MUNEEB AHMED KHAN

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Education

- **Ph.D. in Software (Machine Learning & Computer Vision)** March 2021 – Expected Aug. 2025
  - Sangmyung University, Cheonan, Korea
  - **Dissertation:** Efficient and Interpretable Deep Learning Frameworks for Real-World Applications
  - **Advisor:** Dr. Heemin Park
- **Master of Science in Information Technology** 2019
  - National University of Science and Technology (NUST), Islamabad, Pakistan
  - **Thesis:** Prediction based Target Tracking in Wireless Sensor Network
- **Bachelor of Computer Engineering** 2014
  - COMSATS Institute of Information Technology (CIIT), Lahore, Pakistan

Selected Publications

Total: 23 publications

[1] **MA Khan**, H Park. "HP-ViT: Hierarchical Pathology-Aware Vision Transformer for Multi-Label Thoracic Disease Classification in Chest X-rays" Springer Health Information Science and Systems. **IF: 4.7** (In Review)

[2] **MA Khan**, H Park. "Adaptive Channel Attention and Multi-Path Convolutional Architecture for Brain Tumor Detection Using MRI Images." Springer Multimedia Tools and Applications (2025). **IF: 3.0** [Link]

[3] **MA Khan**, Y Choi, J Eum, H Park. "Traffic Sign Recognition Under Visual Perturbations: Shadows, Light Patches, and Simulated Obstructions." IEEE/CVF Conference on Computer Vision and Pattern Recognition Workshops (**CVPRw**), 2025. (Accepted)

[4] **MA Khan**, H Kim, J Eum, Y Myung, Y Choi, H Park. "M-GAID: A Real-World Dataset for Ghosting Artifact Detection and Removal in Mobile Imaging." IEEE/CVF Winter Conference on Applications of Computer Vision Workshops (**WACVw**), 2025. [Link]

[5] **MA Khan**, H Park. "A Convolutional Block Base Architecture for Multiclass Brain Tumor Detection Using Magnetic Resonance Imaging." Electronics 13, no. 2 (2024): 364. **IF: 2.6** [Link]

[6] U Ejaz, **MA Khan**, H Park, H Kim. "FireXplainer: An Interpretable Approach for Detection of Wildfires." Korea Computer Congress (KCC), pp. 1109-1111. 2023. [Link] (Best Paper Award)

Full publication list available at Webiste

Research & Industrial Experience

- **Objective Quality Metrics for Ghosting Artifacts in Video and HDR Images** June 2023 – May 2024
  ***Research Funding**: Google Korea*
  Tools: PyTorch, OpenCV, scikit-image, NumPy, Pandas
  - Built a dataset of 2,500+ real images and annotated over 37,000 patches for spatial/temporal artifact detection.
  - Designed data pipelines for collection, annotation, and feature extraction from diverse imaging sources.
  - Trained SOTA deep learning models for domain specific tasks (e.g ghosting artifacts, object detection)
  - Developed a test framework simulating multiple camera noise conditions for robust artifact evaluation.
- **Multi-Scale Attention Model for Low-Light Image Enhancement** 2024
  Tools: PyTorch, LoL Dataset v1/v2, GCP A100, SSIM, MS-SSIM, LPIPS
  - Designed a lightweight model (12M parameters) achieving 0.88 SSIM, 0.93 MS-SSIM, 0.207 LPIPS on LoL datasets using GCP A100.
  - Worked on integrating attention Mechanisms and transfer learning.
  - Implemented an adaptive enhancement pipeline balancing perceptual quality and computational efficiency.
  - Reviewed and implemented AAAI, CVPR, and ICCV research papers to optimize model performance.
- **Traffic Sign Recognition with Advanced Neural Network Techniques** 2022 – 2024
  Tools: TensorFlow, OpenCV, Grad-CAM, LIME, GTSRB, ITSD, PTSD
  - Developed an interpretable CNN (2.6M parameters) achieving 98.4% accuracy and 74.34 ms inference.
  - Streamlined ML model development and deployment with MLflow for tracking and reproducibility.
  - Optimize GPU acceleration and parallel processing to optimize the system performance.

