Azhar Hussian

EDUCATION

Friedrich-Alexander-Universität Erlangen-Nürnberg, Erlangen, Germany — October 2022 | March 2025
Master of Science in Artificial Intelligence — GPA: 1.20
Thesis Title: Multimodal Gesture Recognition in Artwork Images. **Grade: 1.0**
Supervisors: Prof. Dr. Andreas Maier, Mathias Zinnen

National University of Computer and Emerging Sciences, Islamabad, Pakistan — Sept. 2015 | June 2019
Bachelor of Science in Computer Science — GPA for Relevant Courses (German): 1.5 [Details]

RESEARCH EXPERIENCE

Pattern Recognition Lab, Friedrich-Alexander-Universität Erlangen-Nürnberg — Erlangen, Germany
Graduate Research Assistant [RL1, RL2] — February 2022 | December 2023

- Researched gesture recognition in artworks within the EU-Horizon project: Odeuropa.
- Addressed challenges like limited labeled data, class imbalances, complex gestures, and noisy labels.
- Applied pretraining and fine-tuning on alternate datasets to boost model performance.
- Integrated contextual information and additional data sources, including keypoints, for better accuracy.
- Engineered extra features to enrich gesture context.
- Investigated CLIP features to enhance contextual understanding in recognition tasks.

Pattern Recognition Lab, Friedrich-Alexander-Universität Erlangen-Nürnberg — Erlangen, Germany
Master's thesis [code, report] — March 2024 | September 2024

- Identified the research gap in current object detection methods when applied to the artwork domain.
- Proposed novel modifications to a state-of-the-art model, achieving improved performance.
- Conducted ablation studies to validate the effectiveness of the proposed modifications.
- Introduced a simple but novel method to isolate classification performance within the AP metric.

RESEARCH PROJECTS

Learning Causal Inference using Neural Networks — Erlangen, Germany
10 ECTS semester research project [code, presentation, RL]

- Developed neural networks to infer causal relations between audio and visual spatial signals.
- Observed distinct causal structures, including common and independent causes for audio and visual signals.

Distracted Activity Detection of Drivers Using Deep Learning — Islamabad, Pakistan
10 ECTS equivalent Bachelor's Final Year Project [code, report]

- Trained MobileNet for efficient, real-time distracted driving detection
- Deployed on Android for live analysis and feedback.

Analysis of Electrophysiological Signals for Diagnosing Eye Diseases — Erlangen, Germany
5 ECTS research seminar [code, report]

- Analyzed ERG signals for retinal disease diagnosis.
- First time use of shapelets and STFT in ERG, boosting classification by 10% and 17% respectively.

Gesture Recognition in Artwork Images — Erlangen, Germany
10 ECTS semester research project [code, report]

- Improved classification by fusing distance and angle features with CNN visual embeddings.
- Validated the effectiveness of combining spatial and visual features.
- Highlighted dataset challenges: limited data, class imbalance and noisy distances.

Flashed Face Distortion Effect - Experimental Analysis Erlangen, Germany
2.5 ECTS research project [presentation]

- Conducted experimental project on FFD illusion, exploring effects across diverse settings.
- Created synthetic dataset with generative models to simulate face variations for controlled experiments.
- Applied face frontalization, alignment, and deformation tools to standardize images for analysis.

PUBLICATIONS

1. **Gesture Classification in Artworks Using Contextual Image Features**
   Azhar Hussain, Mathias Zinnen, Hang Tran, Andreas Maier, Vincent Christlein. *In Proceedings of the Digital Humanities Conference, 2024.*
2. **Smelly, dense, and spreaded: The Object Detection for Olfactory References (ODOR) dataset**
   Mathias Zinnen, Prathmesh Madhu, Inger Leemans, Peter Bell, Azhar Hussain, Hang Tran, Ali Hürriyetoğlu, Andreas Maier, Vincent Christlein. *Expert Systems with Applications, 2024.*
3. **SniffyArt: The Dataset of Smelling Persons**
   Mathias Zinnen, Azhar Hussain, Hang Tran, Prathmesh Madhu, Andreas Maier, Vincent Christlein. *In Proceedings of the 5th Workshop on Analysis, Understanding, and Promotion of Heritage Contents. Association for Computing Machinery, New York, 2023.*
4. **Recognizing Sensory Gestures in Historical Artworks**
   Mathias Zinnen, Azhar Hussain, Andreas Maier, Vincent Christlein. *Submitted to Multimedia Tools and Applications.*

TEACHING EXPERIENCE

Friedrich-Alexander-Universität Erlangen-Nürnberg Erlangen, Germany
Teaching Assistant for Advanced Deep Learning October 2023 | March 2024, October 2024 | Present

- Assisted students with exercise implementations on PyTorch.
- The exercises implemented transformers, diffusion models, energy-based models and representation learning.
- Resolved their questions and aided in implementing solutions from scratch.
- Actively participated in the online course forum.

INDUSTRY EXPERIENCE

Primetals Technologies, Mitsubishi Heavy Industries Erlangen, Germany
Working Student - Computer Vision [Letter] September 2022 | September 2024

- Supported computer vision projects in object detection, segmentation, and anomaly detection.
- Trained, evaluated, and documented models like YOLOX and UNet.
- Built GUI apps with Streamlit for automated labeling using SAM and SAM2.
- Improved productivity with contributions to shared libraries and tools.
- Organized hackathons to address client challenges.
- Enhanced model accuracy using data augmentation.
- Managed datasets for project needs.
- Tracked experiments and documentation with MLflow.

MAANZ-AI, AutoCanvas Islamabad, Pakistan
Artificial Intelligence Developer [Letter] September 2020 | September 2021

- Built detection models for vehicles, pedestrians, traffic signs, and highway ramps.
- Anonymized data by detecting and masking number plates.
- Applied metric learning for vehicle re-identification and feature extraction.
- Enhanced YOLOv5 with a multi-label prediction branch.
- Researched, evaluated, and implemented state-of-the-art methods.
- Managed model deployment in the production pipeline.

Youcan App Pvt Ltd Rawalpindi, Pakistan
Machine Learning Engineer [Letter] June 2019 | August 2020

- Documented product and system requirements.
- Developed a crawler to retrieve data from various online sources.
- Extracted web page data using BeautifulSoup and Selenium.
- Trained classifiers to categorize crawled web pages.
- Designed a novel approach to classify URLs.
- Extracted activity page information with an NER model and regex.
- Built an ETL pipeline to preprocess and store data for the recommender system.
- Implemented a recommender system for personalized activity and news recommendations.
- Created a model to suggest similar activities and news items.

ACHIEVEMENTS

Runner up position in Data Science Competition Nascon, 2019
Team name: Unpredictable, *Got the price of 20,000 PKR*

3rd highest score in Nascon Data Science Competition, 2018
Leaderboard name: Unpredictable

Appeared in Dean's List for acquiring SGPA of 3.55
National University of Computer and Emerging Sciences, Fall 2018

SKILLS

Working Knowledge: OpenCV, Python, MATLAB, C/C++, Java, Android-SDK, Bash
Software & Tools: LaTeX, GNU/Linux
Deep Learning Frameworks: PyTorch, TensorFlow, Keras, Caffe

Languages

Urdu - Native, **English** - Proficient, **German** - Basic