Abhishek Sharma

abhisheksharma@g.harvard.edu   www.abhishekshar.com   github.com/shaabhishek   linkedin.com/in/abhishekshar

EDUCATION

PhD Candidate (Advisor: Finale Doshi-Velez)   2020 – 2025
Harvard University   *Boston, MA*

M.S. in CS, University of Massachusetts Amherst (2018-2020)
B.Tech. in Engineering, Indian Institute of Technology, Madras (2011-2016)

EXPERIENCE

Google Research   [*representation learning, JAX*]   May 2024 – August 2024
Student Researcher (Advisors: Farhad Hormozdiari, Justin Cosentino)   *Cambridge, MA*

- Worked towards foundation modeling efforts for waveform data with applications in healthcare. Proposed a new self-supervised learning (SSL) method to learn interpretable representations. *Manuscript in preparation.*

Mitsubishi Electric Research Labs (MERL)   [*density modeling, PyTorch*]   May 2022 – August 2022
Research Intern (Advisors: Jing Zhang, Daniel Nikovski)   *Cambridge, MA*

- Built a density model of time-to-destination[1] for better uncertainty quantification, with applications to accurate elevator scheduling.

Harvard University   [*representation learning, reinforcement learning*]   September 2020 – Present
Graduate Researcher (Advisor: Finale Doshi-Velez)   *Boston, MA*

Working on decision-focused models, representation learning and reinforcement learning with applications in healthcare.

- **Feature Selection using Prediction-focused Mixture Models**[2]: 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 for Reward Transfer**[3]: 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**[4,5,6]: 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.
- **Safe Policy Improvement in Offline Reinforcement Learning (In Submission)**: Proposed a method to recommend improvements to expert actions using their behavior data, along with theoretical guarantees on the safety of the proposed policy.

University of Massachusetts Amherst   May 2019 – August 2020
Graduate Researcher (Advisor: Madalina Fiterau)   *Amherst, MA*

- **Generative Sequential Stochastic Model for Marked Point Processes**[7]: Proposed a deep state-space model using variational autoencoders (VAE) to capture subpopulation-dependent dynamics of patients in electronic health records. The model works with irregularly sampled data by modeling patient trajectories as a marked point process.

Qualcomm   [*sequence modeling, coreset selection, PyTorch*]   May 2019 – August 2019
Machine Learning Intern   *San Diego, CA*

- Applied sequence modeling to system-on-chip (SoC) design. Used coreset selection to compress training data without accuracy loss.

SKILLS

Languages: Python (expert), R, C++ (familiar). **Frameworks & Libraries**: PyTorch, Tensorflow, JAX. **Machine Learning**: Deep Learning, Time-series Modeling, Generative Modeling, Reinforcement Learning, Probabilistic Modeling, Statistics.

LEADERSHIP & 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.
- **Mentor**: Women in Data Science (WiDS) Datathon (Feb 2021, May 2024).
- **Invited Tutorial** on Decision-focused Reinforcement Learning at Statistical Reinforcement Learning Lab, Harvard University (2024).
- **Runner-up**: DatathonLISH 2021 (Harvard University). *Project Report*.
- **N-of-1 Trials with Multimodal Observations** (2022): Advised student group with Stefan Konigorski to investigate N-of-1 trials on image observations.
- **Certificate of Distinction in Teaching**: CS 282R (Fall 2021) – *Task-focused Generative Models and Inference.*
- **Semi-supervised Neural Topic Modeling** (Sep-Dec 21): Advised student group with Finale Doshi-Velez to investigate Semi-Supervised Neural Topic Models.

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[1]Sharma, Abhishek, et al. "Travel-time prediction using neural-network-based mixture models." Procedia Computer Science 220 (2023): 1033-1038.

[2]Sharma, Abhishek, et al. "Task-Relevant Feature Selection with Prediction Focused Mixture Models." Transactions on Machine Learning Research, 2024.

[3]Sharma, Abhishek, et al. "Decision-Focused Model-based Reinforcement Learning for Reward Transfer." Machine Learning for Healthcare Conference. PMLR, 2024.

[4]Sharma, Abhishek, et al. "Identifying data-driven subtypes of major depressive disorder with electronic health records." Journal of Affective Disorders 356 (2024): 64-70.

[5]Rathnam, Sarah, et al. "Heterogeneity in Antidepressant Treatment and Major Depressive Disorder Outcomes Among Clinicians." JAMA psychiatry (2024).

[6]Rathnam, Sarah, et al. "Association between prescriber practices and major depression treatment outcomes." Journal of Mood & Anxiety Disorders (2024).

[7]Sharma, Abhishek, et al. "Generative sequential stochastic model for marked point processes." ICML Time Series Workshop. 2019.