Mahdi Islam

mahdiiut079.github.io | kaggle

EDUCATION

Erasmus Mundus Joint Master: Medical Imaging and Applications (MAIA) | *Link* Sept. 2023 – Present
University of Girona, University of Cassino, University of Burgundy **Cumulative GPA: 9.06/10.00**

Relevant Courses: Image Processing, Advanced Image Analysis, Machine and Deep Learning, Medical Image Segmentation and Applications, Medical Image Registration and Applications, Computer Aided Diagnosis, Computer Aided Surgery

Bachelor of Science: Electrical & Electronic Engineering Jan. 2018 – May 2022
Islamic University of Technology (IUT), Bangladesh | *Link* **Cumulative GPA: 3.63/4.00**

Relevant Courses: Digital Signal Processing, Artificial Neural Networks, and Fuzzy Logic

RESEARCH & WORK EXPERIENCE

Visiting Research Student, *Master Thesis* (Upcoming)
Medical University of Innsbruck, Austria | *Link* February 2025 - July 2025
Project Title: Few-Shot Video-Based Vision Language Foundation Model for Echocardiogram Regression and Classification
Project Supervisor: Enrique Almar

Lecturer, *Department of Computer Science & Engineering*
Metropolitan University, Bangladesh | *Link* August 2022 - June 2023

- Introduced Machine Learning and Deep Learning concepts for research, mentoring sophomore students and contributing to a 20% increase in students opting for a thesis over a project in their final semester.

Undergraduate Research Assistant, *Department of Electrical & Electronic Engineering*
Islamic University of Technology, Bangladesh April 2021 - April 2022
Project Supervisor: Mirza Munstasir Nishat

- Created a novel dataset from sensor-acquired foot sole heat-map videos using image augmentation techniques.
- Developed a real-time multi-class classification model to detect types of gait anomalies using Keras-Tensorflow framework.

STANDARDIZED TEST SCORES

IELTS: Listening 9 | Reading 9 | Speaking 7 | Writing 7 | **Overall 8**

PUBLICATIONS

M. Islam, M. Tabassum, M. M. Nishat, F. Faisal, and M. S. Hasan, *"Real-Time Clinical Gait Analysis and Foot Anomalies Detection Using Pressure Sensors and Convolutional Neural Network,"* 2022 7th International Conference on Business and Industrial Research (ICBIR), Bangkok, Thailand, 2022, pp. 717-722, **doi:** 10.1109/ICBIR54589.2022.9786472.
Publisher: IEEE Xplore
Keywords: Legged locomotion; Pressure sensors; Biological system modeling; Transfer learning; Data models; Complexity theory; Classification algorithms; Convolutional Neural Network (CNN); Gait Analysis; Foot Anomalies; Predictive Analysis.

PROJECTS

Atlas and Tissue-Model Guided Gaussian Mixture Models for Brain Tissue Segmentation | *Project Link*
University of Girona September 2024 - January 2025

- Developed a hybrid segmentation approach by combining Gaussian Mixture Models (GMM) with probabilistic atlas-based methods to enhance MRI brain tissue segmentation accuracy.
- Implemented multiple initialization methods (e.g., K-means, Tissue Model) and integrated spatial and intensity information, improving segmentation quality for Grey Matter (GM), White Matter (WM), and Cerebrospinal Fluid (CSF).
- Achieved high Dice scores by integrating tissue models and a probabilistic atlas into the EM algorithm, significantly improving segmentation accuracy over traditional methods.

Skin Cancer Detection from Dermoscopic Images: Comparing ML & DL Approaches | *Project Link*
University of Girona September 2024 - November 2024

- Performed image preprocessing tasks such as hair removal, color normalization, and ROI extraction, followed by feature extraction using methods like GLCM, LBP, Gabor filters, and HOG to capture critical color, texture, and gradient characteristics.

- Implemented SVM, Random Forest, and XGBoost classifiers for binary and multiclass classification, addressing data imbalance through resampling techniques.
- Currently exploring advanced deep learning methods, including EfficientNet, to enhance classification accuracy and performance.

Unsupervised Brain Tissue Segmentation with GMM and EM | *Project Link*
University of Girona September 2024 - January 2025

- Developed a Gaussian Mixture Model from scratch using the Expectation Maximization algorithm.
- Built a brain tissue segmentation pipeline with T1 and T2-Flair MRI images using K-means clustering for initialization and the Expectation-Maximization (EM) algorithm.
- Evaluated segmentation accuracy for Grey Matter (GM), White Matter (WM), and Cerebrospinal Fluid (CSF) using Dice similarity scores.

