

Mohammad Jafari

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Education

Sharif University of Technology

Tehran-Iran

B.Sc in Computer Engineering [Transcript]

Sept. 2019 - Present

GPA: 18.72/20 – 3.91/4, GPA Major: 18.86/20 – 3.94/4

Thesis: A data-driven approach for intelligent and robust detection of out-of-distribution data

Advisor: Prof. Mohammad H.Rohban

Publications

- [1] **Unsupervised Out-of-Distribution Detection: From Low to High Inlier Variation** Under Review
Hossein Mirzaei, **Mohammad Jafari***, Mojtaba Nafez*, Mohammad Bagher Soltani, Mohammad Sabokrou, Mohammad Hossein Rohban, *CVPR 2024*.
- [2] **Universal Novelty Detection Through Adaptive Contrastive Learning** Under Review
Hossein Mirzaei, Mojtaba Nafez, **Mohammad Jafari**, Mohammad Bagher Soltani, Mohammad Sabokrou, Mohammad Hossein Rohban, *CVPR 2024*.
- [3] **RODEO: Robust Out-of-Distribution Detection Via Exposing Adaptive Outliers** Under Review
Hossein Mirzaei, **Mohammad Jafari**, Hamid Reza Dehbashi, Ali Ansari, Sepehr Ghobadi, Masoud Hadi, Arshia Soltani Moakhar, Mahdieh Soleymani Baghshah, Mohammad Hossein Rohban, *ICLR 2024*.
Initial Review Scores: 8, 6, 6, 6. [Early Reviews](#)
- [4] **The Power of Few: Accelerating and Enhancing Data Reweighting with Coreset Selection** Accepted
Mohammad Jafari, Yimeng Zhang, Yihua Zhang, Sijia Liu, *ICASSP 2024*. [Access upon request]
- [5] **Killing it with Zero-Shot: Adversarially Robust Novelty Detection** Accepted
Hossein Mirzaei, **Mohammad Jafari**, Hamid Reza Dehbashi, Zeinab Sadat Taghavi, Mohammad Sabokrou, Mohammad Hossein Rohban, *ICASSP 2024*. [Access upon request]
- [6] **Perfected by Imperfections: Adversarially Robust Detection of Out-of-Distribution Samples** Under Review
Hossein Mirzaei, **Mohammad Jafari***, Hamid Reza Dehbashi*, Mohammad Hossein Rohban, *AAAI 2024*. [Access upon request]

Research Interests

- ◇ Trustworthy & Safe AI
- ◇ Fairness & Model Interpretability
- ◇ Multi-Level Optimization
- ◇ Adversarial Learning
- ◇ Anomaly Detection
- ◇ Contrastive Learning

Research Experiences

Hyperparameter Optimization, Dataset Pruning, Data Reweighting

Michigan, USA

OPTML Lab, Michigan State University

Summer 2023 - Present

- Participated in a research initiative supervised by Prof. Sijia Liu, in collaboration with PhD students Damon Zhang and Yihua Zhang.
- Served as the first author for a paper submitted to *ICASSP2024*, emphasizing our team's commitment to advancing machine learning optimization.
- Developed coding skills specific to hyperparameter optimization and dataset pruning. Gained an in-depth understanding of data reweighting techniques, which enhanced my capacity for constructing robust machine learning models.

Adversarial Robustness, Anomaly and Out-of-Distribution Detection

Tehran, Iran

RIML Lab, Sharif University of Technology

Spring 2022 - Present


- Conducted research under the supervision of Prof. Rohban, and in collaboration with Prof. Solaymani and Prof. Sabokrou.
- Contributed to research papers submitted to *AAAI2024*, *ICASSP2024*, and *ICLR2024*, highlighting the lab's interdisciplinary research activities.
- Gained practical insights into adversarial robustness, strengthening my coding skills in implementing defenses against adversarial attacks. Further developed my understanding of anomaly detection algorithms, which aided in improving model reliability for out-of-distribution data.

Highlight Courses


Machine Learning (20/20) - 1st Rank, Computer Vision (18.7/20) - 1st Rank, Artificial Intelligence (20/20) - 1st Rank, Image Processing (19.3/20) - 5th Rank, Linear Algebra (20/20) - 1st Rank, Design of Algorithms (20/20) - 1st Rank, Data Structures (20/20) - 1st Rank, Advanced Programming (20/20) - 1st Rank, Web Programming (20/20) - 1st Rank, Machine Learning-Coursera[†] (Audited), Deep Learning-Coursera[†] (Audited)

Highlight Projects


Hyperparameter Optimization

Hyper Parameter Optimization on Coreset  Summer 2023
Developed a strategy for hyperparameter tuning through coreset, achieving enhanced model performance by validating the selected hyperparameters on the full dataset.

Evaluating Anomaly Detection Methods' Robustness

Robust Test  Summer 2023
Investigated the resilience of anomaly detection algorithms by performing adversarial attacks, serving as a benchmark for assessing robustness under adversarial conditions.

Comprehensive Anomaly Detection with Outlier Exposure

ExposureExperiment  Spring 2023
Executed a series of anomaly detection experiments across multiple datasets, offering valuable insights into dataset limitations and aiding in the creation of more robust anomaly detection models.

Computer Vision Algorithms



ComputerVisionProjects  Spring 2022
Developed a comprehensive repository of computer vision algorithms. Topics covered: Harris Corner Detection and Matching, Perspective Transform, Scene Matching using Homography & RANSAC, Creating Panorama from Video, Background Extraction & Stabilization, Epipolar Geometry, 3D Reconstruction, and HoG Face Detection.

Image Processing Algorithms

ImageProcessingProjects  Fall 2021
Implemented various image processing algorithms. Topics include Prokudin Gorski Colorization, Template Matching, CamScanner, Hybrid Images, Chess Board Detection via Hough Transform, Texture Synthesis, Image Completion and Hole Filling, Image Segmentation, Image Morphing, and Image Blending.

Teaching Experiences

Sharif University of Technology

◇ Image Processing	Spring 2023	◇ Data Structures and Algorithms	Fall 2021
◇ Linear Algebra	Spring 2023, Fall 2022, Fall 2021	◇ Web Programming	Fall 2021
◇ Artificial Intelligence	Spring 2022	◇ Advanced Programming	Spring 2021

Volunteer Service

2021-2023	Poster Designer: Created posters for three departmental social events
Fall 2022	Head of Design Team, Webelopers: Leadership role in design for department's Webelopers event
Spring 2021	Member of Design Team, AI Challenge: Contributed to design elements for AI Challenge event

Technical Skills

Programming Languages	Python, R, C++, C, Java, Javascript, TypeScript, L ^A T _E X
Frameworks & Operating Systems	Linux, Git, React, Django, Bash
Machine Learning Libraries	OpenCV, Numpy, Pandas, Scikit-Learn, Matplotlib, Seaborn
Deep Learning Libraries	PyTorch, PyTorch Lightning, Keras, TensorFlow, WANDB, Tensorboard
Professional Software	Adobe Illustrator, Adobe Photoshop, Davinci Resolve, Adobe Premiere
Languages	Persian (Native), English (Proficient): IELTS Score 8 (L9.0, R8.5, S7.5, W7.0)