Shripad Vilasrao Deshmukh

PhD Candidate in Computer Science

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Last Updated: Sept'24

Core Interests

Reinforcement Learning: Amortized Policy Evaluation, RL from Human Feedback, Human-AI cooperative learning, Interpretable RL

Education

Sept'23 – Present **MS/PhD in Computer Science**, *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

Relevant Coursework

Graduate-Level Courses: Human-centric Machine Learning, Responsible AI, Robotics, Reinforcement Learning, Game Theory, Deep Learning for Computer Vision, Convex Optimization

Work Experience

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

- Developed framework for extending counterfactual explanations to reinforcement learning (RL) policies. Published at ICML'23 workshop on counterfactuals.
- Proposed a data-grounded explainability approach for RL, attributing agent decisions to past trajectory experiences. Published at ICLR'23.
- Designed algorithm for single shot detection of a document snippet in a corpus of documents called MONOMER, a cross-attention-based architecture, which outperformed state-of-the-art models in document analysis and one-shot object detection. Published at WACV'23.
- Simulated a deep agent based model (ABM) for document-sign market to understand the impact of strategic decisions on market dynamics.

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

- Handled the responsibility of maintanenace of deep multi-model models for document analysis and extraction. Streamlined the workflow for training and evaluation resulting in 7% improvement in form conversion quality.

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

- Enhanced multimodal element association precision (15%) and recall (4%) by augmenting segmentation masks as priors. Drafted patent-idea for the same, 'Refining form structures. . . ' which is listed as exemplary drafts on Adobe Brightidea (the only addition of year 2021).
- 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.

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

- Co-developed a new saliency metric for visual explanations of RL agents, applied it to Stockfish chess engine, Atari games, and more. Published at ICLR'20.

Dec'18 – Jan'19 **Research and Development Intern**
Center for Development of Advanced Computing (CDAC), India

- 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

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.

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.

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. (*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.

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

- *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

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 AAAI'25, ICLR'24 and NeurIPS'23

Mentor Adobe Summer Internships on RL and multimodal learning projects (2021-23)

Organizer DX Coding Competition at Adobe Noida, involved in designing problem statements and evaluation setups (2023)

Moderator Moderator at LEAF Society, IIT Madras, leading discussions on socio-economic issues such as agrarian distress and human rights (2020)

Coordinator Extra Mural Lectures (EML), IIT Madras, organizing lectures by luminaries such as Orkut Büyükkökten, Nirmala Sitharaman, Dr. Prakash Amte, and D. Subbarao (2017-18)