligence and Statistics (AISTATS), Virtual* *March 2022*

C4. A Computationally Efficient Method for Learning Exponential Family Distributions, *Conference on Neural Information Processing Systems (NeurIPS), Virtual* *December 2021*

C5. Optimal Compression of Locally Differentially Private Mechanisms, *Google's Workshop on Federated Learning and Analytics, Virtual* *November 2021*

C6. Treatment Effect Estimation using Invariant Risk Minimization, *IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), Virtual* *June 2021*

C7. On learning Continuous Markov Random Fields, *International Conference on Artificial Intelligence and Statistics (AISTATS), Virtual* *March 2021*

C8. On learning Continuous Markov Random Fields, *MIFODS Workshop on Graphical Models, Exchangeable Models and Graphons, MIT* *August 2019*

Teaching Experience (TAship)

T1. Algorithms for Inference (6.438), *MIT.* *2020*

T2. Linear Algebra (MA 106), *IIT Bombay.* *2016*

T3. Quantum Physics and Application (PH 107), *IIT Bombay.* *2015*

Academic Services

Scientific Meetings

- Chair, Social Aspects: Accountability, Transparency and Interpretability Session, International Conference on Machine Learning *2022*

Institutional Mentoring Activities

- MIT EECS Graduate Application Assistance Program (GAAP) for *underrepresented applicants* *2022*
- IIT Bombay Student Mentoring Program (ISMP) for *incoming undergraduates* *2017—2018*
- IIT Bombay Academic Mentoring Program (DAMP) for *sophomores & juniors* *2016—2018*

Reviewing Activities

- ICML 2022 *(top-10% reviewer)*, AISTATS 2022 *(top-10% reviewer)*, NeurIPS 2022, AISTATS 2021, NeurIPS 2021, JSAIT 2020

References

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