

Shripad Vilasrao Deshmukh

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Last Updated: Oct'24

Core Interests

Human-centric sequential decision making – RLHF, Value alignment, AI safety, Interpretability; Faster and verifiable RL agent deployments; Efficient policy gradient methods.

Education

Sept'23 – **Integrated MS/PhD in Computer Science (Year II)**, *University of Massachusetts Amherst*

Present GPA: 4.0/4.0, Advisor: Prof. Scott Niekum

Aug'16 – **BTech in Electrical Engineering**, *Indian Institute of Technology Madras*

Jul'20 CGPA: 9.20/10

Relevant Coursework

- CS690S: Human-Centric Machine Learning
- CS690F: Responsible AI
- CS603: Robotics
- CS6700: Reinforcement Learning
- EE6418: Game Theory
- EE6132: Deep Learning for Computer Vision
- EE5121: Convex Optimization

Overview of Ongoing Research

- Working on faster ways to deploy RL agents in a continuous deployment cycle. Developed framework for guaranteed low-sample high-confidence policy evaluation.
- Developing theoretical and empirical tools for understanding the limitations of multi-agent coordinated decision-making.
- Working on improving on-policy gradient methods (e.g. TRPO, PPO) for faster convergence with theoretical backing.

Prior Work Experience

Machine Learning Research Associate, *Adobe India*, Noida

Feb'22 – Jul'23

- Proposed an explainability framework for RL using counterfactuals in policy space. Work published at ICML'23 workshop on counterfactuals.
- Proposed a data-grounded explainability approach for offline RL, attributing agent's current decisions to trajectories in dataset. Published at ICLR'23.
- Designed single shot document snippet algorithm, MONOMER, that outperformed state-of-the-art models in document analysis and one-shot object detection. Published at WACV'23.
- Implemented a deep Agent Based Model (deepABM) to understand the impact of company's strategic decisions on market dynamics.
- Filed 12 US patents in the areas of explainability, multimodal learning, and marketing decision making. More details in publications section.

Machine Learning Engineer, *Adobe India*, Work from Home

Jun'21 – Jan'22

- Responsible for maintenance of deep multi-model models for document analysis and extraction. Streamlined the workflow for training and evaluation resulting in 7% improvement in overall document conversion quality.

Member of Technical Staff, Adobe India, Work from Home

Aug'20 – May'21

- Enhanced multimodal element association precision (15%) and recall (4%) by augmenting segmentation masks as priors. Drafted patent-idea for the same, 'Refining form structures... ', the *only exemplary patent draft* of 2021 on Adobe Brightidea.
- Used trajectory-ranking based inverse RL methods to reduce customer churn rate by over 20% in customer journey management. Filed a patent for this idea.

Summer Research Intern, Adobe India, Noida

May'19 – Aug'19

- Co-developed a new saliency metric for visual explanations of RL agents, applied it to Chess engines (Stockfish, LeelaChess-0), Go (minigo), and Atari agents. Published at ICLR'20.

R&D Intern, Center for Development of Advanced Computing (CDAC), Pune

Dec'18 – Jan'19

- Developed FORTRAN libraries to test and extract performance of Intel Linear Algebra Kernels for matrix computations as part of the National Supercomputing Mission project.

Publications ([Google Scholar Profile](#))

Drafts under preparation

- 2025 **S Deshmukh**, W Schwarzer, S Niekum. *Faster RL deployments using value predictable policies*. To be submitted to ICML 2025.
- 2025 **S Deshmukh**, C Pendse, S Niekum. *Understanding limitations of multi-agent coordinated decision making*. To be submitted to RLC 2025.

Conference Publications

- 2023 S Singh, **S Deshmukh**, M Sarkar, B Krishnamurthy. *LOCATE: Self-supervised Object Discovery via Flow-guided Graph-cut and Bootstrapped Self-training*. British Machine Vision Conference (BMVC).
- 2023 **S Deshmukh**, A Dasgupta, C Agarwal, N Jiang, B Krishnamurthy, G Theocharous, J Subramanian. *Explaining RL Decisions with Trajectories*. International Conference on Learning Representations (ICLR).
- 2023 A Java*, **S Deshmukh*** M Aggarwal, S Jandial, M Sarkar, B Krishnamurthy. *One-Shot Doc Snippet Detection: Powering Search in Document Beyond Text*. IEEE/CVF Winter Conference on Applications of Computer Vision (WACV). (*Equal Contribution)
- 2020 P Gupta, N Puri, S Verma, D Kayastha, **S Deshmukh**, B Krishnamurthy, S Singh. *Explain Your Move: Understanding Agent Actions Using Focused Feature Saliency*. International Conference on Learning Representations (ICLR).

