Asad **Munir**

AI Researcher

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" Driven and innovative Artificial Intelligence researcher with a passion for advancing the frontiers of AI technology. Eager to contribute to cutting-edge research initiatives aimed at solving complex problems through machine learning, deep learning, natural language processing, and computer vision. Committed to leveraging interdisciplinary approaches to develop AI solutions that positively impact various industries, from healthcare to finance. Seeking opportunities to collaborate with like-minded professionals and organizations dedicated to pushing the boundaries of AI innovation while continuously honing expertise in emerging technologies."

Interests and Background

AI, Computer Vision, Deep Learning, Machine Learning, Natural Language Processing, Medical Imaging, Generative AI, Large Language Models, Vision Language Models.

Education

UNIUD(University of Udine)(www.uniud.it) *Udine, Italy*

PH.D IN INDUSTRIAL AND INFORMATION ENGINEERING *Sep. 2018 - Feb 2022*

- **Thesis Title:** Deep Neural Networks Approaches for Person and Vehicle Re-Identification.
- Worked on Marie Curie's ACHIEVE-ITN Project as ESR5(Early Stage Researcher).
- **Research Area:** Re-Identification , Image super resolution, Image classification, Domain adaptation

CAU(Chung-Ang University)(www.cau.ac.kr) *Seoul, South Korea*

M.S. IN COMPUTER SCIENCE (APPLICATION SOFTWARE) *Feb 2016- Aug 2018*

- **Thesis Title:** Object Segmentation with Active Contours by using Level set Technique.
- **Research Areas:** Active Contours, Image segmentation.

GIKI(Ghulam Ishaq Khan Institute of Engineering Sciences and Technology)(www.giki.edu.pk) *Topi,Pakistan*

B.S. IN ENGINEERING SCIENCES *Aug 2009- Jun 2013*

- **Final Year Project:** RENEWABLE ENERGY BASED EFFICIENT LIGHTING SYSTEM.
- **Majors:** Simulation and Modeling

PhD Project

In my PhD thesis, I explored multiple aspects of computer vision along with adaptation of several AI models to solve the complex problems in the domain of re-identification. I worked with generative models GANs to generate synthetic data for the problem and used that data for the training of the original models with lower weights. I also introduced multiple attention modules in the existing models to capture the long-range dependencies and covered domain and resolution variations present in the data. I also contributed in image super resolution task and vehicle re-identification by upgrading the networks training schemes and architectures.

Experience

Silo-AI (Consultant Industry) *Helsinki, Finland*

AI-Scientist(Computer Vision) *Mar. 2022 – Present*

- Designing, Implementing and deploying computer vision solutions with deep learning models. Worked on the following topics
  - **Vision language Models (VLMs) :**. Accomplished professional photo generation by fine tuning stable diffusion models with textual inversions, hyper networks and Loras. We achieved aesthetic score more than 6 in our generations. We adopt controlnets and inpainting for reconstruct better face to get high face similarity with subject.
  - **TOF cameras interfacing with hardware:** Designed a python application to capture a image dataframes for 3 seconds after every 30 seconds and uploaded it to a cloud platform and in parallel, data from an other sensor is obtained at the same time with python multiprocessing.
  - **3D Computer Vision:** Generated 3D assets and reconstructed 3D scenes from 2D images using nerf and Gaussian splatting.
  - **Active Learning for Object Detection:** Developed and implemented a cutting-edge active learning framework for object detection into a working pipeline, employing random sampling, entropy, margin, and state-of-the-art (SOTA) methods to optimize model performance, achieving a 3%, and 5% increase in mAP respectively as compared to random sampling.
  - **Open Set Recognition:** Detected out of distribution classes by applying sigmoid function for individual probabilities and Reciprocal points as a SOTA method. We concluded SOTA method gives only 5% higher accuracy and OSCR score than a simple sigmoid baseline.
  - **Incremental Object Detection:** Explored continual learning methods for object detection to avoid costly training of the model when new classes introduced in the data. To avoid catastrophic forgetting we designed a solution based on pseudo labeling of unlabelled data and remaind 2% behind the SOTA method in case of accuracy.
  - **Time series Forecasting:** Trained a sophisticated LSTM model integrating image and point data from multiple sensors to predict wind-shere cases. The accuracy (99%) was not the best evaluation matrix as this event happened rarely so we computed on False positives.

