

# Shripad V Deshmukh

CS PhD Candidate (Year III), UMass Amherst

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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

## 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<sup>†</sup>
- *Relational Loss for Enhancing Text-based Style Transfer*, P12300-US
- *A Framework for Leveraging LLM Models and RL in Marketing Decision Making*, P12223-US<sup>†</sup>
- *Video Object Segmentation through Flow-guided Graph-cut*, P12170-US
- *Novel method to propagate personalized error corrections across Forms corpus*, P12004-US<sup>†</sup>
- *Novel Trajectory-based Explainability Framework for RL-based Decision Making*, P11853-US<sup>†</sup>
- *Forms Similarity Matching Framework for Enhancing RnC tool in AEM Forms*, P11882-US<sup>†</sup>
- *A Novel Multimodal One-Shot Detection Approach for Document Snippet Search*, P11686-US<sup>†</sup>
- *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<sup>†</sup>
- *Novel Method and Apparatus to Control Diffusion Model Image Generation*, P11343-US
- *Refining Element Associations for Form Structure Extraction*, P10768-US<sup>†</sup>
- *Customer Journey Management Using Machine Learning*, P10405-US<sup>†</sup>

<sup>†</sup>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**

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| <ul style="list-style-type: none"> <li>○ CS690S: Human-Centric Machine Learning</li> <li>○ CS690F: Responsible AI</li> <li>○ CS603: Robotics</li> <li>○ CS682: Neural Networks</li> </ul> | <ul style="list-style-type: none"> <li>○ CS6700: Reinforcement Learning</li> <li>○ EE6418: Game Theory</li> <li>○ EE6132: Deep Learning for Computer Vision</li> <li>○ EE5121: Convex Optimization</li> </ul> |
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### **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**

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