

Muhammad Zain Amin

PERSONAL INFORMATION







Email: Muhammad-Zain_Amin@etu.u-bourgogne.fr
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Personal Website: <https://zainamin.github.io/>
Google Scholar: <https://scholar.google.com/citations?user=f3uZ9NsAAAAJ&hl=en>

RESEARCH INTERESTS

My research focuses on weakly/semi/self-supervised learning with applications on medical imaging, and computer vision. I am also passionate about applying neuroimaging strategies to prevent and diagnose brain disorders.

EDUCATION AND TRAINING

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| Erasmus Mundus Joint Master Degree in Medical Imaging and Applications (MAIA) | 2022 - Present |
|  Duke University School of Medicine | USA |
| ▪ 30 ECTS in 4th Semester, currently supervised by Prof. Joseph Lo, and F. I. Tushar. | |
|  University of Girona (UdG) | SPAIN |
| ▪ Earned 30 ECTS in 3rd Semester, supervised by Prof. Xavier Lladó, and Prof. Arnau Oliver. | |
|  University of Cassino and Southern Lazio (UNICAS) | ITALY |
| ▪ Earned 30 ECTS in 2nd Semester, supervised by Prof. Mario Molinara, Prof. Mario Guarracino, and Prof. Alessandra di Freca. | |
|  University of Texas Health Science Center (UTHealth) | USA |
| ▪ Post 1st Semester Associate Training, supervised by Giancardo Lab of UTHealth. | |
|  Université de Bourgogne (uB) | FRANCE |
| ▪ Earned 30 ECTS in 1st Semester, supervised by Prof. Alain Lalande, Prof. Olivier Laligant, and Prof. Eric Fauvet. | |
| Bachelor of Science in Computer Science (BSc) | 2015 - 2019 |
|  University of Engineering and Technology Lahore (UET Lahore) | PAKISTAN |
| ▪ Supervised by Prof. Amna Yasin, RANK: 4/37, GRADE: 3.50/4.00 | |

WORK EXPERIENCE

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| Carl E. Ravin Advanced Imaging Lab, Duke University Medical Center | USA |
| <i>Visiting Graduate Student</i> | Jan 2024 - Present |
| ▪ Supervised by Prof. Joseph Lo. | |
| ▪ Research on the Explainable AI for lesions detection and classification using lung CT images. | |
| Italian National Research Council | ITALY |
| <i>Graduate Student Researcher</i> | May 2023 - June 2023 |
| ▪ Supervised by Prof. Mario Rosario Guarracino. | |
| ▪ Researched on the classification of Alzheimer's Disease using MRIs and Gene Expression Data. | |
| University of Warwick | UNITED KINGDOM |
| <i>Visiting Student Fellow</i> | Sep 2022 - Jan 2023 |
| ▪ Supervised by Prof. Yu Guan, and Prof. Yongjian Hu. | |
| ▪ Researched on exposing DeepFake frames through spectral analysis of colour channels in the frequency domain. | |
| Wavy AI Research | CHINA |
| <i>Machine Learning Researcher</i> | June 2020 - April 2021 |
| ▪ Researched and implemented lungs X-ray images segmentation using U-Nets. | |
| ▪ Research on methodologies to minimise the impact of batch effects in classification studies using X-ray image datasets. | |
| United Nations Development Programme (UNDP) | PAKISTAN |
| <i>Data Science Coordinator</i> | Sep 2019 - Nov 2019 |
| ▪ Submitted the measurement of economic goals of healthcare interrelations tailored to Faisalabad. | |
| ▪ Documented over 28 thousand potential relations and ranked them using graph theory methods. | |

- Supervised by Prof. Amna Yasin.
- Implemented a machine learning-based healthcare decision making-system for Cesarean Section surgery.

RESEARCH PROJECTS

University of Girona

- Skin lesions classification based on EfficientNet models and Swin transformers
- Lung computed tomography image registration using intensity based, and VoxelMorph methods
- Comparative analysis of nnUNET, LinkNet, and probabilistic ATLAS techniques for MRI brain tissue segmentation
- Brain tissue segmentation using Expectation-Maximization algorithm
- Skin Image registration using homography method

University of Cassino and Southern Lazio

- Breast mass detection and segmentation using multi-scale morphological sifting and k-means clustering
- Two-step hierarchical classification of skin lesions using transfer learning and machine learning techniques
- Regression analysis challenge based on parametric and non parametric approaches
- Classification challenge on Alzheimer's disease using MRIs and gene expression data (Proposed by [Italian National Research Council](#))

University of Texas Health Science Center

- Image analysis for CTA endovascular stroke therapy

Université de Bourgogne

- Automated detection and diagnosis of diabetic retinopathy
- Detection of Parkinson's disease using automated tunable Q wavelet transform technique with EEG signals
- Comparative analysis of eight direction Sobel Edge Detection algorithm for brain tumor MRI images

