Muhammad Akhtar Munir

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Google Scholar | LinkedIn | Website

Summary

I am a Postdoctoral Researcher in Computer Vision at MBZUAI in Abu Dhabi. My research spans areas like Domain Generalization, Uncertainty Estimation, Model Calibration, and Vision-Language Models (VLMs). Currently, I am focused on tackling challenges in Model Calibration, enhancing the accuracy of Weather Modeling, and improving Remote Sensing analysis through VLMs.

Experience

Postdoctoral Research Associate *Jul 2023 – Present*
Mohamed Bin Zayed University of Artificial Intelligence (MBZUAI), Abu Dhabi, UAE
Department of Computer Vision

Research Assistant/Intern *Aug 2022 – Jun 2023*
Mohamed Bin Zayed University of Artificial Intelligence (MBZUAI), Abu Dhabi, UAE
Department of Computer Vision

Researcher *Jan 2022 – Jul 2022*
Information Technology University (ITU) of Punjab, Lahore, Pakistan
Under Google Research Scholar Award

Fellowship *Sep 2017 – Aug 2021*
Information Technology University (ITU) of Punjab, Lahore, Pakistan
Intelligent Machines Lab

Lab Engineer *Nov 2013 – Aug 2017*
School of Electrical Engineering and Computer Science (SEECS), NUST, Islamabad, Pakistan
Department of Computing

Publications (Selected)

1. Muhamad Sohail Danish*, **Muhammad Akhtar Munir***, Syed Roshaan Ali Shah, Kartik Kuckreja, Fahad Shahbaz Khan, Paolo Fraccaro, Alexandre Lacoste, and Salman Khan. *GEOBench-VLM: Benchmarking Vision-Language Models for Geospatial Tasks*. IEEE/CVF International Conference on Computer Vision (ICCV 2025). **Highlight Paper**
   ***Equally Contributing First Authors.**
2. Ashshak Sharifdeen, **Muhammad Akhtar Munir**, Sanoojan Baliah, Salman Khan, Muhammad Haris Khan. *O-TPT: Orthogonality Constraints for Calibrating Test-time Prompt Tuning in*

Vision-Language Models. IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR 2025). **Highlight Paper**

3. Vishal Nedungadi, **Muhammad Akhtar Munir**, Marc Rußwurm, Ron Sarafian, Ioannis N. Athanasiadis, Yinon Rudich, Fahad Shahbaz Khan, Salman Khan. *AirCast: Improving Air Pollution Forecasting Through Multi-Variable Data Alignment*. TerraBytes-workshop International Conference on Machine Learning (ICML 2025). **Best Paper**
4. Sagar Soni, Akshay Dudhane, Hiyam Debary, Mustansar Fiaz, **Muhammad Akhtar Munir**, Muhammad Sohail Danish, Paolo Fraccaro, Campbell Watson, Levente Klein, Fahad Khan, Salman Khan. *EarthDial: Turning Multi-sensory Earth Observations to Interactive Dialogues*. IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR 2025).
5. **Muhammad Akhtar Munir**, Fahad Khan, and Salman Khan. *Efficient Localized Adaptation of Neural Weather Forecasting: A Case Study in the MENA Region*. Workshop on Tackling Climate Change with Machine Learning (CCAI-NeurIPS 2024).
6. Sohail Danish, Muhammad Haris Khan, **Muhammad Akhtar Munir**, M. Saquib Sarfraz, and Mohsen Ali. *Improving Single Domain-Generalized Object Detection: A Focus on Diversification and Alignment*. IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR 2024).
7. **Muhammad Akhtar Munir**, Salman Khan, Muhammad Haris Khan, Mohsen Ali, and Fahad Khan.*Cal-DETR: Calibrated Detection Transformer*. Conference on Neural Information Processing Systems (NeurIPS 2023).
8. **Muhammad Akhtar Munir**, Muhammad Haris Khan, M. Saquib Sarfraz, and Mohsen Ali. *Domain Adaptive Object Detection via Balancing between Self-Training and Adversarial Learning*. IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI, IF=20.8).
9. **Muhammad Akhtar Munir**, Muhammad Haris Khan, Salman Khan, and Fahad Khan. *Bridging Precision and Confidence: A Train-Time Loss for Calibrating Object Detection*. IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR 2023).
10. **Muhammad Akhtar Munir**, Muhammad Haris Khan, M. Saquib Sarfraz, and Mohsen Ali. *Towards Improving Calibration in Object Detection Under Domain Shift*. Conference on Neural Information Processing Systems (NeurIPS 2022).
11. **Muhammad Akhtar Munir**, Muhammad Haris Khan, M. Saquib Sarfraz, and Mohsen Ali. *SSAL: Synergizing between Self-Training and Adversarial Learning for Domain Adaptive Object Detection*. Conference on Neural Information Processing Systems (NeurIPS 2021).

Pre-prints (ArXiv)

1. Muhamad Sohail Danish, **Muhammad Akhtar Munir**, Syed Roshaan Ali Shah, Muhammad Haris Khan, Rao Muhammad Anwer, Jorma Laaksonen, Fahad Shahbaz Khan, Salman Khan. *TerraFM: A Scalable Foundation Model for Unified Multisensor Earth Observation*. ArXiv 2025.
2. Akashah Shabbir*, **Muhammad Akhtar Munir***, Akshay Dudhane*, Muhammad Umer Sheikh, Muhammad Haris Khan, Paolo Fraccaro, Juan Bernabe Moreno, Fahad Shahbaz

Khan, Salman Khan. *ThinkGeo: Evaluating Tool-Augmented Agents for Remote Sensing Tasks*. ArXiv 2025. ***Equally Contributing First Authors.**

Education

Doctor of Philosophy in Computer Science *Sep 2017 – Dec 2024*
Information Technology University, Lahore
Thesis: Domain Adaptation for Object Detection

Master of Science in Computer Science *Feb 2015 – Jun 2017*
COMSATS Institute of Information Technology, Islamabad
Thesis: Ischemic Stroke Lesion Segmentation in MR Sequences Using MLP and SVM

Programming Languages & Tools

- **Programming Languages:** Python, C/C++, MATLAB
- **Deep Learning Frameworks:** PyTorch, Keras
- **Tools:** ArcGIS, Linux, VS Code, MS Office, LaTeX

Services & Honors

- **Reviewer:** CVPR 2023-25, ICLR 2024-25, ICCV 2023-2025, NeurIPS 2023-25, TPAMI, IJCV
- **Awards:** NeurIPS 2022 & 2023 Scholar Award, CVPR 2023 DEI Award
  Outstanding Reviewer: Recognized as Outstanding Reviewer for CVPR 2025
- **Scholarship:** PhD Fellowship (4 years) from Information Technology University, Lahore
- **Conferences (Attended):** CVPR (2023, 2024, 2025), NeurIPS 2023, BMVC 2024

References

- **Dr. Salman Khan**
  Associate Professor
  Mohamed bin Zayed University of Artificial Intelligence (MBZUAI), Abu Dhabi, UAE
  Email: salman.khan@mbzuai.ac.ae

- **Dr. Muhammad Haris Khan**
  Assistant Professor
  Mohamed bin Zayed University of Artificial Intelligence (MBZUAI), Abu Dhabi, UAE
  Email: muhammad.haris@mbzuai.ac.ae

- **Dr. Mohsen Ali**
  Associate Professor
  Information Technology University (ITU) of Punjab, Lahore, Pakistan
  Email: mohsen.ali@itu.edu.pk