

## Summary

My work spans transformers, sequence models, classification models, Diffusion models, and networking data, utilizing tools such as TensorFlow, Keras, Scikit-learn, Pandas, Numpy and Matplotlib. I excel in Knowledge Distillation, Transfer Learning, and Federated Learning.

## Education

### Bachelor of Science in Computer Science

School of Electrical Engineering and Computer Science (SEECS)  
National University of Sciences and Technology (NUST)

Sept.2022-Present

CGPA 3.23/4.0

## Experiences

### Deep Learning Intern:

June-Sep-2023

Optical Networks and Technologies Lab, SEECS, Islamabad

Main Research topics: *Early Warning Systems, Federated Learning, Knowledge Distillation, ML in optical Networking*

- Worked on Quality of Transmission Estimation Using ML in Optical Networks.
- Worked on Transfer Learning based QOT Estimation of an Unestablished Light path.
- Implemented Knowledge Distillation Based QOT Estimation in Optical Networks.
- Developed a model to detect car wheels using sensor data.
- Explored Federated Learning in Optical Networks.
- **Submitted a journal paper related to federated learning based QOT estimation ON.**

### Diffusion Models Researcher:

Dec.2023-April.2024

National Center of Artificial Intelligence (NCI), NUST, Islamabad

Main Research topics: *Using Diffusion models for Image generation, Diffusion models for 2D and 3D generation*

- Implemented **Denoising Diffusion Probabilistic Models** from scratch.
- Training and hosting diffusion models on **MS Azure**.
- Implemented DDPM for landscapes image generation.
- Researching on how we can use diffusion models for **3D model** generation.

### Computer Vision Intern:

June.2024-present

School of Electrical Engineering and Computer Science (SEECS), NUST, Islamabad

Main Research topics: *Crops identification at different growth stages, Agri-Drone project, Shelf life detection*

- Implemented a unique **CNN** based **AUTOENCODER + SOFTMAX** classifier for shelf life detection of fruits.
- Implemented YOLO based object detection model for fruits detection in crops.
- Working on classifying crops and then generating heat maps based on model out for various crops in an image.

## Projects

### Knowledge Distillation based QOT estimation in optical networks:

- This research gives great idea how we can extract knowledge from large models to teach our small models.
- In this research project we have explored Knowledge Distillation for QOT Estimation in Optical Networks.

### Early warning Systems for flooding:

- In this research project we have explored how we can use sensor data to make early warning systems for flood.
- We have four classes on basis of which we developed a model for early warning.

### Car Wheels Detection Using Transformers:

- We have used confidential data set from Turkey based sensor for detecting car wheels when they pass the road.
- This project explores the core concept behind transformers architecture which is activation mechanism.

### Neural Machine Translation | English to Urdu:

- Developed a sequence to sequence model that converts English text to urdu. Learned different core concepts of NLP.

### Gradient Classification Activation Maps for Visualizing CNNs (Grad-CAM):

- The problem with CNNs is our model is performing well but we don't know on what basis it is giving this prediction.
- Solved this problem using GRAD-CAM that tells us exactly where the model is looking in the image for making decision.

### Booking Database Management System:

- Developed a management system which keeps record of all the tickets purchased for movies, flights, buses etc also provide route for destination. You can either purchase or get registered to sell your own tickets.

## Technical Skills

**Languages:** Python, Java, Mysql, C/C++. **Programming:** Tensorflow, Keras, Scikit-Learn, Numpy, Pandas, pytorch

**Certifications:** Deep Learning specialization ([link](#)), Numpy ([Link](#)), Python ([Link](#)), Problem Solving([Link](#))