

ABHISHEK SHARMA

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EDUCATION

Harvard University *September 2020 - May 2025 (Expected)*
PhD Candidate, Computer Science *GPA: 4.0 / 4.0*
Advisor: Finale Doshi-Velez
Research Focus: Representation Learning, Reinforcement Learning

University of Massachusetts Amherst *September 2018 - May 2020*
Master of Science, Computer Science *GPA: 4.0 / 4.0*
Advisors: Madalina Fiterau, Philip Thomas
Course work: Machine Learning, Optimization

Indian Institute of Technology, Madras *August 2011 - June 2016*
Bachelor of Technology, Engineering *GPA: 7.6 / 10*
Master of Technology, Engineering

EXPERIENCE

Student Researcher, Google Research, Google LLC *Dec 2024 - Present*
Working on advancing the Genomics capabilities of Med-Gemini (Google's medical LLM).

Student Researcher, Google Research, Google LLC *May 2024 - August 2024*
Worked towards foundation modeling efforts for waveform data with applications in healthcare. Proposed a new self-supervised learning (SSL) method to learn interpretable representations. [1]

Research Intern, Mitsubishi Electric Research Labs (MERL) *May 2022 - August 2022*
Built a density model of time-to-destination for better uncertainty quantification, with applications to accurate elevator scheduling. [9]

Graduate Researcher, Harvard University *September 2020 - Present*
Working on decision-focused models, representation learning and reinforcement learning with applications in healthcare. Collaboration with Roy Perlis at Massachusetts General Hospital. [2], [4]–[8], [10]

Machine Learning Intern, Qualcomm *May 2019 - August 2019*
Applied sequence modeling to system-on-chip (SoC) design. Used coreset selection to compress training data without accuracy loss.

Graduate Researcher, University of Massachusetts Amherst *May 2019 - August 2020*
Worked on optimization and reinforcement learning problems. [11], [12]

Reinforcement Learning Intern, MathLogic Inc *June 2018 - August 2018*
Created curriculum for Reinforcement Learning tutorials and benchmarked RL algorithms for several domains.

Research Assistant, Indian Institute of Technology, Madras *March 2017 - June 2018*
Worked on research and consulting in data mining and machine learning. [13]

Co-founder, Blaffer Inc. *January 2016 - January 2017*
Startup on smartphone-based virtual reality experiences for real estate and travel.

Vital Sensing R&D Intern, Sony Tokyo *May 2014 - July 2014*
Developed the firmware and designed experiments to study dependence of Galvanic Skin Response on emotions.

PUBLICATIONS

1. **Sharma, Abhishek**, Farhad Hormozdiari, and Justin Cosentino, “Ecg foundation model with interpretable representations,” *In preparation*,
2. **Sharma, Abhishek**, Leo Benac, Sonali Parbhoo, and Finale Doshi-Velez, “Decision-point guided safe policy improvement,” *Accepted to AISTATS*, 2025. arXiv: 2410.09361 [cs.LG].
3. Leo Benac, **Abhishek Sharma**, Sonali Parbhoo, and Finale Doshi-Velez, *Inverse transition learning: Learning dynamics from demonstrations*, 2024. arXiv: 2411.05174 [cs.LG].
4. Sarah Rathnam, Kamber L Hart, **Sharma, Abhishek**, *et al.*, “Heterogeneity in antidepressant treatment and major depressive disorder outcomes among clinicians,” *JAMA psychiatry*, 2024.
5. **Sharma, Abhishek**, Sonali Parbhoo, Omer Gottesman, and Finale Doshi-Velez, “Decision-focused model-based reinforcement learning for reward transfer,” in *Machine Learning for Healthcare 2024*, 2024.
6. **Sharma, Abhishek**, Pilar F Verhaak, Thomas H McCoy, Roy H Perlis, and Finale Doshi-Velez, “Identifying data-driven subtypes of major depressive disorder with electronic health records,” *Journal of Affective Disorders*, vol. 356, pp. 64–70, 2024.
7. **Sharma, Abhishek**, Catherine Zeng, Sanjana Narayanan, Sonali Parbhoo, Roy H Perlis, and Finale Doshi-Velez, “Task-relevant feature selection with prediction focused mixture models,” *Transactions on Machine Learning Research*, 2024.
8. Jingjing Fu, Shuheng Liu, Siqi Du, *et al.*, “Multimodal n-of-1 trials: A novel personalized healthcare design,” *arXiv preprint arXiv:2302.07547*, 2023.
9. **Sharma, Abhishek**, Jing Zhang, Daniel Nikovski, and Finale Doshi-Velez, “Travel-time prediction using neural-network-based mixture models,” *Procedia Computer Science*, vol. 220, pp. 1033–1038, 2023.
10. Jeffrey Chiu, Rajat Mittal, Neehal Tumma, **Sharma, Abhishek**, and Finale Doshi-Velez, “A joint learning approach for semi-supervised neural topic modeling,” in *Proceedings of the Sixth Workshop on Structured Prediction for NLP*, Association for Computational Linguistics, 2022.
11. Sneha Aenugu, **Sharma, Abhishek**, Sasikiran Yelamathi, Hananel Hazan, Philip S. Thomas, and Robert Kozma, “Reinforcement learning with spiking coagents,” *arXiv preprint arXiv:1910.06489*, 2019.
12. **Sharma, Abhishek**, Aritra Ghosh, and Madalina Fiterau, “Generative sequential stochastic model for marked point processes,” in *ICML Time Series Workshop*, 2019.
13. Nandan Sudarsanam, Nishanth Kumar, **Sharma, Abhishek**, and Balaraman Ravindran, “Rate of change analysis for interestingness measures,” *Knowledge and Information Systems*, pp. 1–20, 2019.

