Mohammad Hanan Gani

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RESEARCH INTERESTS

My research interests are at the intersection of data-efficient learning, out-of-distribution generalization, and multi-modal learning, with applications to problems in test-time adaptation, unifying generative and discriminative spaces, and world-centric evaluation of multi-modal models.

EDUCATION

Mohamed Bin Zayed University of Artificial Intelligence (MBZUAI) — Abu Dhabi, UAE
Master of Science (M.Sc.) in Machine Learning — *August. 2022 – May 2024*
GPA: 3.77/4.0
Advisor: Prof. Salman Khan, *Co-Advisor:* Prof. Fahad Khan
Thesis title: Text-to-Image Diffusion with Complex and Detailed Prompts (link)

National Institute of Technology (NIT) — Srinagar, Kashmir, India
Bachelor of Technology (B.Tech), Electronics and Communication Engineering — *Aug. 2014 – June 2018*
GPA: 8.561/10.0
Advisor: G. R. Begh, *Co-Advisor:* Shahid Mehraj
Thesis title: Channel Estimation in Cognitive Radio using Machine Learning

PUBLICATIONS

(* indicates joint first authors, + indicates my role as co-mentor)

Papers Published

- **Hanan Gani**, Muzammal Naseer, Fahad Khan and Salman Khan. *"MedContext: Learning Contextual Cues for Efficient Volumetric Medical Segmentation"*. 27th **International Conference on Medical Image Computing and Computer Assisted Intervention Society (MICCAI) 2024**. 📄 Paper ⌽ Code

- **Hanan Gani**, Shariq Farooq, Muzammal Naseer, Salman Khan and Peter Wonka. *"LLM Blueprint: Enabling Text-to-Image Generation with Complex and Detailed Prompts"*. In preceedings of 12th **International Conference on Learning Representations (ICLR) 2024**. 📄 Paper ⌽ Code

- **Hanan Gani***, Jameel Hassan*, Noor Hussein, M. Uzair Khattak, Muzammal Naseer, Fahad Khan and Salman Khan. *"Align Your Prompts: Test-Time Prompting with Distribution Alignment for Zero-Shot Generalization"*. In proceedings of 37th **Advances in Neural Information Processing Systems (NeurIPS) 2023**.
📄 Paper ⌽ Code

- **Hanan Gani**, Muzammal Naseer, Mohammad Yaqub. *"How To Train Vision Transformer On Small-scale Datasets?"*. In proceedings of 33rd **British Machine Vision Conference (BMVC) 2022**.
📄 Paper ⌽ Code

- **Hanan Gani**, Nada Saadi, Noor Hussein, Karthik Nandakumar. *"Multi-Attribute Vision Transformers are Efficient and Robust Learners"*. Accepted at **IEEE International Conference on Image Processing (ICIP) 2024.**
📄 Paper ⌽ Code

- Saumya Kumaar, Abrar Majeedi, **Hanan Gani**, Abhinandan Dogra, Ravi M. Vishwanath and S N Omkar. *"A Supervised learning Methodology for Real time Disguised Facial Recognition in Wild"*. Accepted at **International Conference on Robotics and Computer Vision (ICRCV) 2018**.
📄 Paper ⌽ code

Papers Under Review

- Umair Nawaz, Awais M., **Hanan Gani+**, M. Naseer, F. Khan, S. Khan and R. Anwer. *"AgriCLIP: Adapting CLIP for Agriculture and Livestock via Domain-Specialized Cross-Model Alignment"*. Under review at **COLING 2025**.
📄 Paper ⌽ Code

- Raza Imam, **Hanan Gani+**, Mohammad Huzaifa and Karthik Nandakumar. *"Test-time Low Rank Adaptation via Confidence Maximization for Zero-Shot Generalization"*. Under review at **WACV 2025**.
📄 Paper ⌽ Code

- **Hanan Gani***, Rohit Bhardwaj*, Muzammal Naseer, Fahad Khan and Salman Khan. *"VANE-Bench: Video Anomaly Evaluation Benchmark for Conversational LMMs"*. Under review at **NAACL 2025**.
  - 🗎 Paper ⌗ Code

- Shehan Munasinghe*, **Hanan Gani+***, Wenqi Zhu, Jiale Cao, Fahad Khan and Salman Khan. *"VideoGLaMM: A Large Multimodal Model for Pixel-Level Visual Grounding in Videos"*. Under submission at **CVPR 2025**.

PATENTS

Hanan Gani, Muzammal Naseer, Mohammad Yaqub. *"System and Method of Training Vision Transformer on Small-Scale Datasets"*. <u>US Patent</u>. Pub. No. US 2024/0212330 A1. USPTO application no.: 18089107

RESEARCH EXPERIENCE

King Abdullah University of Science and Technology (KAUST)   Saudi Arabia
Visiting Sudent   *June 2023 – October 2023*
Host Advisor: <u>Prof. Peter Wonka</u>, Full Professor, Computer Science Department

- Developed the first approach enabling diffusion models to generate detailed, complex scenes from lengthy and intricate textual prompts, significantly advancing text-to-image generation capabilities. (*ICLR 2024*)

Mohamed Bin Zayed University of Artificial Intelligence (MBZUAI)   Abu Dhabi, UAE
Research Assistant   *Oct 2021 – Aug. 2022*
Advisor: <u>Prof. Mohammad Yaqub</u>, Associate Professor, Computer Vision Department

- Developed a self-supervised scheme to learn weights from low-resolution views on small datasets, enabling Vision Transformers to be trained from scratch without large-scale pre-training. (*BMVC 2022*)

