

ABHIN SHAH



MIT



abhin-shah.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 algorithms for trustworthy and robust machine learning using ideas from causal inference, algorithmic fairness, differential privacy, compression, and high-dimensional statistics.

SELECTED AWARDS

Presidential Graduate Fellowship, MIT

2018-19

AND ACHIEVEMENTS

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

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

Summer 2021

EXPERIENCE

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”

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

(* 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”, <i>IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)</i>, 2021. C6. Abhin Shah, Devavrat Shah, Gregory W. Wornell, “On learning Continuous Markov Random Fields”, <i>International Conference on Artificial Intelligence and Statistics (AISTATS)</i>, 2021 (Oral) C7. Abhin Shah, Nikhil Karamchandani, Suhas Diggavi, “Coded Caching: Global vs Local Content Popularity”, <i>Canadian Workshop on Information Theory, (CWIT)</i>, 2019 C8. Su Li, Abhin Shah, Michael Gastpar, “Cooperative Data Exchange with Weighted Cost based on Basis Construction”, <i>Annual Allerton Conference on Communication, Control, and Computing (Allerton)</i>, 2017
JOURNAL PUBLICATIONS	J1. Abhin Shah, Sai Vinjanampathy, Bhaskaran Muralidharan, “Classical information driven quantum dot thermal machines”, <i>Annals of Physics</i>, 2018
SOFTWARES & METHODOLOGIES	S1. Abhin Shah, Yuheng Bu, Joshua Ka-Wing Lee, Subhro Das, Rameswar Panda, Prasanna Sattigeri, Gregory W. Wornell. <i>Python repository</i> “<i>Selective Regression Under Fairness Criteria</i>” (🔗 link). S2. Abhin Shah, Karthikeyan Shanmugam, Kartik Ahuja. <i>Python repository</i> “<i>Finding Valid Adjustments under Non-ignorability with Minimal DAG Knowledge</i>” (🔗 link). S3. Abhin Shah, Wei-Ning Chen, Lucas Theis, Peter Kairouz, Johannes Ballé. <i>Python repository</i> “<i>Optimal Compression of Locally Differentially Private Mechanisms</i>” (🔗 link). S4. Abhin Shah, Kartik Ahuja, Karthikeyan Shanmugam, Dennis Wei, Kush Varshney, Amit Dhurandhar. <i>Python repository</i> “<i>Treatment effect estimation using invariant risk minimization</i>” (🔗 link).
RESEARCH TALKS	T1. On counterfactual inference with unobserved confounding, <i>LIDS and Stata tea talk, MIT</i> Nov 2022 T2. Selective Regression Under Fairness Criteria, <i>International Conference on Machine Learning, (ICML), Baltimore</i> July 2022 T3. Optimal Compression of Locally Differentially Private Mechanisms, <i>International Conference on Artificial Intelligence and Statistics (AISTATS), Virtual</i> March 2022 T4. Finding Valid Adjustments under Non-ignorability with Minimal DAG Knowledge, <i>International Conference on Artificial Intelligence and Statistics (AISTATS), Virtual</i> March 2022 T5. Selective Regression Under Fairness Criteria, <i>Jane Street Symposium, Virtual</i> Jan 2022 T6. A Computationally Efficient Method for Learning Exponential Family Distributions, <i>Conference on Neural Information Processing Systems (NeurIPS), Virtual</i> Dec 2021 T7. Optimal Compression of Locally Differentially Private Mechanisms, <i>Federated Research Group, Google Research, Virtual</i> Aug 2021 T8. Optimal Compression of Locally Differentially Private Mechanisms, <i>Neural Compression Group, Google Research, Virtual</i> Aug 2021 T9. Finding Valid Adjustments under Non-ignorability with Minimal DAG Knowledge, <i>Brain Causality Group, Google Research, Virtual</i> July 2021 T10. Finding Valid Adjustments under Non-ignorability with Minimal DAG Knowledge, <i>Causality and Machine Learning group, Microsoft Research, Virtual</i> July 2021 T11. Treatment Effect Estimation using Invariant Risk Minimization, <i>IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), Virtual</i> June 2021 T12. On learning Continuous Markov Random Fields, <i>International Conference on Artificial Intelligence and Statistics (AISTATS), Virtual</i> March 2021 T13. Treatment Effect Estimation using Invariant Risk Minimization, <i>IBM Research, Virtual</i> Aug 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 Dec 2021
- C5. Optimal Compression of Locally Differentially Private Mechanisms, *Google's Workshop on Federated Learning and Analytics*, Virtual Nov 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 Aug 2019

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

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

DEVAVRAT SHAH Professor, EECS MIT (Ph. D. Advisor) ✉ devavrat@mit.edu 🏠 devavrat.mit.edu	GREGORY W. WORNELL Professor, EECS MIT (Ph. D. Advisor) ✉ gww@mit.edu 🏠 allegro.mit.edu/gww	KUSH VARSHNEY Distinguished Research Staff Member IBM Research (Internship Advisor) ✉ krvarshn@us.ibm.com 🏠 krvarshney.github.io
LUCAS THEIS Senior Research Scientist Google Research (Internship Advisor) ✉ theis@google.com 🏠 theis.io	PETER KAIROUZ Research Scientist Google Research (Internship Advisor) ✉ kairouz@google.com 🏠 kairouzp.github.io	JOHANNES BALLÉ Research Scientist Google Research (Internship Advisor) ✉ jballe@google.com 🏠 balle.io