Muhammad Faizan

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EDUCATION

M.Sc. **National University of Sciences & Technology (NUST), Islamabad Pakistan** | 2022-24
Robotics & Intelligent Machines, *Grade: 3.9/4.0*

B.Sc. **University of Engineering & Technology (UET), Peshawar Pakistan |** 2016-20
Mechatronics Engineering

PROFESSIONAL EXPERIENCE

Radar Research Lab | Islamabad, Pakistan 09/23-Present
Research Associate AI

- Procured a 20k-image obstacle detection dataset for railway tracks under different settings, annotated post-sensor fusion (radar, infrared, optical camera) to avert accidents on susceptible tracks.
- Trained YOLO7 with 0.88 F1-score on thermal imaging and developing joint sensor fusion and object detection algorithms for Jetson Orin nano.

Web Solutions Plus | Islamabad, Pakistan 04/22-06/23
Machine Learning Engineer

- Trained YOLO5 and YOLO7 on 1M images on multi-GPUs to detect persons, head, car, trolley, and person falling in retail store settings by increasing F1-score by 6% and 7.5% respectively, then deployed on Jetson nano and Axis Communications cameras.
- Developed a customized YOLO5 architecture for edge applications on the Axis camera, resulting in a 27% speed improvement on GPU and 3 FPS increase on the edge.
- Improved re-identification benchmark of StrongSORT by integrating a centroid-based model that detects robust appearance features mitigating ID switches in retail stores.

EAST Industries | Peshawar, Pakistan 06/21- 12/21
Python Developer

- Designed a Graphical User Interface in Python and Node-red, enhancing the user experience and enabling intuitive system control.
- Developed a control system to regulate the heater, humidifier, and compressor in a stability chamber, using Raspberry Pi.

PROJECTS

Novel Hybrid Deep Learning Architecture Design for Multi-modal Brain Imaging for Tumor Segmentation

- Used the latest BraTS23 challenge brain tumor segmentation dataset with 12,51 multimodal MRI scans for training SegResNet, UNet, and SwinTransformer.
- Achieved a mean dice score of 0.89 on training and 0.87 on validation set using SwinTransformer.
- The novel architecture is being developed by incorporating clinical aware diagnosis with modality correlated attention, more updates here.

Recognition and Gradient Based Localization of Chest Radiographs

- Achieved a 0.963 mean F1-score with DenseNet121 on Kaggle's 21k COVID-19 radiography database, fine-tuning ResNet18, DenseNet121, and VGG16 on the dataset.
- Utilized the GradCAM localization algorithm to enhance model interpretability through prediction localization using heatmaps, more on this repository here.

Implementation of A* Search algorithm for solving N puzzle problem

- The informed search algorithm implemented the Manhattan and Hamming heuristic to find the optimal path from the initial state to the goal state for solving N puzzle. More on the project repository here.

Building a Multi-layer Perceptron from Scratch with Numpy

- Implementation of L layer MLP with forward propagation, backprop, gradient descent implementation and weights update, trained on the cats recognition dataset with 0.81 test accuracy without regularization.

SKILLS AND LANGUAGES

Techniques: NLP, Computer Vision, Machine Learning, Deep Learning, Big Data, Data analysis, MLOps
Technical: Python, PyTorch, TensorFlow, C++, Git/GitHub, Scikit-Learn, Dockers, OpenCV, NLTK, JIRA
Certifications: Deep Learning Specialization, Machine Learning, TensorFlow Developer certificate, Generative AI with LLMs, AI for medicine, ML in production, and others.