MAHDI ISLAM

RESEARCH INTEREST:

Deep Learning, Computer Vision, Neuroscience, Biomedical Image Processing, Machine Learning

EDUCATION:

Erasmus Mundus Joint Master
Medical Imaging and Applications | 6 September, 2023 - Present

Bachelor of Science
Islamic University of Technology | 8 January, 2018 - 23 May, 2022 **CGPA: 3.63/4.00**

WORK EXPERIENCE:

Metropolitan University **16 August 2022 - 30 June 2023**

Lecturer | Department of Computer Science and Engineering

- Implemented a software lab for the Electrical Circuit course, which had previously been exclusively hardware-based.
- Introduced Machine Learning and Deep Learning for research purposes to sophomore students, resulting in approximately a 20% increase in students choosing to undertake a thesis instead of a project for their final semester.

PUBLICATIONS:

Real-Time Clinical Gait Analysis and Foot Anomalies Detection Using Pressure Sensors and Convolutional Neural Network (1st Author)

7th International Conference on Business and Industrial Research (ICBIR2022):

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

PROJECTS:

Multi-class Classification and Gland Segmentation of Colorectal Cancer tissues from Histopathology Images (2024) : Python

- Built a segmentation pipeline using only advanced image processing techniques.
  - Primarily used K-means clustering and Watershed algorithm for segmentation.
  - Grayscale morphology and smoothing, noise elimination and circularity based estimation was applied for assisting the segmentation pipeline for better result.
  - Class-wise separate pipelines were made due to their heterogeneity of shapes.
- Built a Machine learning pipeline for multi-class classification using image descriptors as features.
  - GLCM, Local Binary Patterns and Gabor features were extracted.
  - XGBoost, LightGBM, Support Vector Machines were used as classifiers.

- Built a segmentation pipeline using deep learning techniques with Pytorch
  - UNet and UNet++ architectures with VGG16, ResNet, EfficientNet B0, B1 backbones were used for experimenting.
  - Custom Loss function and different augmentation techniques were introduced to enhance performance.

Stock Trends Prediction (2024) : Python

- Developed a predictive model to accurately forecast stock trend movements based on financial indicators from various companies.
  - Addressed severe issues with missing values and handled outliers and high leverage points effectively.
  - Experimented with Random Forest and LightGBM algorithms for prediction.

AI Generated Text Detection System (2024) : Python

- Built a web application to tackle the current crisis of detecting sentences generated by AI.
  - Used Byte & Pair tokenizer followed by a TFIDF vectorizer to create word embeddings.
  - Classification model built using an ensemble of LightGBM, Catboost, SGD, Logistic regression classifiers.

Adult Income Prediction (2022) : Python

- Conducted exploratory data analysis and multi-variate analysis to identify predictors with strong correlation with target.
  - Classification model implemented using an ensemble of LightGBM, XGBoost classifiers.

ECG Signal Analysis (2022) : MATLAB, FDA Tool, Proteus

- Designed a digital filter to remove noise from raw ECG signals.
  - Used FFT to analyze frequency spectrum and identify high frequency white noise.
  - Filter designed based on the spectrum analysis using FDA Tools and imported using MATLAB Simulink.
  - Circuit implementation done using Proteus.

SKILLS:

Programming Languages: Python, R, SQL, MATLAB, C++, JavaScript, Java
Deep Learning: Visual-Language Models, Convolutional Neural Networks, Large Language Models, Recurrent Neural Networks, LSTM.
Machine Learning: SVM, XGBoost, LightGBM, Random Forest, Logistic Regression, Gradient Boost, CatBoost, etc.
Data Processing & Analysis: EDA, Data Cleaning, Data Wrangling, Feature Selection, Dimensionality Reduction, Principal Component Analysis, etc.
Visualization, Image & Data Processing Libraries, Python: Matplotlib, Plotly, Seaborn, OpenCV, Python Image Library (PIL) , Sci-kit Image Library (Skimage), Pandas, Numpy, Scipy, Statmodels.
Deep Learning, Machine Learning Frameworks: Pytorch, Tensorflow, Keras, Hugging Face, Sklearn.
Databases and Web Server: MySQL, Apache, XAMPP, Google BigQuery
Designing Software: AutoCAD Electrical, Proteus, Simulink, PSpice, etc.
Soft Skills: Leadership, Teamwork, Research, Communication

STANDARDIZED TEST SCORES:

IELTS | Listening 8 | Reading 8 | Speaking 7 | Writing 6.5 | Overall 7.5

ACCOMPLISHMENTS:

LLM - Detect AI Generated Text | The Learning Agency Lab | Kaggle Competition (2024)

- 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
- Prediction of bacteria species based on repeated lossy measurements of DNA snippets
- Data cleaning, data preprocessing , feature selection performed and sample weight added
- Prediction done using ExtraTrees Classifier and CrossValidation

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

VOLUNTARY ACTIVITIES:

Captain | IUT University Tennis Club | April, 2021 - May 2022

- Addressed and ensured funding for improving illumination conditions for playing at night.
- Organized intra-doubles, intra-singles tournaments consisting of 16 and 32 teams respectively which was significantly higher than previous years.

Organizer (Sponsor Team, Robotics Department) | ESONANCE , IUT | 2018 & 2019

- Secured six out of seven sponsors for funding food stall of the event.
- Organized and orchestrated the Robocopter Competition.

REFERENCE:

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