Muhammad Ali Farooq (he/ him)

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CAREER OBJECTIVE

To groom myself as an established researcher in the field of computer vision, machine vision, edge computing, and sensor fusion. Moreover, committed to become an expert ML engineer and work in the areas of intelligent system designing, system deployments, and system up-gradation.

EDUCATION

September 2019 – August 2022 Ph.D., Electrical and Electronic Engineering, National University of Ireland Galway
Grade: Successful Ph.D. remote defense
Thesis: Evaluations of Thermal Imaging Technology for Automotive Use Cases
Other Projects: Medical Image Analysis, Digital image processing and enhancement, Facial depth map estimations, 3D face construction using deep learning.
Subjects: Research Integrity

August 2014 - May 2017 Masters of Science (MS), Electrical Control Engineering, National University of Sciences and Technology Pakistan
CGPA: 3.50 on a scale of 4.00
Thesis: Automatic Lesion Detection System for Skin Cancer Classification using SVM and Neural Classifiers
Other Projects: Digital Incubation System using PID Controller.
Subjects: Computer Vision, Control System, Advanced Embedded Systems design, Advanced Digital Signal Processing, Digital Data Acquisition, Probability, and Statistics

August 2008 - December 2012 Bachelor of Engineering (BE), Electronic Engineering, IQRA University
CGPA: 3.24 on a scale of 4.00
Final Year Project: Advanced Digital Controller for BUCK and Boost Converter
Other Projects: Smart Grid, Switch Mode Power Supply, PIC Micro-Controller based Home Automation System
Subjects: Digital Electronics, Power Electronics, Digital Logic Design, Industrial Electronics, Applied Mathematics, Circuit Analysis, and Digital Communication Systems

WORK EXPERIENCE

September 2022 - Currently Working as a Postdoctoral Researcher, University of Galway and Machine Learning Intern, Xperi Corporation Galway

- Currently I am working on the Disruptive Technologies Innovation Fund 'DTIF-DAVID' project funded by Enterprise Ireland (EI) with overall funding of 1,408,660 Euros allocated for University of Galway. The main objective is the development of a multimodal (sound and vision) AI processing platform with low cost and low power consumption to be used for the creation of voice-enabled devices.
- Working towards generating large-scale synthetic datasets using the composite structure of computer vision algorithms which includes Image-to-Image translation based Generative Adversarial Networks and Text-to-Image based stable diffusion models for optimal training and validation of deep learning networks. Further, building 3D speaking facial models using 2D data by incorporating advanced latent diffusion models using ControlNet.
- Focusing on machine learning model optimization using state-of-the-art network quantization methods for deployment on single board low-powered edge devices for real-time data processing.
- Mentoring Ph.D. and master's students in their research projects by providing technical assistance and helping them in drafting publications and research-based ethical approvals.

- Served as Program Chair for the 25th Irish Machine Vision and Image Processing (IMVIP23) Conference where I successfully set up the program committee, paper submission portal, decision announcement of full and short papers via Microsoft CMT in due time frames, designing the conference program and conducted a training workshop on Image synthesis and its potential usage for real-world applications.

September 2019 – August 2022 Ph.D. Researcher, National University of Ireland Galway

- Worked on industry based European Union (EU) funded 'HELIAUS' project as a part of my Ph.D. research project with overall funding of 485,873.75 Euros allocated for National University of Ireland Galway.
- Research and implementation of state-of-the-art algorithms from the domains of computer vision, machine learning, deep neural networks, and edge computing for implementation of smart in-cabin driver monitoring and road monitoring system (smart forward sensing perception system).
- Integrating various image modalities which includes thermal, visible (RGB) and depth data with machine learning algorithms to build AI-based artificially intelligent imaging pipelines.
- Data Acquisition, optimization, and deployment of trained machine learning (ML) networks on graphical processing unit (GPUs) and low-powered single board edge devices.
- During this project, I have worked and successfully deployed various in-cabin and out-cabin applications which include autonomous thermal gender classification, large-scale synthetic thermal data generation, face localization, and facial landmarks detection on thermal facial frames, object detection in thermal spectrum using SoA YOLO-v5 framework, neural network optimization using TensorRT and Tensorflow-Lite tools and deploying the optimized network engines on resource-constrained edge-GPU devices which includes Nvidia Jetson Nano and Xavier development boards.
- Collaborating with a team of research engineers and professionals from different European companies which include Xperi Corporation based in Ireland, Lynred based in France, Next2U based in Italy, and Denso based in Germany working under Heliaus project as the consortium partners for effective cross-fertilization of ideas.
- Drafting and publishing the research findings at various international computer vision conferences and engineering Journals.
- Collaboration with other Ph.D. researchers for brainstorming on different ongoing projects which includes human facial depth estimation using single 2D images, creating new large-scale synthetic datasets for computer vision applications, etc.

August 2016 - July 2019 Research Officer, PNEC-NUST, Karachi-Pakistan

- Lead and provide in-depth research expertise in the domains of computer Vision, machine learning, deep neural networks, and graphical processing unit (GPU) Servers Management for an intelligent security system to be replaced with the conventional CCTV camera system for enhanced university campus security.
- Successfully integrated and deployed intelligent facial recognition and automatic number plate recognition system with conventional CCTV camera system on various entrance points of the university campus.
- Develop plans and strategies for ongoing research projects under the supervision of higher management to outline time & cost-based feasible methods to be followed as per university guidelines.
- Recommend process improvements and pitch new ideas to improve the efficiency and capabilities of existing systems.
- Writing research grants for large-scale projects focused on building safe and smarter cities using artificial intelligence (AI).
- Preparing presentations, and user guide manuals of different project modules for technical and non-technical staff.
- Drafting and publishing the research findings and experimental results at various international conferences.

