

Mutybba Asghar

Islamabad, Pakistan

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Research Interest

Image processing | Computer Vision | Large Language Models | Machine Learning | Deep Learning | Topological Data Analysis | Generative AI |

Publications

JOURNAL ARTICLES

Context-aware subregion-wise patching for effective brain tumor segmentation in 3D MRI scans

Mutybba Asghar, Ahmad Raza Shahid

PeerJ Computer Science 12 (2026) e3768. PeerJ Inc., 2026

Tumor-Centered Patching for Enhanced Medical Image Segmentation

Mutybba Asghar, Ahmad Raza Shahid, Akhtar Jamil, Kiran Aftab, Syed Ather Enam

arXiv preprint arXiv:2308.12168 (2023). 2023

An Automated and Real-time Approach of Depression Detection from Facial Micro-expressions

Ghulam Gilanie, Mahmood Hassan, Mutyba Asghar, Ali Mustafa Qamar, Hafeez Ullah, Rehan Ullah Khan, Nida Aslam, Irfan Ullah Khan

CMC-COMPUTERS MATERIALS & CONTINUA 73.2 (2022) pp. 2513–2528. TECH SCIENCE PRESS 871 CORONADO CENTER DR, SUTE 200, HENDERSON, NV 89052 USA, 2022

IoT-Enabled Intelligent System for the Radiation Monitoring and Warning Approach

Muhammad Saifullah, Imran Sarwar Bajwa, Muhammad Ibrahim, Mutyba Asghar

Mobile Information Systems 2022 (2022). Hindawi, 2022

Coronavirus (COVID-19) detection from chest radiology images using convolutional neural networks

Ghulam Gilanie, Usama Ijaz Bajwa, Mustansar Mahmood Waraich, Mutyba Asghar, Rehana Kousar, Adnan Kashif, Rabab Shereen Aslam,

Muhammad Mohsin Qasim, Hamza Rafique

Biomedical Signal Processing and Control 66 (2021) p. 102490. 2021

Work Experience

FAST National University of Computer and Emerging Sciences

Islamabad, Pakistan

Research Assistant

Nov 2022 - Present

- Conducted research on methods for reading, visualizing, and Pre-processing 3D MR images using different libraries like Imageio, SimpleITK, Nibabel, Ndimage, Ipywidgets, and Numpy for brain tumor segmentation.
- Conducted research on methods for Patching and segmenting tumors in 3D MR images using Topological Data Analysis with the help of Gudhi, Persim, Ripser, Cubical Ripser, Persistencemager, Open3D, and scikit-tda, the proposed patching technique help in reducing the class imbalance and preserve the overall shape of tumors in a volume.
- Documented and Presented research findings to team members and faculty advisors.
- Worked with team members to develop and test new algorithms for improved segmentation accuracy.
- Contributed to the development of software tools and scripts for data pre-processing and analysis.
- Worked with medical professionals to evaluate the effectiveness of proposed algorithms in clinical settings.
- Writing and editing manuscript for publication using LaTeX and Overleaf.
- Technical Skills:** Python with NumPy, Matplotlib, Pandas, Scikit-learn, Imageio, SimpleITK, Nibabel, Ndimage, Ipywidgets, Gudhi, Persim, Ripser, Cubical Ripser, Persistencemager, Open3D, scikit-tda

CODE STUDIO (Islamabad)

Islamabad, Pakistan

Python Developer

Sept 2021 - Sept 2022

- Developed a voice recognition system for Arabic audios using libraries for NLP. Trained the model using an artificial neural network.
- Conducted data cleansing and processing for analysis of a real-world dataset of audio recordings, feature collection, and selection using Librosa.
- Created a voice-to-text query-based model using Pandas and other Python libraries.
- Developed an Arabic optical character recognition model that converts images into Arabic, English text, and numbers using a simple neural network.
- Analyzed, interpreted, and documented research findings regarding feature selection and classification using deep learning techniques to classify the data into multiple classes.
- Worked in team to optimize the deep-learning model and improve its accuracy and robustness.
- Presented research findings to team members, and participated in discussions and brainstorming sessions.
- Maintained accurate and up-to-date records of experiments, results, and progress.
- Technical Skills:** Tensorflow, Keras, NumPy, Pandas, NLTK, Librosa, Tesseract, Google Colab, Jupyter Notebook, Git

GOVT. SADIQ EGERTON COLLEGE BAHAWALPUR

Bahawalpur, Pakistan

COLLEGE TEACHING INTERN

Jan 2022 - May 2022

- Taught computer science to the intermediate level. Conducted bachelor courses like Computer Application, Introduction to Computer, and Compiler Construction.
- Managed and Invigilated students during examinations
- **Soft Skills:** Teaching, time management, communication, writing and editing lectures.

