Shripad Vilasrao Deshmukh

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Current Research Focus

Evaluation-aware Reinforcement Learning, Advanced Policy Gradient Algorithms, Theory of beliefs in RLHF, Theory of Gains in Multi-Agent Cooperation

Education

Sept'23 – Present **Integrated MS/PhD in Computer Science (Year II)**, *University of Massachusetts Amherst*
GPA: 4.0/4.0, Advisor: Prof. Scott Niekum

Aug'16 – Jul'20 **BTech in Electrical Engineering**, *Indian Institute of Technology Madras*
CGPA: 9.20/10

Publications (Google Scholar Profile)

Preprints and Drafts

2025 **S Deshmukh**, W Schwarzer, S Niekum. *Evaluation-Aware Reinforcement Learning*. Draft under preparation.

2025 **S Deshmukh***, D Gupta*, S Niekum, B C da Silva, P Thomas. *Rectifying Approximate RL with Trust Regions*. Draft under preparation.(*Equal Contribution)

2025 S Dandekar, **S Deshmukh**, W B Knox, S Niekum. *A Descriptive & Normative Theory of Human Beliefs in RLHF*. Under submission at International Conference on Machine Learning (ICML).

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.

Prior Professional Experience

Machine Learning Research Associate, *Adobe India*, Noida, Feb'22 – Jul'23

- Proposed counterfactual-based RL explainability framework. Published at ICML'23 workshop on counterfactuals.
- Proposed a data-grounded explainability approach for offline RL – attributing agent's current decisions to the past trajectory experiences. Published at ICLR'23.
- Designed and implemented transformer-based document processing framework, MONOMER, outperforming state-of-the-art document analysis and one-shot detection approaches. Work published at WACV'23.
- Filed 12 US patents in the areas of marketing decision making and multimodal learning.
- *Noteworthy implementations*: (i) Decision transformers with RL-centric losses, (ii) LLMs for marketing decision making, (iii) Decision RNNs, (iv) Deep agent-based models.

Machine Learning Engineer, *Adobe India*, Work from Home, Jun'21 – Jan'22

- Maintainer of Adobe's automated form conversion service. Rigorously converted Adobe's internal form corpus to standard COCO format for streamlined training and evaluation. This led to state-of-the-art conversion quality.

Member of Technical Staff, *Adobe India*, Work from Home, Aug'20 – May'21

- Enhanced form element association using segmentation masks, line text and spatial characteristics (15% precision and 4% recall gain). Drafted patent-idea, 'Refining form structures...', now listed as the *exemplary patent draft* on Adobe Brightidea.
- Proposed novel trajectory-ranking based inverse RL for reducing customer churn rate in marketing. Patented the idea.

Summer Research Intern, *Adobe India*, Noida, May'19 – Aug'19

- Co-developed a new saliency metric for visual explanations of RL agents and 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 as part of the National Supercomputing Mission project.

Relevant Graduate-level 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

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 research interns working in RL and multimodal learning at Adobe (2021-23)

Organizer Part of Adobe Digital Experience (DX) ML Hackathon organizing team (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's principal lecture organizing team. Together, we organized lectures from luminaries like Orkut Büyükkökten, Nirmala Sitharaman and Dr. Prakash Amte. Spearheaded organizing an off-campus lecture by Prof. Babu Vishwanathan (2017-18)