CAU (Teaching) *Seoul, South Korea*

Teacher Assistant *Feb. 2018 - Aug.2018*

- Worked as Teacher assistant with my supervisor and delivered lectures on Image processing. I also Instructed image processing laboratory where general image processing techniques like denoising, histograms, edge detection, image mosaicing, PCA, segmentation etc. were covered.

GIKI (Teaching) *Topi, Pakistan*

Electronic Engineer *Sep. 2013 - Feb.2016*

- Worked in GIK Institute of Engineering Sciences and Technology as Lab Engineer (Electronics). I have conducted following labs as an instructor
  - Computer Simulation Lab
  - Intensive Programming Lab
  - Circuit Analysis Lab

Technical Skills

Technologies, frameworks and libraries

PyTorch, Automatic1111, Kohya (LORA), numpy, sklearn, Matplotlib, OpenCV, detectron2, MQTT, genicam/harvesters, xarray, SciPy, Pandas, MLflow, Kubeflow

Artificial Intelligence

Computer Vision, Natural Language Processing (NLP), Deep Learning, Convolutional Neural Networks (CNNs), Generative Adversarial Networks (GANs), Generative AI, Large language Models (LLMs), Vision Language Models (VLMs), Stable Diffusion, Image classification, Object Detection, Image Segmentation, LSTMs, Person and Vehicle Re-identification, Support Vector Machine (SVM), Linear Regression, Time Series Forecasting, Supervised Learning, Semi-supervised Learning, Continual Learning, Active Learning.

Programming tools

MLops, Docker, Git, Google Colab, CI/CD pipelines, Anaconda, Jupyter Notebook, PyCharm, Spyder, Python Multiprocessing, Basler ToF Cameras

Programming Languages

Python, C, Latex, Matlab, Bash

Software Devlopement and Cloud Technologies

Agile, Scrum, JIRA, Bitbucket, Confluence, GCP, Azure, Microsoft Office, Windows, Linux, Mac

Academic Achievements

EU H2020 MSCA Fellowship:

Won Marie Curie fellowship in Project ACHIEVE-ITN (Grant No 765866) for my PhD degree.

CAYSS Scholarship:

Won Chung Ang Young Scientist Scholarship for my masters degree.

FYP Competition:

Secured Second position in the final year project competition in bachelor's.

Selected Publications

PhD

- **A Munir**, C Lyu, B Goossens, W Philips, C Micheloni, "Resolution based Feature Distillation for Cross Resolution PersonRe-Identification" Proceedings of The IEEE/CVF International Conference on Computer Vision Workshops (ICCV Workshop IWDSC 2021).
- **A Munir**, N Martinel, C Micheloni, "Multi branch siamese network for person re-identification." IEEE International Conference on Image Processing (ICIP 2020).
- **A Munir**, N Martinel, C Micheloni, "Self and Channel Attention Network for Person Re-Identification." 25th International Conference on Pattern Recognition (ICPR 2020).
- **A Munir**, N Martinel, C Micheloni, "Oriented Splits Network to Distill Background for Vehicle Re-Identification." IEEE International Conference on Advanced Video and Signal Based Surveillance (AVSS 2021) (Submitted).
- **A Munir**, N Martinel, C Micheloni, "Consistent Attentive Dual Branch Network for Person Re-Identification." Multimedia Tools and Applications (Revision Submitted).

Masters

- **A Munir**, S. Soomro, MT Shahid, T.A. Soomro, K.N. Choi. "Hybrid active contours driven by edge and region fitting energies based on p-Laplace equation, IEEE Access (2019).
- **A Munir**, S. Soomro, C.H. Lee, K.N. Choi. "Adaptive active contours based on variable kernel with constant initialisation", IET Image Processing (2018).

Extracurricular Activities

Play and watch football and video games. Also Love Travelling, Gym and hiking.