Mohammad Jafari

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Education

Sharif University of Technology

Tehran-Iran

B.Sc in **Computer Engineering** [Transcript] Sept. 2019 - July. 2024

GPA: 18.34/20 — 3.87/4, GPA Major: 18.61/20 — 3.91/4

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

Advisor: Prof. Mohammad H.Rohban

Publications

[1] **RODEO: Robust Out-of-Distribution Detection Via Exposing Adaptive Outliers** *Accepted*
*Hossein Mirzaei, **Mohammad Jafari**, Hamid Reza Dehbashi, Ali Ansari, Sepehr Ghobadi, Masoud Hadi, Arshia Soltani Moakhar, Mahdieh Soleymani Baghshah, Mohammad Hossein Rohban, **ICML 2024**.* Link.

[2] **Universal Novelty Detection Through Adaptive Contrastive Learning** *Accepted*
*Hossein Mirzaei, Mojtaba Nafez, **Mohammad Jafari**, Mohammad Bagher Soltani, Mohammad Sabokrou, Mohammad Hossein Rohban, **CVPR 2024**.* Link.

[3] **The Power of Few: Accelerating and Enhancing Data Reweighting with Coreset Selection** *Accepted*
***Mohammad Jafari**, Yimeng Zhang, Yihua Zhang, Sijia Liu, **ICASSP 2024**.* Link.

[4] **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**.* Link.

Research Interests

- ◇ Trustworthy & Safe AI
- ◇ Fairness & Model Interpretability
- ◇ Computer Vision
- ◇ Adversarial Learning
- ◇ Out-of-Distribution Detection
- ◇ Large Language Models

Awards and Honors

Nov 2024	**NeurIPS-2024 Erasing the Invisible Challenge - BlackBox Track**: Ranked **2nd** among **77** teams
Nov 2024	**NeurIPS-2024 Erasing the Invisible Challenge - BeigeBox Track**: Ranked **3rd** among **65** teams

Research Experiences

Redundancy on Large Language Models

Vancouver, Canada

TAI Lab, Simon Fraser University Fall 2024 - Present

- Investigating the effects of data redundancy on reasoning abilities of large language models, aiming to develop robust approaches to handle redundancy without compromising model performance.
- Conducting research under the supervision of Prof. Linyi Li to design controlled experiments that analyze how redundant information in training datasets influences model robustness and generalization.

Hyperparameter Optimization, Dataset Pruning, Data Reweighting

Michigan, USA

OPTML Lab, Michigan State University Summer 2023 - Spring 2024

- Participated in a research 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*.
- Developed coding skills specific to hyperparameter optimization and dataset pruning. Gained an in-depth understanding of data reweighting techniques.
- Gained valuable experience working with a professional team of researchers. Learned how to conduct research systematically, from managing experiments to drafting and revising a manuscript for publication.

Adversarial Robustness, Anomaly and Out-of-Distribution Detection

Tehran, Iran

RIML Lab, Sharif University of Technology — Spring 2022 - Summer 2024

- Conducted research under the supervision of Prof. Rohban, and in collaboration with Prof. Solaymani and Prof. Sabokrou.
- Contributed to research papers submitted to *CVPR2024*, *ICASSP2024*, and *ICML2024*.
- 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 coresets, achieving enhanced model performance by validating the selected hyperparameters on the full dataset.

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

Technical Skills

Programming Languages	Python, R, C++, C, Java, Javascript, TypeScript, LaTeX
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)