Muhammad Jehanzeb Mirza

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Research Interests: Online Learning, Vision-Language Understanding, Unsupervised Representation Learning

My Ph.D. research is mainly focused on designing self-supervised and unsupervised representation learning techniques for making deep neural networks robust to distribution shifts on the fly at test time. During numerous research projects, I have worked with different types of data including images, point clouds, videos, radar signals, and most recently natural language. Along with the main research focus on online learning, recently I have also started working with large language models (LLMs) and I am particularly interested in multi-modal (vision-language) models.

EDUCATION

Graz University of Technology   *Jan 2021 - Mar 2024 (expected)*
Doctor of Philosophy in Computer Science (Computer Vision)   Graz, Austria.

Karlsruhe Institute for Technology   *Oct 2017 - Aug 2020*
Master of Science in Electrical Engineering and Information Technology   Karlsruhe, Germany.

National University of Science and Technology   *Sep 2013 - June 2017*
Bachelor of Science in Electrical Engineering   Islamabad, Pakistan.

WORK EXPERIENCE

Research Assistant (PhD. Student)   *Jan 2021 – Present*
Graz University of Technology   Graz, Austria

- PhD. research is mainly focused on employing self-supervised and unsupervised representation learning techniques for making deep neural networks robust to distribution shifts on-the-fly, at test-time.
- Worked with different types of data including Images, Videos, 3D Point Clouds, Radar Signals and most recently with Natural Languages.
- Along with the main research focus on online learning, recently started working with large language models (LLMs) and particularly focusing on multi-modal (vision-language) models.

Master Thesis   *Jan 2020 – Jul 2020*
Intel Labs   Karlsruhe , Germany

- Evaluated the robustness of state-of-the-art deep neural networks in degrading weather conditions in the context of Autonomous Driving. The study included evaluation of both 2D and 3D object detectors.

Intern (C++ developer)   *Oct 2019 – Dec 2019*
Intel Labs   Karlsruhe , Germany

- Worked on state estimation of objects detected in the environment using the Unscented Kalman Filter. The development was done by extensively using C++ and OpenCV.

Intern (Platform Application Engineer)   *Mar 2019 – Aug 2019*
Intel   Karlsruhe , Germany

- Designed a framework to help the team to automate some important internal tasks. The framework involved designing a PCB to interface the boards with a micro controller.

TECHNICAL SKILLS

Languages: Python, C++

Deep Learning Frameworks: PyTorch

Data Modalities: Images, Point Clouds, Videos, Natural Language

Selected Publications (Lead Author)

LaFTer: Label-Free Tuning of Zero-shot Classifier using Language and Unlabeled Image Collections | Neural Information Processing Systems (NeurIPS)   *2023*

MATE: Masked Autoencoders are Online 3D Test-Time Learners | Proceedings of the IEEE/CVF International Computer Vision Conference (ICCV)   *2023*

ActMAD: Activation Matching to Align Distributions for Test-Time-Training | Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR)   *2023*

Video Test-Time Adaptation for Action Recognition | Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR)   *2023*

The Norm Must Go On: Dynamic Unsupervised Domain Adaptation by Normalization | Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR)   *2022*

An Efficient Domain-Incremental Learning Approach to Drive in All Weather Conditions | Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition Workshops (CVPR)   *2022*

Invited Talks

Center for Robotics, Paris Tech. (September, 2023)

VIS Lab, University of Amsterdam. (October, 2023)

Cohere. (October, 2023)

Academic Services

Reviewer: CVPR, ICCV, TPAMI

Program Chair: What's next in Multi-Modal Foundation Model Workshop at CVPR 2024

Student Supervised Projects (Selected)

Master Thesis: Online Test-Time Training for 3D point clouds with Masked Autoencoders (Completed)

Master Thesis: How Much are Data Augmentations Worth for 3D Representation Learning (Completed)

Master Thesis: Online Perception System Deployment in Real-Time Scenarios (Ongoing)

Bachelor Thesis: Online Domain Incremental Learning for Driving in Adverse Weather Conditions (Completed)

Bachelor Thesis: Online Test-Time Training for Vision-Language Models (Ongoing)

Reference

PhD. Supervisor: Prof. Horst Bischof (bischof@icg.tugraz.at)

PhD. Advisor: Dr. Horst Possegger (possegger@icg.tugraz.at)