National College of Business Administration and Economics

Lahore, Pakistan

Research Scholar

Nov 2019 - Aug 2022

- Developed an image processing system based on a convolutional neural network for the detection of COVID-19(Coronavirus Disease). The proposed method achieved average accuracy (96.68).
- Worked on machine learning models to extract the micro-expressions through the facial expressions for Depression Detection.
- Conducted experiments using Anaconda, Jupyter Notebook, and MATLAB to train and develop models like CNN, SVM, LSTM, RNN, and ResNet-50
- Worked with various Python libraries such as Scikit-image, OpenCV, DeepFace, Pandas, Numpy, and Scikit-learn for feature extraction, normalization, image alignment, and other tasks.
- Worked on Mask R-CNN for biological profile estimation from bone images.
- Explored different radiation detection sensors for radiation monitoring and warning and classified these radiations into different categories
- Conducted data curation and visualization, scheduled meetings and reports, and drafted and proofread technical writing for publications
- Presented research findings to team members, and participated in discussions and brainstorming sessions.
- **Technical Skills:** Python, MATLAB, OpenCV, DeepFace, Pandas, OpenFace, Tensorflow, Keras, scipy, matplotlib, seaborn.

GOVT. SADIQ COLLEGE WOMEN UNIVERSITY

Bahawalpur, Pakistan

COMPUTER SCIENCE LECTURER

Dec 2018 - Sep 2021

- Conducted undergraduate courses in Web Development, Artificial Intelligence, E-Commerce, Application Development, IT Project, Management, Multimedia systems, And Design.
- Adopted distinctive teaching methodologies, documenting all lessons

Education

National University of Computer and Emerging Sciences (FAST)

Islamabad, Pakistan

Doctor of Philosophy in Computer Sciences

2022 - Cont.

- **Thesis:** Novel Patch Based Framework for Brain Tumor Segmentation and Survival Prediction
- **CGPA:** 3.93/4.00

National College of Business Administration and Economics

Lahore, Pakistan

Master of Philosophy in Computer Sciences

2019 - 2021

- **Thesis:** An automated and real-time approach for depression detection
- **CGPA:** 3.92/4.00

GOVT. SADIQ COLLEGE WOMEN UNIVERSITY(GSCWU)

Bahawalpur, Pakistan

BS in Information Technology

2014 - 2018

- **Final Year Project:** Online monitoring and management of child day care center
- **CGPA:** 3.83/4.00

Projects

Virtual Biopsy for Classification, Outcome Prediction and Treatment Planning of Brain Tumors (ViBCOT)

Islamabad, Pakistan

HEC | FAST | AKU | GIKI | Xylexa

Nov 2022 - Present

- Analyzed and visualized DICOM and NIFTI data using libraries such as NumPy, pandas, and matplotlib
- Analyzed and visualized DICOM and NIFTI data using libraries such as NumPy, pandas, and matplotlib
- Collaborated with medical professionals to ensure accurate interpretation of data.
- Familiar with various software tools and libraries for handling files, including ITK, and SimpleITK.
- Pre-processing 3D MRI volume for whole tumor Segmentation and applying topological data analysis for 3D patch extraction that increases the percentage appearance of tumor then original MRI and also preserves tumor boundaries

Licenses, Certifications and Awards

2024 **Facilitator**, Computer Vision for Medical Imaging

Aga Khan University

2023 **Speaker**, Seminar on AI in medical image processing

NUCES-FAST

2023 **Course**, Introduction to Computer Vision and Image Processing

IBM

2023 **Course**, Python for Data Science, AI and Development

IBM

2018 **Medal Holder**, Silver Medalist

GSCWU

Skills

Programming

Python (Pandas, NumPy, SimpleITK, Scikit-image, OpenCV, Matplotlib, TensorFlow, Keras, Pytorch, Nibabel, OpenFace, Librosa, Gudhi, Ripser, Cubical Ripser), MATLAB

Miscellaneous

LaTeX, Overleaf, Google Colab, Jupyter Notebook, Microsoft Office, Git, Kaggle.