

Sina Malakouti

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Legal status in the US: Permanent Resident (Green Card holder)

Education

University of Pittsburgh

PhD in Computer Science

Aug 2020 - April 2026

Pittsburgh, PA

- Advisor: Adriana Kovashka

Amirkabir University of Technology

B.Sc. in Software Engineering

Sep 2015 - May 2020

Tehran, Iran

- Advisors: Maryam Amir Haeri and Saeedeh Momtazi

Interests

Computer Vision Multimodal Learning Foundational Models (LLM, Vision-Language) Generative AI Robustness

Selected Peer-Reviewed Publications

- *Investigating and Improving Counter-Stereotypical Action Relation in Text-to-Image Diffusion Models*, **Under-review @ ICCV'25**
- *Benchmarking VLMs' Reasoning About Persuasive Atypical Images*, **WACV'25**
- *Incorporating Geo-Diverse Knowledge into Prompting for Increased Geographical Robustness in Object Recognition*, **CVPR'24**
- *Semi-Supervised Domain Generalization for Object Detection via Language-Guided Feature Alignment*, **BMVC'23**
- *DeepTreeNetworks: A New Symbolic Deep Architecture*, DeCoDeML workshop, **ECML PKDD'19**

Presentations & Talks

- *(Invited Talk)* Introduction to Labeled-Efficient Deep Learning Approaches, From Few to None: Exploring Few-Shot, One-Shot, and Zero-Shot Deep Learning in Clinical Settings tutorial, **BHI'23**

Technical Skills

Programming Languages	Python, Java , MATLAB, SQL, C/C++, R
ML & Deep Learning	PyTorch, DL4j, Scikit-learn, Weka, Keras, Tensorflow, Numpy, Pandas
Big data	Hadoop, Spark, S3
Web Programming	JavaScript, Vue.js, Node.js, Express.js, jQuery, HTML/CSS, Flask, Jetty
Database	MySQL, MongoDB, SQLite
Misc	Data Engineering and Cleaning, Object Oriented, MVC, Problem-Solving

Experience

Graduate Research Assistant

University of Pittsburgh

Aug 2020 - Present

Pittsburgh, PA

- Researching on making ML methods more **robust** and capable of understanding and **reasoning** about complex and **compositional scenes**, focusing on **vision-language** and **text-to-image (T2I) generative models**.

Applied Scientist Intern

Prime Video, Amazon

May 2024 - Sep 2024

New York, NY

- Led research on multimodal content understanding & duplicate detection. Developed a novel CLIP-based fusion model and multimodal chain-of-thought (Claud, InternVL), achieving > 10% improvement. **S3, SageMaker**

Applied Research Intern

Search Science, eBay

May 2023 - Aug 2023

San Jose, CA

- Employed **vision-language models (CLIP)** and a novel **transformer-based Mixture-of-Modality-Experts fusion** model, significantly boosting results on search and ranking tasks. **PyTorch, Spark, Hadoop**

Machine Learning Image Processing Intern

Image Signal Processing (ISP), Apple

May 2022 - September 2022

Cupertino, CA

- Developed efficient models for computer vision and Image Processing tasks, achieving enhanced performance and efficiency over state-of-the-art methods and baselines. **Python, PyTorch, and Matlab**.

- Designed an efficient symbolic deep network using differentiable decision trees, effective on imbalanced data.

Selected Projects

- Improved Counter-Stereotypical Action Reasoning in Text-to-Image Models** under-review
Generative AI, Diffusion Models, Compositional Reasoning, Out-of-Distribution Generalization
 - Created ActionBench, quantifying **stereotypical bias in action relations** (e.g., “cat chasing mouse” vs. “mouse chasing cat”) across **pre-trained T2I models** and **compositional generation** methods.
 - Developed a novel **2-stage Role-Bridging Decomposition framework** that decomposes **rare relationships into learnable intermediates**, achieving 15.2 point improvement on alignment metrics and 70% preference in human evaluations without complex architectural modifications.
 - Tools/Models:** Stable Diffusion(sdx, sd3/3.5), DALL-E 3, AuraFlow, GPT-4o, InternVL, LLaVA
 - Explored: Novel DPO-based contrastive objective, LLM-guided feedback for error correction, soft-prompting
- Multistep Reasoning for Understanding Advertisement Images** WACV’25
LLMs, Multimodal Large Language Modeling (MLLM), Compositional & chain-of-thought Reasoning
 - Designed/benchmarked tasks requiring **multi-step compositional reasoning** to assess MLLMs on complex ads.
 - Highlighted **critical reasoning gaps** between **multimodal models** and **LLMs**. Then, developed an **atypicality-aware chain-of-thought method** improving zero-shot reasoning by 40% on abstract/unusual relations.
 - Tools/Models:** VLMs (InternVL, LLaVA, BLIP-2, InstructBLIP), LLMs (Vicuna, LLaMA, InternLM, GPT4)
- Domain Robustness with Soft Prompting in Vision-Language Object Recognition** CVPR’24
LLM, Parameter Efficient Finetuning (PEFT), Domain Robustness, Vision-Language Models (VLM)
 - Proposed a **novel distillation-based approach** leveraging LLMs’ extensive world knowledge to **learn generalized soft prompts in a few-shot manner**, enhancing cross-geography generalization.
- Cross-Domain Descriptive Multi-Scale Learning for Object Detection** BMVC’23
Contrastive Learning, Vision-Language Pre-training (VLP), Domain Robustness, Object Detection
 - Developed a **novel multi-scale contrastive consistency framework preserving semantic information in language feature space**, improving object detection by 12%
- MuST for Semi-Supervised Medical Image segmentation**
Python, PyTorch, Data Augmentation, Consistency Regularization, Semantic Segmentation
 - Proposed a **feature-space augmentation consistency** approach for brain lesion segmentation, achieving sota performance with only 3% labeled data

Professional Services

- Conference Reviewer:** International Conference on Computer Vision (ICCV), 2025
IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR), 2024-2025
European Conference on Computer Vision (ECCV), 2024
Winter Conference on Applications of Computer Vision (WACV), (2022, 2024-2025)
Empirical Methods in Natural Language Processing (EMNLP), 2022
Association for the Advancement of Artificial Intelligence (AAAI), 2024
- Co-Organizer:** Demographic Diversity in Computer Vision Workshop, To appear @ CVPR 2025

Honors & Awards

- Doctoral Consortium, Winter Conference on Applications of Computer Vision (WACV), 2025
- Outstanding Reviewer Award, European Conference on Computer Vision (ECCV), 2024
- Department of Computer Science Travel Award, University of Pittsburgh (2023)
- Full SCI Fellowship, University of Pittsburgh (2020)
- Honored as an outstanding student, Amirkabir University of Technology (2015-2020)

Extra Curricular & Leadership

- President of Student Scientific Chapter** Jan 2017 - March 2018
Computer Engineering, Amirkabir University of Technology *Tehran, Iran*
- Organized 70+ national and international contests, talks, and workshops in collaboration with Technische Universität München, Germany, and KTH Royal Institute of Technology, Sweden.