Automatic Knee Rehabilitation Exercises using Collaborative Robot | *Project Link*
University of Girona September 2024 - November 2024

- Developing a system to perform knee rehabilitation exercises with a collaborative robot, including knee flexion/extension movements, range of motion analysis, and resistance simulation exercises using Universal Robot 3.

Colorectal Cancer Tissue Classification and Gland Segmentation from Histopathology Images | *Project Link*
University of Cassino March 2024 - May 2024

- Developed an image processing segmentation pipeline using K-means clustering and Watershed algorithms, improving segmentation accuracy with grayscale morphology, smoothing, and circularity-based estimation.
- Created a machine learning pipeline for multi-class classification, extracting GLCM, Local Binary Patterns, and Gabor features, and used classifiers such as XGBoost, LightGBM, and SVM for improved classification.
- Engineered a deep learning segmentation pipeline using PyTorch, experimenting with UNet and UNet++ architectures and backbones like VGG16, ResNet, and EfficientNet.

Stock Trends Prediction | *Project Link*
University of Cassino March 2024 - May 2024

- Conducted exploratory data analysis to handle missing values, outliers, and identify key predictors, improving data integrity for stock trend modeling.
- Performed multivariate analysis to uncover relationships among financial indicators, identifying crucial variables for trend prediction.
- Implemented an ensemble model using LightGBM and XGBoost, achieving accuracy in stock trend forecasting.

AI Generated Text Detection System | *Project Link*
University of Burgundy September 2023 - December 2023

- Built a web application to detect AI-generated sentences, using a Byte-Pair tokenizer followed by a TFIDF vectorizer for word embeddings.
- Developed a classification model using an ensemble of LightGBM, CatBoost, SGD, and Logistic Regression classifiers.
- Created the web interface using Streamlit for real-time user interaction.

ACCOMPLISHMENTS

Associate Data Scientist | DataCamp | *Certificate Link* November 2024
LLM - Detect AI Generated Text | The Learning Agency Lab | Kaggle Competition December 2023

- Top 30% among all participants
- Built the base classifier for my AI Text Detection Application.

Kaggle Tabular Playground Series February 2022

- Top 10% among all participants
- Predicted bacteria species based on repeated lossy measurements of DNA snippets
- Performed data cleaning, preprocessing, feature selection, and added sample weights
- Used ExtraTrees Classifier with CrossValidation for final prediction

Bangladesh Physics Olympiad, Divisional Round | Rank 5 2015
SUST Astro Carnival | Champion 2014
Bangladesh Physics Olympiad, National Round | Rank 7 2012

EXTRACURRICULAR ACTIVITIES

Captain, IUT University Tennis Club April 2021 - May 2022

- Secured funding to improve illumination conditions for night-time play, enhancing the overall playing experience and safety for participants.
- Organized intra-doubles and intra-singles tournaments with 16 and 32 teams respectively, significantly increasing participation compared to previous years.
- Fostered greater student engagement in sports through improved facilities and well-organized tournaments.

SKILLS

- **Programming:** Python, R, SQL, MATLAB, C++, JavaScript, Java
- **Deep Learning:** Vision-Language Models, CNNs, LSTMs, RNNs
- **Machine Learning Frameworks:** PyTorch, TensorFlow, Keras, Hugging Face, Scikit-learn
- **Medical Image Processing Tools:** ITK-SNAP, Elastix, SPM, Transformix
- **Data Processing:** EDA, Feature Selection, Data Wrangling, PCA
- **Visualization:** Matplotlib, Seaborn, OpenCV, Skimage, PIL, Pandas, NumPy
- **Robotics and Scripting:** Universal Robot Script
- **Web Development:** MySQL, Apache, XAMPP, Streamlit

RESEARCH INTERESTS

Deep Learning, Machine Learning, Computer Vision, Neuroscience, Biomedical Image Processing, Semi/Weakly Supervised Segmentation, Foundational Models, Multimodal Data Analysis, Image Registration, Biomarker and Radiomics Analysis, Image Reconstruction and Synthesis for Diagnosis, Prognosis, and Treatment Outcome Prediction

REFERENCES

Dr. Alessandro Bria, Associate Professor
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