Sina Malakouti

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

Education

University of Pittsburgh Aug 2020 - March 2026
PhD in Computer Science *Pittsburgh, PA*

· Advisor: Adriana Kovashka

Amirkabir University of Technology Sep 2015 - May 2020
B.Sc. in Software Engineering *Tehran, Iran*

· Advisors: Maryam Amir Haeri and Saeedeh Momtazi

Related Coursework Computer Vision, Natural Language Processing, Machine Learning, Artificial Intelligence, Data Mining, Statistics, Linear Algebra, Algorithms, Data Structures, Database Design

Interests

Computer Vision Multimodal Learning Foundational Models (VLM, LLM, Multimodal LLM) Robustness

Publications

· *Atypicality-Aware Verbalization: Improved Reasoning of Multimodal LLMs on Complex Persuasive Media*, Under Review
· *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**
· *A MuST for Consistency Regularization in Semi-Supervised Medical Image Segmentation*
· *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**
· *DeepTreeNetworks: A New Symbolic Deep Architecture. DeCoDeML workshop,* ***ECML PKDD'19***

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
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

Applied Research Intern May 2024 - Present
Prime Video, Amazon *New York, NY*

· Leveraging Vision-Language (VLM) and Multimodal Large Language models (MLLM) for content understanding.

Graduate Research Assistant Aug 2020 - Present
University of Pittsburgh *Pittsburgh, PA*

· Conducting research on domain robustness in computer vision, especially on label-efficient methods (e.g., semi-supervised, weakly-supervised, and self-supervised), with a focus on vision-language models.

Applied Research Intern May 2023 - Aug 2023
Search Science, eBay *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. *To be submitted*

Machine Learning Image Processing Intern May 2022 - September 2022
Image Signal Processing (ISP), Apple *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**.

Machine Learning Research Assistant, Intern July 2018 - Sep 2019
Johannes Gutenberg University *Mainz, Germany*

· Proposed a novel efficient symbolic deep architecture with differentiable decision trees, achieving superior performance on imbalanced data. **Java**, **DL4j**, **Weka**

Machine Learning Engineer, Intern June 2019 - Sep 2019
Shahid Rajaei Hospital & Research Center *Tehran, Iran*

· Developed ML pipeline, predicting pulmonary complication with 20% improvement. **Python**, **scikit-learn**, **Flask**.

Selected Projects

- **Multi-Modal Reasoning for Understanding Advertisement Images** Spring 2023 (Under review)
PyTorch, Large Language Models (LLM), Multimodal Large Language Modeling (MLLM)

· Benchmarked 3 novel tasks and proposed a novel semantically hard negative generation method (for VQA-like tasks) to assess MLLM (e.g., LLaVA, MiniGPT4, GPT4-V) understanding of complex visual reasoning data. Developed an atypicality-aware verbalization strategy that mitigates MLLM's lack of reasoning ability, significantly improving ad image understanding in a zero-shot manner.

- **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 method by proposing a contrastive consistency objective to enforce descriptive consistency in the language feature space, preserving essential semantic information and improving object detection performance by up to 12%.

- **Image-Caption Discourse Coherence Relation Prediction**
Python, PyTorch, Self-Supervised Learning, Discourse Relation

· Enhanced semi-supervised image-text discourse-relation prediction in a semi-supervised manner by enhancing self-supervised models (e.g., ViLBERT, SwAV) by employing a self-training based approach.

- **MuST for Semi-Supervised Medical Image segmentation**
Python, PyTorch, Data Augmentation, Consistency Regularization, Semantic Segmentation

· Proposed a novel consistency regularization framework for brain lesion segmentation with feature-space augmentation. Achieved novel performance by only having 3% labeled data.

Professional Services

Conference Reviewer: IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR), 2024
European Conference on Computer Vision (ECCV), 2024
Winter Conference on Applications of Computer Vision (WACV), (2022, 2024)
Empirical Methods in Natural Language Processing (EMNLP), 2022
Association for the Advancement of Artificial Intelligence (AAAI), 2024

Honors & Awards

· 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.