Parth Padalkar

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Academic Appointment

Assistant Professor – Texas State University, San Marcos, TX Fall 2026 – Present

Research Areas

- Neuro-Symbolic AI and Reasoning
- Interpretable and Trustworthy Machine Learning
- Reliable Large Language Models
- Logic Programming and Knowledge Representation

My research focuses on building interpretable and reliable AI systems by integrating neural models with symbolic reasoning across vision, language, and decision-making tasks.

Education

The University of Texas at Dallas • Richardson, TX Jan 2021 – May 2026
*Ph.D. (**Templeton Fellow**)* • *Computer Science* • GPA: 3.89/4.0

The University of Texas at Dallas • Richardson, TX Aug 2019 – Dec 2020
Master of Science • *Computer Science* • GPA: 3.8/4.0

National Institute of Technology Jalandhar • Punjab, India Aug 2015 – May 2019
Bachelor of Technology • *Instrumentation and Control Engineering*

Publications

Peer-Reviewed Conference Papers

Symbolic Rule Extraction from Attention-Guided Sparse Representations in ViTs
Parth Padalkar, Gopal Gupta. International Conference on Logic Programming (ICLP) 2025. Selected as a journal publication in Theory and Practice of Logic Programming **(<26% selection rate)**

NeSyFOLD: A Framework for Interpretable Image Classification
Parth Padalkar, Huaduo Wang, Gopal Gupta. AAAI 2024. ***Oral presentation (<4% selection rate)**

A Neurosymbolic Framework for Bias-Correction in CNNs
Parth Padalkar, Natalia Ślusarz, Ekaterina Komendantskaya, Gopal Gupta. International Conference on Logic Programming (ICLP) 2024. Selected as a journal publication in Theory and Practice of Logic Programming.
(<26% selection rate) *Nominated for best student paper

Using Logic Programming and Kernel-Grouping for Improving Interpretability of CNNs
Parth Padalkar, Huaduo Wang, Gopal Gupta. International Symposium on Practical Aspects of Declarative Languages (PADL) 2024

Automated Interactive Domain-Specific Conversational Agents that Understand Human Dialogs
Yankai Zeng, Abhiramon Rajasekharan, Parth Padalkar, Kinjal Basu, Joaquin Arias, Gopal Gupta. International Symposium on Practical Aspects of Declarative Languages (PADL) 2024

Reliable Natural Language Understanding with Large Language Models and Answer Set Programming
Abhiramon Rajasekharan, Yankai Zeng, Parth Padalkar, Gopal Gupta International Conference on Logic Programming (ICLP) 2023. **(<30% selection rate)**

Peer-Reviewed Journals and Book Chapters

Explainable AI tools provide meaningful insight into rationale for prediction in machine learning models
Soham Lahiri, Huaduo Wang, Parth Padalkar and Gopal Gupta. Journal of Emerging Investigators 2025. ***First paper as mentor**

Prolog: Past, Present and Future
Gopal Gupta, Elmer Salazar, Farhad Shakerin, Joaquín Arias, Sarat Chandra Varanasi, Kinjal Basu, Huaduo Wang, Fang Li, Serdar Erbatur, Parth Padalkar, Abhiramon Rajasekharan, Yankai Zeng, Manuel Carro. Prolog: The Next 50 Years, LNCS 13900, Springer, 2023

Logic-Based Explainable and Incremental Machine Learning
Gopal Gupta, Huaduo Wang, Kinjal Basu, Farhad Shakerin, Elmer Salazar, Sarat Chandra Varanasi, Parth Padalkar, Sopam Dasgupta. Prolog: The Next 50 Years, LNCS 13900, Springer, 2023

Algorithm Development based on an Integrated Approach for Identifying Cause and Effect Relationships Between Various Factors
Neeraj Bhanot, Parth Padalkar. De Gruyter Series on Smart Computing Applications 2022

Refereed Workshop Papers

Symbolic Reinforcement Learning Framework with Incremental Learning of Rule-based Policy
Kinjal Basu, Elmer Salazar, Huaduo Wang, Joaquín Arias, Parth Padalkar, Gopal Gupta. International Conference on Logic Programming (ICLP) Workshops 2022

Preprints

Improving Interpretability and Accuracy in Neuro-Symbolic Rule Extraction Using Class-Specific Sparse Filters
Parth Padalkar, Jaeseong Lee, Shiyi Wei, Gopal Gupta. ArXiv abs/2501.16677, 2025

Copyrights

Software for Efficient Matrimonial Match-making – Govt. of India (Ref no: SW-12849/2019) 2019

Software for Identifying Cause and Effect Relationships Between Enablers and Barriers in Sustainable Manufacturing – Govt. of India (Ref no: SW-10923/2018) 2018

Funding and Grants

- Contributed to grant proposals and industry collaborations securing over $200K in funding for applied AI and neuro-symbolic research.

