Shripad V Deshmukh

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Current Research Focus

Advanced convex optimization-based policy optimization; Reinforcement learning for healthcare; Multi-agent large language systems; Evaluation-aware reinforcement learning

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Education

Fall 2023 – **Integrated MS/PhD in Computer Science (Year III)**, *University of Massachusetts Amherst*
GPA: 4.0/4.0, Advisor: Prof. Scott Niekum

2016 – 2020 **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* . Under submission.

2025 S Dandekar, **S Deshmukh**, F Chiu, W B Knox, S Niekum. *A Descriptive and Normative Theory of Human Beliefs in RLHF* . Under submission.

2025 **S Deshmukh**, K Kim, R Addanki, N Vlassis, J Subramanian. *Algorithms for Decentralized Training of Multi-Agent Large Language Systems*. Draft under preparation.

2025 **S Deshmukh***, D Gupta*, Y Chittepu*, B C da Silva, S Niekum, P Thomas. *Convex-Concave Reinforcement Learning*. Draft under preparation.(*Equal Contribution)

Conference Publications

2023 S Singh, **S Deshmukh**, M Sarkar, B Krishnamurthy. *LOCATE: Self-supervised Object Discovery* . 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

Research Intern, *Adobe Research*, San Jose, May'25 – Aug'25

○ Developed algorithms for decentralized training of multi-agent large language systems. Demonstrated consistent improvements in team coordination across multiple cooperative setups. Draft under preparation.

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
- CS682: Neural Networks
- 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
2012	NTSE Scholarship

Volunteering & Mentorship

Conference Reviewer	ICLR'24-26, ICML'25, AAAI'25, NeurIPS'23. OpenReview profile
Grad App Reviewer	Reviewed 60+ RL-centric PhD applications at UMass Amherst (2025 admission cycle).
Research Mentor	Mentored 3 undergraduate students investigating transcendence in AI at UMass (Summer 2025) and 9 research interns on topics in RL and multimodal learning at Adobe (2021-2023).
Hackathon Organizer	Organized Adobe Digital Experience (DX) ML Hackathon (2023).
Club Moderator	Led Liberty, Equality & Fraternity (LEAF) society at IIT Madras, facilitating discussions on Indian socio-economic issues and technological solutions (2020).
Lecture Organizer	Organized principal lectures at IIT Madras featuring luminaries including Orkut Büyükkökten, Nirmala Sitharaman, and Dr. Prakash Amte. Spearheaded off-campus lecture by Prof. Babu Vishwanathan (2017-18).