PROJECTS

Safe Policy Improvement in Offline Reinforcement Learning [2] *Mentor: Finale Doshi-Velez*

We proposed a method to recommend improvements to expert actions using their behavior data, along with theoretical guarantees on the safety of the proposed policy.

Feature Selection using Prediction-focused Mixture Models [7] *Mentor: Finale Doshi-Velez*

Characterized failure mode of the Gaussian Mixture Models with underspecified clusters on real-world data. We then proposed an approach to learn relevant clusters when the data also contains irrelevant features, and show that our probabilistic model allows fast and stable inference. We demonstrate the

model is able to select depression-related clusters in a real world electronic health records (EHR) dataset.

Robust Decision-focused Model-based Reinforcement Learning [5]

Mentor: Finale

Doshi-Velez

Model-based reinforcement learning (MBRL) method to learn transition dynamics when constrained by using a simple/interpretable model for inspection by domain experts. We show that our method is able to transfer to different objectives while still learning high-quality decision-making policies.

Discovering Depression Subtypes using Interpretable Models [6]

Mentor: Finale Doshi-Velez,

Roy Perlis

Summarized EHRs of patients with major depressive disorder (MDD) to discover subtypes of depression. Our modified topic model learned representations of patient history that are both meaningful and predictive of the MDD subtype, and was able to identify and ignore the patient history unrelated to MDD.

Individual COVID-19 Risk Modeling of Singapore Migrant Workers

Collaborator: Temasek

Developed an agent-based multi-scale risk model to aid policy decisions for COVID-19 management in Singapore's migrant worker population.

PROFESSIONAL SERVICE, TEACHING, AND LEADERSHIP

Professional Service

Organizer, I Can't Believe It's Not Better (ICBINB) Workshop at Reinforcement Learning Conference (RLC) 2024.

Reviewer, AISTATS 2021, 2023 (**Top-10% Reviewer**), 2024, TMLR 2024

Mentor, Women in Data Science (WiDS) Datathon (Feb 2021, May 2024)

Teaching and Mentorship

Students Mentored: Sanjana Narayanan (2020-2021), Catherine Zeng (2021-2022)

Certificate of Distinction in Teaching, CS 282R (Fall 2021) – *Task-focused Generative Models and Inference*.

Invited Tutorial, Decision-focused Reinforcement Learning at Statistical Reinforcement Learning Lab, Harvard University (2024)

N-of-1 Trials with Multimodal Observations, Advised student group with Stefan Konigorski to investigate N-of-1 trials on image observations. [8]

Semi-supervised Neural Topic Modeling, Advised student group with Finale Doshi-Velez to investigate Semi-Supervised Neural Topic Models. [10]

Awards

Runner-up, DatathonLISH 2021 (Harvard University). *Project Report*

SKILLS

Programming Languages and Frameworks

Python (expert), R, C++ (familiar), PyTorch, TensorFlow, JAX

Machine Learning

Deep Learning, Time-series Modeling, Generative Modeling, Reinforcement Learning, Probabilistic Modeling, Statistics