- **Brain Tumor Detection Using Magnetic Resonance Imaging** 2023 – 2024
  Tools: TensorFlow, Keras, Grad-CAM, LIME
  – Developed a lightweight convolutional block architecture achieving 99.51% mAP with 17.2 ms inference speed.
  – Performed tumor segmentation, lesion classification, and anomaly detection in multi-modal MRI sequences.
  – Reduced false positives by 78% using explainable AI techniques (Grad-CAM, LIME).
- **FireXplainNet: Interpretable Wildfire Detection System** 2022 – 2023
  Tools: PyTorch, Grad-CAM, Matplotlib
  – Developed a lightweight interpretable CNN (5.3M parameters) for early wildfire detection.
  – Applied gradient-based attribution (Grad-CAM) for decision explainability in high-risk outdoor scenarios.
  – Achieved high accuracy under variable conditions; received Best Paper Award at KCC 2023.
- **YOLO-Based Real-Time Object Detection and Tracking System** 2021 – 2023
  Tools: YOLOv5, YOLO-NAS, DeepSORT, Kalman Filter, ByteTrack, PyTorch, OpenCV
  – Built a real-time multi-object detection and tracking system using YOLOv5/YOLO-NAS and DeepSORT.
  – Achieved mAP > 92% and 30+ FPS on COCO/MOT datasets, enabling real-time visual intelligence.
  – Leveraged GPU parallelization strategies to optimize inference performance.

Technical Skills

- **ML Frameworks:** TensorFlow, PyTorch, Keras, Python, Pandas
- **Computer Vision:** Object detection and classification, Image segmentation, Visual Intelligence Systems
- **CV Libraries:** OpenCV, Keras, scikit-image, Pillow, NumPy
- **Deep Learning:** SSD, YOLOX, YOLO-NAS, Faster R-CNN, Transfer learning, Attention mechanisms
- **Efficient Model Design:** Lightweight Architecture design, Model Optimization and Quantization
- **Medical Imaging:** MRI analysis, Tumor segmentation, Multi-class classification, Artifact removal
- **Data Science:** Data collection, Data Cleaning and Labeling, Feature Engineering and Visualization
- **Research Tools:** Google Cloud Platform (GCP), CUDA, Git, LaTeX, Jupyter Notebook

Research Funding & Honors

- **Google Korea Research Grant** (2024-Present): "Post-Processing Methods for Artifact Removal"
- **Google Korea Research Grant** (2023-2024): "Objective Quality Metrics for Ghosting Artifacts"
- **Best Paper Award** (2023): "FireXplainer: An Interpretable Approach for Detection of Wildfires" KCC, Jeju, Korea
- **Professor Scholarship for Ph.D.** (2021-2025): Pi-Lab, Sangmyung University
- **DURE Scholarship** (2022-2023): For international collaboration with Mongolia
- **Teaching Assistant Scholarship** (2021-2022): Department of Software, Sangmyung University

Conference Participation

- **WACV'25, CVPR'23, KCC'23, ICWSM'22, KCC'22, WWW'21, AAAI'21, CSCW'21**

Current Projects

- **Post-Processing Methods for Artifact Removal Using Machine Learning** @Google Korea & Pi Lab, Korea
  ***Research Funding**: Google Korea*
  – Investigating machine learning techniques for suppressing noise, ghosting, and compression artifacts.
  – Optimized artifact removal performance across diverse imaging modalities.
  – Designed deployment strategies suitable for mobile and resource-constrained environments.
- **Multi-Modal Framework for Medical Condition Classification and Detection** @ Pi Lab, Korea
  – Developing multi-class detection system for brain tumors, COVID-19, pneumonia, and lung opacities.
  – Working on CNN architectures to handle ambiguous boundaries in medical images.
  – Optimizing model performance for resource-constrained clinical environments with explainability.
- **Partial Diffusion Model Architecture for Medical Image Super-Resolution**
  – Developing partial diffusion techniques for medical image resolution enhancement.
  – Optimizing computational efficiency for deployment with limited resources.
  – Quantifying diagnostic value improvements through clinical partner collaboration.

References

Dr. Heemin Park
Professor, Department of Software
Sangmyung University, Cheonan, Korea
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Dr. Muazzam A. Khan Khattak
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