Fatima Fellowship – Predoc Program   USA (remote)
Part-time fellow   *March 2021 – Dec. 2021*
Advisor: <u>Dr. Abubakr Abid</u>, ML Lead, Hugging Face Inc

- Developed a multi-task approach optimizing Vision Transformers to efficiently handle multiple tasks simultaneously within a constrained computational budget. (*IEEE ICIP'24, UAE GSRC'23*)

Indian Institute of Science (IISc)   Bangalore, India
Research Intern   *Dec. 2017 – March 2018*
Host Lab: Computational Intelligence & UAV Lab, Aerospace Engineering Department

- Worked with a team in developing a lightweight Disguised Facial Recognition Systemv utilizing 20 unique facial keypoints, capable of operating in real-time at 19 FPS (*IEEE ICSIP'18, ICRCV'18*)

WORK EXPERIENCE

Mohamed Bin Zayed University of Artificial Intelligence (MBZUAI)   Abu Dhabi, UAE
Research Associate I   *June. 2024 – Present*
Advisor / Line Manager: <u>Prof. Salman Khan</u>

- Working on developing an image super-resolution model for low-quality satellite sensory imagery to determine potential locations for seeding to reduce the cost in cloud seeding operations (collaboration with UAE Govt.).
- Collaboration with an MS student in developing a Video Grounding model capable of grounded conversation generation, visual grounding, reasoning and referring video segmentation.
- Developed a new benchmark for evaluating Video LMMs on inconsistencies in AI generated videos (*NAACL'25*)

Harman International - Connected Car R&D (Samsung)   Bangalore, India
Machine Learning Engineer   *Oct. 2018 – Sept. 2021*
- Developed ***Screen Reliability system*** for real-time detection of anomalies in continuous video streams on HMI screens. Employed deep learning techniques, specifically a Auto-encoders and GANs (currently being used in production at Harman facilities).
- Developed ***Test Case Recommender*** which uses transformer based language models to map user's text query with the relevant test cases to fix automation issues such as software run failures or system crashes. (currently being used in production at Harman facilities)

- Developed **Log Failure Categorization** which utilizes error logs to distinguish between software and hardware failures. (saves 2 hours per day to software team)
- Devised a system, called **Similar Issue Recommender**, which accepts the detailed description of a software issue and uses language model to recommend similar types of software issues fixed in the past. (currently being used in production at Harman facilities)

TEACHING AND ACADEMIC SERVICES

Teaching Assistant | *MBZ University of Artificial Intelligence (MBZUAI), Abu Dhabi*
- Advanced Topics in Vision and Language (CV806) – Spring 2024 with Prof. Ivan Laptev
- Deep Learning (AI702) – Spring 2024 with Prof. Harris Khan
- Probabilistic and Statistical Inference (ML703) – Fall 2023 with Prof. Kun Zhang
- Machine Learning (ML701) – Fall 2023 with Prof. Samuel Horvath

Tutor & Lab Instructor | *UGRIP program, MBZUAI*
- Tutor for Foundations of AI course and lab instructor for UGRIP internship program at MBZUAI

Conference Reviewing | *Reviewer*
- ICLR'25, 24 & 23, AAAI'24, WACV'24, ECCV'24, NeurIPS'24 & 23, CVPR'24, ICML'24, ICCV'23

Conference Volunteer | *IEEE International Conference on Image Processing (ICIP) 2024*
- Serving as a program volunteer for IEEE ICIP conference in Abu Dhabi, UAE

Invited Talk | *University of Jordon*
- Presented a talk on Generative AI to undergrad CS students at the University of Jordon

HONORS AND AWARDS

- Research excellence award by MBZUAI for my research contributions during masters degree
- Awarded **ICLR 2024** Travel Grant
- Awarded **NeurIPS 2023** Travel Grant
- MBZUAI graduate studies scholarship holder
- Selected as one of the few candidates from India to participate in the Google India Research Week 2022
- Received Harman Star Excellence award from the Harman International India Head
- Merit Based Scholarship granted for undergraduate studies by Ministry of Minority Affairs India.

TECHNICAL SKILLS

Languages: Python, C, C#, MATLAB, SQL, HTML/CSS
Frameworks: PyTorch, TensorFlow, Keras, Scikit-Learn, OpenCV, HuggingFace, Flask
Developer Tools: Git, Docker, Google Cloud Platform, VS Code, Visual Studio, PyCharm, Linux

EXTRACURRICULAR AND SOCIAL ACTIVITIES

Graduate Student Council (GSC) | Machine Learning Coordinator & Member of GSC at MBZUAI
- Act as a bridge between the students and department and discuss any student-related issues with the head of the ML department to ensure issues are addressed promptly and the department runs smoothly
- Discuss and organize general student-centric initiatives with the administration as a part of GSC team

Rivero | Co-Founder (undergrad initiative)
- Rivero is a Kashmir-based NGO dedicated to guiding students in exploring various career paths. Through this initiative, we organized numerous educational workshops and events, providing counseling to nearly 2,000 students, primarily those from underprivileged and conflict-affected backgrounds.

Sports & Games | Badminton, Volleyball, Football, First-person shooter games

REFERENCES

Prof. Salman Khan | ✉ salman.khan@mbzuai.ac.ae
Prof. Fahad Khan | ✉ fahad.khan@mbzuai.ac.ae
Prof. Muzammal Naseer | ✉ muz.pak@gmail.com
Prof. Peter Wonka | ✉ pwonka@gmail.com
Prof. Kun Zhang | ✉ kunz1@cmu.edu
Dr. Abubakr Abid | ✉ a12d@stanford.edu