

Muhammad Muzammil

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EDUCATION

Friedrich-Alexander-Universität Erlangen-Nürnberg

Master of Science in Artificial Intelligence

Erlangen, Germany

2021 - 2024 (expected)

Sir Syed University of Engineering and Technology

Bachelor of Science in Software Engineering

Karachi, Pakistan

2015 - 2018

WORK EXPERIENCE

Fraunhofer Institute for Integrated Circuits IIS

Student Research Assistant

Erlangen, Germany

Starting Dec. 2023

- Joining the team working on 3D reconstruction from images at DSAI at Fraunhofer IIS.

FAU Erlangen-Nürnberg

Student Research Assistant

Erlangen, Germany

May 2022 - Sep. 2023

- Continued the material acquisition work started at the internship at Adidas.
- Refined and documented the material capturing and processing pipeline for open-sourcing.
- Developed rendering pipeline for testing single-shot flash image based SVBRDF parameter estimation methods.

Adidas

Intern - Future Creation Technologies

Herzogenaurach, Germany

Sep. 2022 - Feb. 2023

- The aim of the internship was to improve the current material acquisition process and explore possible Image based digital material acquisition methods.
- Captured a dataset of physical material samples using a cell-phone camera through Adidas-FAU custom capturing device.
- Built pipeline for material capturing, calibration, and processing materials for digital material acquisition.

FAU Erlangen-Nürnberg - Cognitive Computer Vision Group

Student Research Assistant

Erlangen, Germany

Mar. 2022 - Aug. 2022

- Worked on 3D reconstruction from feature supervision using implicit neural representations in the Cognitive Computer Vision group under the supervision of Prof. Bernhard Egger.

Love for Data (LFD)

Data Analyst

Karachi, Pakistan

Dec. 2018 - Sep. 2021

- Worked on a product on ML based Network & Link Analysis for suspicious account and activity detection for the banking industry.
- Worked on a data matching project. In order to make the NP-Complete problem tractable, we used stochastic combinatorial optimization to reach approximate solutions for intractable cases, after reducing the search space using several heuristics.
- Link Analysis for detecting criminal ties using Call Detail Records (CDR).
- Text analytics on chat data of one of the leading textile brands of Pakistan, goal was to organize the most frequent queries according to seasons and sale periods.
- Recommendation engine for a large micro-finance bank of Pakistan to cross sell digital financial inclusion services to their existing customer base.
- Other projects included prediction models for default and delinquency, customer churn, and forecasting for cargo handling.

RELEVANT PROJECTS

Friedrich-Alexander University Erlangen-Nürnberg

Summer 2023

Mini-Project for the Course: High-End Simulation in Practice

- Implemented Particle Swarm Optimization (PSO) on CUDA using C++.
- Our optimized parallel-reduction based implementation gave on average ~30x speed up.

Friedrich-Alexander University Erlangen-Nürnberg

Winter 2021

Final Project for the course: Computational Visual Perception

Taught by: Prof. Bernhard Egger | **Project Supervised by:** Prof. Andreas Kist

- In this course project, I explored the shape and texture bias in the Vision Transformer (ViT) model. Specifically, I evaluated all variants of ViT and DeiT (from the papers [A Dosovitskiy et al. 2020](#) and [H Touvron et al. 2021](#) respectively) for texture and shape bias using cue-conflict dataset by [R. Geirhos et al. 2018](#). I fine-tuned Imagenet trained DeiT-Small model on [Stylized-Imagenet \(SIN\)](#) dataset and evaluated potential of shape biased models for domain adaptation in medical imaging domain by conducting preliminary experiments of transfer learning on [MURA dataset](#).
- Based on the results, I concluded that all variants of ViT models demonstrate more shape bias than their ConvNet counterparts. The DeiT-S model converged more quickly when fine-tuned on Stylized-Imagenet compared to ResNet-50 which has similar number of parameters and performance of the SIN trained DeiT substantially closed the gap between human and machine shape bias. Furthermore, my evaluation of the pretrained models hinted at the emergence of high shape bias without explicit induction in the models trained on high volumes of data in either supervised or self-supervised manner.

Queen Mary University of London

Spring 2020

Independent Research Assistant for the project on measuring network flow on internet infrastructure
Supervised by: Dr. Zafar Gilani

- My work in the project mainly consisted of understanding, organizing and documenting the codebase for experiments and analysis. I also worked on creating a pipeline for automatically fixing discrepancies in updated data sources using variable profiles to make an aligned dataset for the experimentation process.

Sir Syed University of Engineering and Technology

Academic Year 2018

Bachelor's Final Project: Detecting Abnormality in Musculoskeletal Radiographs through ConvNets

Supervised by: Moona Kanwal, Dur-E-Shawar Agha

Domain Advisor: Dr. Tasir Ahmed Mumtaz (Department of Radiology, Hamdard University, Karachi)

- This project was done with 3 other team members. In this project we trained ConvNet model for abnormality detection in upper limb radiographs (X-Ray Images), as well as extended the work for fracture detection by creating novel labels with the help of expert radiologist and used boosting classifier on deep features (reusing the same features for abnormality detection task). Explored various model architectures (DenseNet-169, Inception-ResNetv4 and variants), performed ablation studies, compared performances and trade-offs. Provided a way to interpret model activation through class activation maps. Developed a website and API for hosting the model. Final demo of the project can be seen [here](#).

Technologies used: Python (PyTorch, Scikit-Learn, Django web framework)

TECHNICAL SKILLS

Programming Languages: Python, C++, R, Java, SQL

Tools and Frameworks: Pytorch, CUDA, OpenCV, Jax, Tidiverse, R-Shiny, git, L^AT_EX

SUMMER SCHOOLS AND CERTIFICATIONS

Eastern European Machine Learning Summer School

Kraków, Poland (Virtual)

Deep Learning & Reinforcement Learning (Organized by Deepmind)

Summer 2020

VOLUNTEERING AND SOCIETIES

Fachschaftsinitiative (FSI) Artificial Intelligence

Erlangen, Germany

Friedrich-Alexander-Universität Erlangen-Nürnberg

Oct. 2022 - Present

IEEE Computer Society

Karachi, Pakistan

Sir Syed University of Engineering & Technology

Jan. 2017 - Dec. 2018



Muhammad Muzammil
 November, 2023