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GScholar

Mahera Roksana Islam

Education

University of Dhaka **January 2020 – Ongoing**
Bachelor of Science (BSc.) in Electrical and Electronic Engineering *Dhaka, Bangladesh*

- CGPA: 3.66 (up to 6th semester). Last 2 semester GPA 3.81.
- Achieved the 3rd highest score in the department in the most competitive university admission exam of my country.
- Member: IEEE SB DU, SIGHT, WIE, Computer Society, and DU Writer's Hub.
- Secretary at IEEE SIGHT (2024 onwards): Organized club meetings and activities. Arranged several skill-building workshops.
- Webmaster at IEEE SIGHT(2020-2024): Created and maintained the official website.
- Relevant Coursework: Digital Signal Processing, Industrial and Medical Instrumentation, Signal and Systems, Linear Algebra and Numerical Methods.

Research Interests

- Medical Image Analysis
- Computer Vision
- Generative Networks
- Image Segmentation and Object Detection

Publications

- **M. R. Islam**, A. M. Ferdous, S. Hossain, M. A. Rahman Ahad and F. Alnajjar, "**Optimizing Endotracheal Suctioning Classification: Leveraging Prompt Engineering in Machine Learning for Feature Selection**," 2024 International Conference on Activity and Behavior Computing (ABC), May 2024. **[Conference Proceeding]**

Research Experience

Undergraduate Thesis **January 2024 – Ongoing**
University of Dhaka *Dhaka, Bangladesh*

- **Title: Enhanced Classification of Microbial Images using Conditional WGANs**
- **Supervisor(s):** Prof. Md. Atiqur Rahman Ahad, Dr. Md. Zasim Uddin, Prof. Mosabber Uddin Ahmed.

- Designed and optimized conditional WGAN architecture with custom generator and critic networks to generate high-quality synthetic images to augment microbial dataset.
- Explored methods to train stable GANs on smaller datasets.
- Plan to integrate augmented datasets into UNET and YOLO pipelines for microbial image segmentation and detection tasks
- Skills & Tools: Pytorch, Python(Conda), Bash

Research Assistant **January 2023 – June 2023**
University of Dhaka *Dhaka, Bangladesh*

- Worked with a research team on an unpublished literature review on neuromorphic computing. Investigated 100+ papers in this field.

Professional Experience

Data Science Intern **September 2023 – December 2023**

iFarmer *Dhaka, Bangladesh*

- Developed scripts to clean small and large datasets, visualize, and identify patterns on agricultural datasets to aid rural farmers.
- Used statistical and machine learning techniques (regression analysis, decision trees) to perform predictive analysis.
- Skills & Tools: Python(Numpy, Pandas, Scikit-learn, Seaborn, Regex, etc.), Bash, SQL

Data Analysis Intern (Part-time) **June 2023 – August 2023**

Plexus Cloud *Dhaka, Bangladesh*

- Developed and implemented SQL queries to extract, clean, and analyze large datasets from relational databases, and generated data-driven insights. Developed Bash scripts to streamline data extraction and loading from various sources into centralized repositories.
- Collaborated with Operations and Finance departments to understand data requirements and objectives. Helped to communicate data-driven insights using BI tools to upper-level managers.
- Skills & Tools: SQL, Bash, Python, MS Excel, BI Tools

Selected Projects

EEG Classification Using LSTM models **May 2024**

- Developed LSTM models to analyze EEG time series data in predicting mental state of samples.
- Explored Bayesian optimization for hyperparameter tuning, PCA for dimensionality reduction methods and utilized Shapley additive explanations (SHAP) for feature selection.
- Skills & Tools: Pytorch, Python(Conda)

Activity Recognition of Endotracheal Suctioning Procedure using Skeleton and Video Dataset with Generative AI **February - March 2024**

- **Supervisors**: Prof. Md. Atiqur Rahman Ahad, Dr. Shahera Hossain, Dr. Fady Alnajjar
- Employed chain-of-thought prompting to several large language models (LLMs) to identify and select key features from the skeletal data.
- Implemented several classical machine and deep learning models to predict nursecare activities from extracted skeletal points data. Explored GANs to augment the skeletal dataset.
- Subsequently wrote a challenge paper and presented it at **2024 International Conference on Activity and Behavior Computing (ABC)**.
- Skills & Tools: Pytorch, Python(Conda, Colab), LLMs (GPT, Claude, Gemini, etc.)

Archer: A Cost-Effective Single-Board Computer System **April 2023 - September 2024**

- Developed and deployed cost-effective single-board computer (SBC) systems to a rural school in Mymensingh, Bangladesh. Provided on-site training and continually offered remote and online assistance for maintenance.
- Secured project funding from **IEEE HAC**.
- Skills & Tools: OrangePi, Python, Linux, various open-source educational software

Beshuddho: A Tank-Based Water Purification System **July 2020 - December 2021**

- Designed and deployed a microcontroller-based UV filtration system to purify water in lower-income urban households of Dhaka.
- Secured project funding from **IEEE HAC**.
- Skills & Tools: Arduino, C/C++

NASA Space Apps Challenge: Global Nominee **October 2022**

- Worked on project, 'Mission Mars: A New Exhibit', to design 3D tools tailored to the unique conditions of Mars which was selected as the Champion from Dhaka region by BASIS, the local organizer of the competition.
- Skills & Tools: AutoCAD

Skills, Tools, and Frameworks

Frequently use: Pytorch, Python(OpenCV, Numpy, Pandas, Scikit-learn, SciPy, Regex, Matplotlib, Seaborn, Beautiful Soup, etc.), Bash, LaTeX.
Often use: SQL (PostgreSQL, T-SQL, Oracle DB), MATLAB, Docker, Git tools, BI/Office tools.
Know: C/C++, LTspice, AutoCAD, Cadence Virtuoso.

References

Available upon request.
Prof. Md. Atiqur Rahman Ahad, University of East London, UK.
Prof. Mosaber Uddin Ahmed, University of Dhaka, Bangladesh.
Assc. Prof. Zasim Uddin, Begum Rokeya University, Bangladesh.