Abhin Shah

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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 algorithms for trustworthy machine learning with a focus on causality, fairness, and privacy by using ideas from high-dimensional statistics, optimization, and information theory.

Selected Awards And Achievements

Presidential Graduate Fellowship, MIT *2018-19*

Undergraduate Research Award 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*

News Coverage

N1. Research on "Fair Selective Regression" featured in MIT News article, "A technique to improve both fairness and accuracy in artificial intelligence" *July 2022*

Pre-Prints

P1. **Abhin Shah**, Raaz Dwivedi, Devavrat Shah, Gregory W. Wornell, "On counterfactual inference with unobserved confounding", *under review*

P2. **Abhin Shah**, Maohao Shen, Jongha Jon Ryu, Subhro Das, Prasanna Sattigeri, Yuheng Bu, Gregory W. Wornell, "Group Fairness with Uncertainty in Sensitive Attributes", *under review*

P3. **Abhin Shah**, Karthikeyan Shanmugam, Murat Kocaoglu, "Data-driven Causal Effect Estimation via Generalized Front Door", *under review*

P4. **Abhin Shah**, Devavrat Shah, Gregory W. Wornell, "On Computationally Efficient Learning of Exponential Family Distributions", *under review*

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)*, link *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)*, link *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)*, link *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)*, link *2021*

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

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*

Research Talks

On counterfactual inference with unobserved confounding

- DeepMind/UCL Computational Statistics and Machine Learning Seminar, Virtual *sched. June 2023*
- ICSA Applied Statistics Symposium, Ann Arbor, Michigan *sched. June 2023*
- Machine Learning Foundations and Optimization Group, Google Research, Virtual *April 2023*
- Machine Learning Seminar, IBM Research, Virtual *March 2023*
- Machine Learning Department, Carnegie Mellon University (CMU), Virtual *March 2023*
- Econometrics Lunch, MIT *March 2023*
- Brain Causality Group, Google Research, Virtual *Feb 2023*
- LIDS and Stata tea talk, MIT *Nov 2022*

Group Fairness with Uncertainty in Sensitive Attributes

- Machine Learning Tea (MLTea) Seminar Series, MIT *sched. May 2023*
- LIDS and Stata tea talk, MIT *March 2023*

Selective Regression Under Fairness Criteria

- International Conference on Machine Learning (ICML), Baltimore *July 2022*
- Jane Street Symposium, Virtual *Jan 2022*

Finding Valid Adjustments under Non-ignorability with Minimal DAG Knowledge

- International Conference on Artificial Intelligence and Statistics (AISTATS), Virtual *March 2022*
- Brain Causality Group, Google Research, Virtual *July 2021*
- Causality and Machine Learning group, Microsoft Research, Virtual *July 2021*

Optimal Compression of Locally Differentially Private Mechanisms

- International Conference on Artificial Intelligence and Statistics (AISTATS), Virtual *March 2022*
- Federated Research Group, Google Research, Virtual *Aug 2021*
- Neural Compression Group, Google Research, Virtual *Aug 2021*

Treatment Effect Estimation using Invariant Risk Minimization

- International Conference on Acoustics, Speech and Signal Processing (ICASSP), Virtual *June 2021*
- IBM Research, Virtual *Aug 2020*

A Computationally Efficient Method for Learning Exponential Family Distributions

- Conference on Neural Information Processing Systems (NeurIPS), Virtual *Dec 2021*

On learning Continuous Markov Random Fields

- International Conference on Artificial Intelligence and Statistics (AISTATS), Virtual *March 2021*

Selected Poster Presentations

On counterfactual inference with unobserved confounding

- American Causal Inference Conference, Austin, Texas *sched. May 2023*
- NeurIPS Workshop on Causality for Real-world Impact, New Orleans, Louisiana *Dec 2022*

Group Fairness with Uncertainty in Sensitive Attributes

- Social and Ethical Responsibilities of Computing Symposium, MIT *April 2023*

Finding Valid Adjustments under Non-ignorability with Minimal DAG Knowledge

- American Causal Inference Conference, Austin, Texas *sched. May 2023*

Optimal Compression of Locally Differentially Private Mechanisms

- Google's Workshop on Federated Learning and Analytics, Virtual *Nov 2021*

On learning Continuous Markov Random Fields

- MIFODS Workshop on Graphical Models, Exchangeable Models and Graphons, MIT *Aug 2021*

Teaching Assistant

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*

Mentoring Activities

- MIT EECS for *MEng* students *2022-23*
- 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*

Committees

- Student Search Advisory Group, MIT EECS Faculty Search *2023*

Reviewing Activities

- ICML 2023, ISIT 2023, ACIC 2023, ICML 2022 *(top-10% reviewer)*, AISTATS 2022 *(top-10% reviewer)*, NeurIPS 2022, AISTATS 2021, NeurIPS 2021, JSAIT 2020

References

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