HONOURS AND AWARDS

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| ▪ 1st Position, Alzheimer's Disease Classification Challenge Winner by the Italian National Research Council | 2023 |
| ▪ Aquisis International Mobility Grant by the Region Bourgogne Franche Comte, France | 2023 |
| ▪ Erasmus Mundus Scholarship for joint MAIA Master Degree by the European Union (7th out of 869 applicants worldwide) | 2022 |
| ▪ GREAT Scholarship for Digital Health Master Degree by the UK government and the British Council | 2022 |
| ▪ Think Big Grant for Health Economics and Policy Analysis Degree by the University of Bristol, UK | 2021 |
| ▪ Best Graduation Thesis Award during undergraduate studies, 14th graduation projects ceremony | 2019 |
| ▪ Pakistan's National ICT Research Grant by the Ministry of Information Technology and Telecommunications | 2019 |
| ▪ High Honors Student for 8 semesters by the dean of UET Lahore Engineering Faculty, Pakistan | 2019 |
| ▪ Semifinalists in the Pakistan's National ICT Project Exhibition Contest. Featured on National Television News | 2019 |
| ▪ Teaching Assistant Award by the Department of Computer Science and Engineering, UET Lahore | 2018 |
| ▪ Best Paper Award at National Conference on AI and Neural Information Processing System, UET Lahore | 2018 |

PUBLICATIONS

BIBLIOMETRICS (Google Scholar)

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|----------------|------------|--------------|
| Citations: 110 | H index: 5 | i10-index: 3 |
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RESEARCH POSTERS

A Novel Automatic Echography Process for Pregnant Women using a Collaborative Robot

Final Presentation on Medical Robotics, MAIA Medical Imaging and Applications, University of Girona, Spain, 2024.

Breast Mass Detection and Segmentation using Multi-Scale Morphological Sifting and K-Means Clustering

Poster Session, 17th EXCITE Zurich Summer School on Biomedical Imaging, ETH Zürich, Switzerland, 2023.

Comparative Analysis of Eight Direction Sobel Edge Detection Algorithm for Brain Tumor MRI Images

Final Presentation on Image Processing, MAIA Medical Imaging and Applications, Université de Bourgogne, France, 2022.

Detection of Parkinson's Disease Using Automated Tunable Q Wavelet Transform Technique with EEG Signals

Final Presentation on Digital Signal Processing, MAIA Medical Imaging and Applications, Université de Bourgogne, France, 2022.

CONFERENCE & TECHNICAL PAPERS

Exposing Deepfake Frames through Spectral Analysis of Color Channels in Frequency Domain

Muhammad Ahmad Amin, Yongjian Hu, Huimin She, Jicheng Li, Yu Guan, **Muhammad Zain Amin**

In proceedings of the 11th IEEE International Workshop on Biometrics and Forensics (IWBF), Barcelona, Spain, 2023.

Conversational AI Chatbot Based on Encoder-Decoder Architectures with Attention Mechanism

Amir Ali, **Muhammad Zain Amin**

Oral Presentation at National AI Conference, NED University of Engineering and Technology, Karachi, Pakistan, 2019.

Convolutional Neural Network: Text Classification Model for Open Domain Question Answering System

Muhammad Zain Amin, Noman Nadeem

ArXiv preprint arxiv: 1809.02479, Cornell University, 2018.

Performance Evaluation of Supervised Machine Learning Classifiers for Predicting Healthcare Operational Decisions

Muhammad Zain Amin, Amir Ali

In proceedings of the National Conference on Artificial Intelligence and Neural Information Processing System (AINIP), University of Engineering and Technology, Lahore, Pakistan, 2017.

* *Caesarian Section Classification Dataset* published in UCI Machine Learning Repository, University of California, Irvine, USA, 2017.

Application of Multilayer Perceptron for Data Mining in Healthcare Operations

Muhammad Zain Amin, Amir Ali

Oral presentation at 3rd International Conference on Biotechnology (ICB), University of South Asia, Lahore, Pakistan, 2017.

InceptFood: A CNN based Classification Approach for Recognizing Food Images

Muhammad Zain Amin, Amir Ali

In proceedings of National Conference on Emerging Trends in Computing, Statistics and Mathematical Sciences, Peshawar, Pakistan, 2017.

TECHNICAL SKILLS

Frameworks - Tensorflow, Keras, Scikit-Learn, Matplotlib, Numpy, Pandas, OpenCV, Flask

Programming languages - Python, C++, Javascript, R

Online Courses -

- Applied Data Science (**University of Michigan**).
- Machine Learning (**Stanford University**).
- Neural Networks and Deep Learning (**Andrew Ng**).

OPEN DAYS

- Attended the MAIA days' thesis and poster presentation sessions and received introductions to the latest medical imaging research activities from MAIA industrial partners, Gaeta, Italy (2023).
- Attended the EIPHI days, and received introductions about research activities, tutoring, mentoring, and doctoral schools at the University Burgundy Franche-Comté in Besançon, France (2022).
- Attended the Project Exhibition Contest "Village de science", Le Creusot, France (2022).

SERVICES

CONFERENCE WORKSHOPS ORGANIZED

- Adaptive and Multitask Learning Workshop at AINIP Conference (2017).

LEADERSHIP AND VOLUNTEERING ACTIVITIES

- Member of the Erasmus Mundus Association, Brussels, Belgium (2022 - present).
- Senior Member and GREAT Scholar for Study UK campaign at the British Council, London, UK (2022 - present).
- Dataset Donor in Life Sciences, UCI Machine Learning Repository, University of California, Irvine, USA (2018 - present).