Workshop Publications

- 2023 **S Deshmukh**, Srivatsan R, S Vijay, J Subramanian, C Agarwal. *Counterfactual Explanation Policies in RL*, ICML Workshop on Counterfactuals in Minds & Machines
- 2023 S Jandial, **S Deshmukh**, A Java, S Shahid, B Krishnamurthy. *Gatha: Relational Loss for Enhancing Text-based Style Transfer*, CVPRW on Computer Vision for Fashion Art and Design

- 2023 S Singh, **S Deshmukh**, M Sarkar, R Jain, M Hemani, B Krishnamurthy. *FODVid: Flow-guided Object Discovery in Videos*, CVPRW on Learning with Limited Labelled Data for Image & Video Understanding
- 2022 **S Deshmukh**, A Dasgupta, C Agarwal, N Jiang, B Krishnamurthy, G Theocharous, J Subramanian. *Trajectory-based Explainability Framework for Offline RL*, NeurIPS Offline RL Workshop

Patents (with Attorney Docket Numbers)

- *Novel Self-supervised Object Discovery in Videos*, P12351-US
- *Account Executive Actionable Digest*, P12314-US[†]
- *Relational Loss for Enhancing Text-based Style Transfer*, P12300-US
- *A Framework for Leveraging LLM Models and RL in Marketing Decision Making*, P12223-US[†]
- *Video Object Segmentation through Flow-guided Graph-cut*, P12170-US
- *Novel method to propagate personalized error corrections across Forms corpus*, P12004-US[†]
- *Novel Trajectory-based Explainability Framework for RL-based Decision Making*, P11853-US[†]
- *Forms Similarity Matching Framework for Enhancing RnC tool in AEM Forms*, P11882-US[†]
- *A Novel Multimodal One-Shot Detection Approach for Document Snippet Search*, P11686-US[†]
- *Semantic Noise based Soft Label Regularization for Distilling Model Knowledge*, P11539-US
- *Novel method to simplify data points for easier understanding of neural networks*, P11364-US[†]
- *Novel Method and Apparatus to Control Diffusion Model Image Generation*, P11343-US
- *Refining Element Associations for Form Structure Extraction*, P10768-US[†]
- *Customer Journey Management Using Machine Learning*, P10405-US[†]

[†]First inventor or significant contributor. See google scholar profile for details.

Awards & Achievements

- 2017 National Prize Certificate for top students at IIT Madras (Top 7%)
- 2016 All India Rank 323 in JEE Advanced (Top 0.16%) and AIR 491 in JEE Mains (Top 0.03%)
- 2015 Ranked among top 1% in National Chemistry Olympiad, India
- 2015 KVPY Fellowship, National Rank 621
- 2012 NTSE Scholarship, Stage II AIR 516, Stage I State Topper

Volunteering & Mentorship

- Reviewer ICLR'25, AAAI'25, ICLR'24 and NeurIPS'23. Link to OpenReview profile.
- Mentor Mentored 9 undergraduate summer interns working on reinforcement learning and multimodal learning projects at Adobe (2021-23)
- Organizer One of the core designers of Adobe Digital Experience (DX) ML Hackathon (2023)
- Moderator First moderator & founding member of Liberty, Equality & Fraternity (LEAF) society, IIT Madras. Led discussions on concurrent Indian socio-economic issues & technological solutions (2020)
- Coordinator Part of the IITM team organising Extra Mural Lectures (EML). Helped organize lectures from luminaries like Orkut Büyükkökten, Nirmala Sitharaman, Dr. Prakash Amte, etc. and also, was the main coordinator for organizing off-campus lecture by Prof. Babu Vishwanathan (2017-18)