Muhammad Muzammil

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Deep Learning • 3D Reconstruction • Inverse Graphics • Vision Transformers

EDUCATION

Friedrich-Alexander-Universität Erlangen-Nürnberg   Erlangen, DE
Master of Science in Artificial Intelligence   *2021 - 2024 (expected)*

Sir Syed University of Engineering and Technology   Karachi, PK
Bachelor of Science in Software Engineering   *2015 - 2018*
Grade 1.9, Final Project Grade: 1.0

WORK EXPERIENCE

Fraunhofer Institute for Integrated Circuits IIS   Erlangen, DE
Graduate Student Research Assistant   *Dec. 2023 - Present*

- Working on optimizing Neural Radiance Fields (NeRFs) for 3D object capture in Computational Imaging and Algorithms group with Joachim Keinert.

Adidas   Herzogenaurach, DE
Graduate Intern - Future Creation Technologies   *Sep. 2022 - Feb. 2023*

- Worked on improving existing material scanning pipeline through single-shot deep learning based material reflectance properties (SVBRDF) estimation methods with Jochen Süßmuth, Tim Weyrich, and Bernhard Egger.
- Captured a dataset of physical material samples as well as built pipeline for calibrating and processing the captured materials.
- Evaluated state-of-the-art Single-shot methods for estimating material reflectance properties on the captured dataset.

FAU Erlangen-Nürnberg - Cognitive Computer Vision Group   Erlangen, DE
Graduate Student Research Assistant   *Mar. 2022 - Aug. 2022*

- Worked on light field networks for 3D reconstruction of objects using joint image color & extracted features supervision, in the Cognitive Computer Vision group under the supervision of Bernhard Egger.

LFD - Data Science Consultancy   Karachi, PK
Data Analyst   *Dec. 2018 - Sep. 2021*

- Developed a product for the banking industry that uses Machine Learning based Network & Link Analysis to detect suspicious account and activity.
- Worked on a data matching project and used stochastic combinatorial optimization to reach approximate solutions for intractable cases.
- Conducted Link Analysis using Call Detail Records (CDR) to detect criminal ties. Analyzed chat data of a leading textile brand of Pakistan to organize the most frequent queries according to seasons and sale periods.
- Built a recommendation engine for a large micro-finance bank of Pakistan to cross-sell digital financial inclusion services to their existing customer base.
- Developed prediction models for default and delinquency, customer churn, and forecasting for cargo handling.

RESEARCH & PROJECTS

Friedrich–Alexander University Erlangen–Nürnberg   *Winter 2023 (In Progress)*
Equivariant Neural Representation Learning from Images   *ML Project*
Project for: Image Data Exploration and Analysis Labs

- Exploring methods of learning SO(3) equivariant 3D representations from Images.
  Technologies used: PyTorch

Friedrich–Alexander University Erlangen–Nürnberg   *Winter 2023 (In Progress)*
Industrial Visual Inspection using Vision Transformers   *AI Applications Project*
Project for: Institute for Factory Automation and Production Systems

- Investigating the potential of Vision Transformers on industrial visual inspection with limited training data using self-supervised pretraining.
  Technologies used: PyTorch, Huggingface Transformers

Friedrich–Alexander University Erlangen–Nürnberg *Winter 2021*

Shape vs Texture bias in Vision Transformers *(slides)* *Course Project*

Supervised by: Bernhard Egger and Andreas Kist

- Explored shape and texture bias in Vision Transformer (ViT) models. Concluded that ViT models exhibit more shape bias than ConvNets, while also noting quicker convergence of DeiT-S on Stylized-Imagenet compared to ResNet-50. Found SIN-trained DeiT narrowed the gap between human and machine shape bias. The evaluation of various ViT models suggested the emergence of high shape bias in ViT models trained on really large datasets, whether supervised or self-supervised.
  Technologies used: PyTorch

Sir Syed University of Engineering and Technology *Academic Year 2018*

Detecting Abnormality in Radiographs through ConvNets *(demo video)* *Bachelor's Final Project*

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

- Collaborated with a team of four on a project involving ConvNets training for upper limb radiograph abnormality detection. Extended the scope to include fracture detection with novel labels created with expert radiologist input. Utilized a boosting classifier on shared deep features for both tasks. Explored diverse model architectures, conducted ablation studies, and provided insights through class activation maps. Developed a website and API to host the model. *Technologies used: PyTorch, Scikit-Learn, Django web framework*

TECHNICAL SKILLS

Programming Languages: Python (5+ yrs), C++ (< 1 yr), R (2+ yrs), Java (1+ yrs), SQL (2+ yrs)

Tools and Frameworks: Pytorch, CUDA, OpenCV, Jax, Tidyverse, R-Shiny, git, LaTeX

SUMMER SCHOOLS AND CERTIFICATIONS

Eastern European Machine Learning Summer School Kraków, PL (Virtual)

Deep Learning & Reinforcement Learning (Organized by Deepmind) *Summer 2020*

VOLUNTEERING AND SOCIETIES

Fachschaftsinitiative (FSI) Artificial Intelligence Erlangen, DE

Friedrich-Alexander-Universität Erlangen-Nürnberg *Oct. 2022 - Present*

IEEE Computer Society Karachi, PK

Sir Syed University of Engineering & Technology *Jan. 2017 - Dec. 2018*

LANGUAGES

English Full Professional Proficiency
German Elementary Proficiency
Urdu Native

REFERENCES

Prof. Dr. Bernhard Egger FAU Erlangen-Nürnberg

Junior Professor for Cognitive Computer Vision

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Muhammad Muzammil
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