January 2014 – February 2015 Trainee Engineer, Aga Khan University Hospital, Karachi-Pakistan

- Efficiently log in complaints received via phone, email, and web portal through the ticket management system.

- Work with vendor representatives and operations teams to coordinate, escalate, troubleshoot and resolve service interruptions as expeditiously as possible, ensure service levels are met and adverse impacts are kept to a minimum.
- Communicate with global users and provide support for various IT activities that include remote installation, troubleshooting of software, and email configuration.
- Diagnose and treat incidents.
- Monitor and maintain computer systems and networks.
- Troubleshoot system and network problems, diagnose, and solve hardware/software faults.
- Provide support, including procedural documentation and relevant reports.
- Support the roll-out of new applications.
- Respond to website-related queries and escalate them to the appropriate IT group.
- Create Oracle PeopleSoft accounts and roles assignments for the new staff members.
- Provide technical support on production servers.

Publications

Open Access Journal Publications

1. Muhammad Ali Farooq, Hossein Javidnia, Peter Corcoran, "Performance estimation of the state-of-the-art convolution neural networks for thermal images-based gender classification system," J. Electron. Imag. 29(6) 063004 (18 November 2020) https://doi.org/10.1117/1.JEI.29.6.063004
2. M. A. Farooq, P. Corcoran, C. Rotariu and W. Shariff, "Object Detection in Thermal Spectrum for Advanced Driver-Assistance Systems (ADAS)," in IEEE Access, vol. 9, pp. 156465-156481, 2021, doi: 10.1109/ACCESS.2021.3129150.
3. M. A. Farooq, W. Shariff and P. Corcoran, "Evaluation of Thermal Imaging on Embedded GPU Platforms for Application in Vehicular Assistance Systems," in *IEEE Transactions on Intelligent Vehicles*, doi: 10.1109/TIV.2022.3158094.
4. M. A. Farooq, et al. "ChildGAN: Large Scale Synthetic Child Facial Data Using Domain Adaptation in StyleGAN." *arXiv preprint arXiv:2307.13746* (2023). Submitted in IEEE-Access Journal, Project website: https://mali-farooq.github.io/childgan/
5. F. Khan, M. A. Farooq, W. Shariff, S. Basak and P. Corcoran, "Towards Monocular Neural Facial Depth Estimation: Past, Present, and Future," in IEEE Access, vol. 10, pp. 29589-29611, 2022, doi: 10.1109/ACCESS.2022.3158950.

Cited Conference Publications

1. Farooq, Muhammad Ali, Muhammad Aatif Mobeen Azhar, and Rana Hammad Raza. "Automatic lesion detection system (ALDS) for skin cancer classification using SVM and neural classifiers." 2016 IEEE 16th International Conference on Bioinformatics and Bioengineering (BIBE). IEEE, 2016.
2. Soomro, Moazam, Muhammad Ali Farooq, and Rana Hammad Raza. "Performance evaluation of advanced deep learning architectures for offline handwritten character recognition." 2017 International Conference on Frontiers of Information Technology (FIT). IEEE, 2017.
3. Farooq, Muhammad Ali, and Peter Corcoran. "Infrared imaging for human thermography and breast tumor classification using thermal images." 2020 31st Irish Signals and Systems Conference (ISSC). IEEE, 2020.
4. Farooq, Muhammad Ali, et al. "Effectiveness of State-of-the-Art Super Resolution Algorithms in Surveillance Environment." *Conference on Multimedia, Interaction, Design and Innovation*. Springer, Cham, 2020.

Open Source Dataset Publication

1. Muhammad Ali Farooq, Waseem Shariff, Faisal Khan, Peter Corcoran, Cosmin Rotariu, March 26, 2022, "C3I Thermal Automotive Dataset", IEEE Dataport, doi: https://dx.doi.org/10.21227/jf21-rt22.

SKILLS PROFILE

General skills: Project Management, team player, time management, problem-solving, effective communication, determination.

Technical skills: Matlab, Pytorch, TensorFlow, Keras, CNN designing, 3D image reconstructions, Microsoft Office, Microsoft Server Management, Active Directory, analog, and digital circuit designing, Arduino, Raspberry-pi, Nvidia Development boards, Python and C++ programming, edge computing, embedded system designing, sensor Interfacing and embedded system designing, hands-on experience on Siemens and Fatek Programmable Logic Controller (PLC) and Human to Machine Interface (HMIs).

ACHIEVEMENTS

- Won the prestigious European Union (EU) H2020 Ph.D. scholarship.
- Active reviewer in various prestigious Q1 engineering journals which includes IEEE Transactions on Intelligent Vehicles (IEEE-TIV), IEEE Access, SPIE Journal of Electronic Imaging (SPIE-JEI), SPIE Journal of Applied Remote Sensing (SPIE-JARS).
- Awarded NUIG employability award, lifts leadership award, and Alive presidential award for being an active member as an event manager in the University Postgraduate society, Seas Suas volunteer, and student union class representative.
- Published several research papers in high-tier conferences and impact factor journals.
- Awarded various technical certifications which include Convolution Neural Networks by Andrew NG, Research Integrity (Engineering and Technology) from Oxford University Press, IT security awareness and protecting PII by KnowBe4, Journal reviewer certifications from SPIE.

Personal Portfolio

Google Scholar Profile: https://scholar.google.com/citations?user=Km-BcFoAAAAJ&hl=en
LinkedIn Profile: https://www.linkedin.com/in/muhammad-ali-farooq-phd-876235a1/
GitHub Page: https://github.com/MAli-Farooq

INTERESTS/HOBBIES: Traveling, cycling, cooking, dronography, exploring technical concepts and methods by reading books and research papers, and making interactive videos.