Invited Talks

- "Creating Neurosymbolic models for Interpretable Image Classification" NeSy Wednesday, Centaur AI, 2026
- "Explainable AI using Logic Programming", HackReason, UT Dallas, 2024

Research Experience

Research Scientist Intern – Large Language Models – IBM Research May 2025 – Aug 2025
Yorktown Heights, NY

- Trained Process Reward Models (PRMs) using supervised fine-tuning (SFT) on synthetically generated multi-step agentic trajectories.
- Demonstrated **2–3%** performance improvements on multi-step tool-calling benchmarks through test-time scaling, advancing reliability of LLM-based agents.

Research Assistant – Center for Applied AI and ML (CAIML), UT Dallas Sept 2021 – Present
Richardson, TX

- Partnered with *Nexco (USA)* to design an AI system for road repair planning, integrating domain constraints and improving municipal decision-making for the City of Richardson.
- Collaborated with *Atos* on developing an explainable AI toolkit, advancing research on interpretability and supporting enterprise adoption of AI systems.
- Led work with *CorroHealth* to create AI methods for processing sensitive patient records, reducing manual workload while ensuring privacy and compliance, and demonstrating the use of AI in high-stakes domains.
- Co-wrote a grant proposal with *FirstThen Inc.* for using LLM and logic programming based chatbots for automating psychosocial treatment for pediatric ADHD.

Research Assistant – Schizophrenia and Social Cognition Lab, UT Dallas Sept 2019 – May 2020
Richardson, TX

- Collaborated with psychologists to design a software tool for visual cognitive experiments, gaining experience in handling noisy, real-world clinical data.
- Developed machine learning models to predict schizophrenia occurrence with **89%** accuracy, demonstrating the potential of AI for supporting clinical decision-making.

Teaching Experience

Teaching Assistant – Department of Computer Science, UT Dallas 2021 – 2022
Richardson, TX

- TA for multiple graduate courses, including:
  - CS 6320: Natural Language Processing (Spring 2021, Fall 2021)
  - CS 6350: Big Data Analytics (Spring 2022, Fall 2022)
- Responsibilities included teaching 1-2 classes per semester, leading lab sections, grading assignments and exams, holding office hours, and mentoring students on projects.

Professional Experience

Sr. Data Science Intern – ServiceLink June 2024 – Aug 2024
Irving, TX

- Mentored three interns on data science projects, including duplicate image detection and address verification from images using open-source multimodal LLMs such as LLaVA.
- Deployed multimodal LLMs (e.g., GPT-4o) for detecting damage in property images with an average accuracy of **95%**, gaining hands-on experience in model fine-tuning, scene understanding, and Azure deployment.

Computer Vision Research Intern – Tech For Good Inc. May 2020 – Aug 2020
Boston, MA

- Collaborated in a team of five to meticulously curate and annotate a comprehensive dataset comprising 5,000 images depicting firearms in active shooter scenarios.
- Used PyTorch to implement the YOLO model, resulting in an exceptional 90% accuracy on the test data, demonstrating a strong ability to optimize deep learning models for real-world tasks.

Awards and Honors

- **Award Nomination**: Nominated for Outstanding Graduate Student Award at UT Dallas 2026
- **Fellowship**: Templeton Graduate Fellowship for exceptional researchers at UT Dallas 2024–2025
- **Finalist**: University-Wide 3 Minute Thesis competition 2025
- **Best Student Paper Nomination**: International Conference on Logic Programming (ICLP) 2024
- **Oral presentation**: AAAI 2024 2024

Service and Mentorship

- Served as a judge for the ACM Research Symposium Poster Competition at UT Dallas 2025
- Co-founded the Student Research Club at UT Dallas and mentored 3 undergraduate students 2024–Present
- Served as a reviewer for AAAI 2022, AAAI 2025, AAAI 2026, NeurIPS 2025, and ICLP 2024 2022–Present
- Mentored a high school student whose paper was published in the *Journal of Emerging Investigators* 2024–2025
- Mentored 5 undergraduates on a research project for the ACM Research Symposium, earning an "Honourable Mention" 2024
- Served as mentor for HackReason, the annual AI Hackathon at UT Dallas 2022-2024
- Served as a reviewer SUBSETML Workshop at ICML 2021 2021

Technical Skills

- Proficient in Human Behaviour Modelling and Commonsense Reasoning using Answer Set Programming, Python, Prolog, along with frameworks such as PyTorch, TensorFlow, Pandas and NumPy.
- Solid grasp of Deep Learning for Computer Vision, LLMs, ML algorithms, Explainable AI (XAI) and Reinforcement Learning coupled with AWS and Azure experience.

References

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