Sanjana Binte Siraj

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Research Interests

Biomedical Image Analysis - Human Computer Interaction - Vision - Artificial Intelligence

Work Experience

Research Assistant **Jun 2024 – Present**
Dept. of CSE, Bangladesh University of Engineering and Technology (BUET)

- Working as a graduate research assistant under supervision of Dr. Mahmuda Naznin, Professor, Ex-Dept. Head, CSE, BUET.
- Keywords of the project: biomedical analysis, multimodal learning, vision transformers, applied deep learning.
- Project has been awarded **RISE Student Research Grant**

Project Intern **May 2023 – Jun 2023**
eSRD-Lab & MySoft Limited *Full Stack Development*

- Completed an internship project focused on developing a full-stack framework.
- Languages: Java, JavaScript; Frameworks: Angular, Spring Boot; Tools: GitHub; Database: MySQL

Education

Bachelor of Science (BSc) in Computer Science & Engineering **Apr 2019 – Jul 2024**
Bangladesh University of Engineering & Technology (BUET) *CGPA: 3.48/4.00*

- Notable Courses: Machine Learning, Microprocessor, Microcontroller & Embedded Systems, Compiler, Computer Networking, Simulation & Modelling, Computer Security, Computer Graphics, Artificial Intelligence

Research Experience

Transfer Learning in Bone Morphology Study for Better Hip Fracture Assessment **Jun 2023 – Jun 2024**
Co-Supervised by: Dr. Mahmuda Naznin, Professor, Ex-Dept. Head, CSE, BUET and Dr. Tanvir Faisal, Assistant Professor, ME, University of Louisiana at Lafayette

- Manuscript in submission
- Description: This research centers on predicting hip fracture risk by first predicting stress and strain distributions across the bone under various fall scenarios. These distributions and the density distribution are then projected onto images of the one. The study then employs a modified vision transformer to classify images corresponding to different patient-fall case pairs based on their fracture risk, providing a comprehensive approach to fracture risk assessment.
- Project was awarded **BUET RISE Student Research Grant 2023**

Improvement on Hip Fracture Assessment Pipeline **Nov 2024 – Present**
Co-Supervised by: Dr. Mahmuda Naznin, Professor, Ex-Dept. Head, CSE, BUET and Dr. Tanvir Faisal, Assistant Professor, ME, University of Louisiana at Lafayette

- Study in progress
- Description: This study's objectives are to replace the entire previous multi-stage pipeline with a single multimodal architecture that will directly take the qct images and textual metadata as input. Also different PERT strategies will be employed to make the previous vision transformer more lightweight.

Recent Projects

Radiology Report Generation Using Multimodal Large Language Model
Biomedical Image Analysis, Vision Transformer, Multimodal Learning, Deep Learning, Applied Machine Learning

- Project in progress
- Description: This study plans to offer a lightweight, comprehensive and clinically accurate architecture for generating chest X-ray reports. The proposed solution will integrate retrieval-based data augmentation techniques along with different fine-tuning strategies.

Detection of Adversarial Android Malware with Query-Efficient Transformation Strategies
Networks and Security, Large Language Models

- Project in progress

- Description: This study plans to offer a detection architecture of the malware produced through the latest and highly efficient malware generator EvadeDroid. The proposed solution is going to use fine-tuned LLMs to detect relevant features for the detection.

Book Review Popularity Prediction using NLP techniques
Natural Language Processing
- Description: In this project we compare performance of different methods of feature preprocessing, both textual and non-textual features, on popularity prediction of book reviews.
- Links: Documentation GitHub

Watcher 24-7
Android App
- Description: Watcher 24-7 is an android app that allows active location sharing with emergency contacts. Pressing the phone's power button 3 times or pressing the big red emergency button on the app just once sends sms alerts to your emergency contacts and starts location sharing. The novelty of this project is that it included a design of a prototype of a wearable with a button which on pressing also starts the mentioned features.
- Links: Documentation GitHub Media Coverage

RivERO
Android App
- Description: RivERO is an android app that tracks real time river erosion rates and in risk or actively eroding zones of Bangladesh. It also sends out natural disaster warning SMS alerts based on user's registered location.
- Links: GitHub

Smart Mask
Arduino
- Description: Smart Mask a prototype of a smart mask with a fan for cooling and ventilation and sensors to detect the quality and temperature of air. The fan starts rotating whenever there's toxic substance like smoke etc. in the air or temperature is too high. It also sends the ppm values of toxic elements in the air to any phone connected to the mask via bluetooth.
- Links: Documentation GitHub

TutorHub
Node.js, React, PostgreSQL
- Description: TutorHub is a webapp wherein students looking for tutors can post advertisements and tutors looking for jobs can apply for them. The students can also directly ask a teacher to tutor them via sending requests to their profile. The novelty of this webapp is that it filters those requests and advertisements based on location, pay(for tutors) and budget(for students). It also uses a rating system so users can filter good tutors from the rest or unruly or trouble students from the rest. Additionally, it offers various tools like grouped SMS sending, grade uploading, calendars etc. which tutors might need to keep track of their students.
- Links: GitHub

Technical Skills

- Languages: C, C++, Python, Java, JavaScript, x86 Assembly, MySQL
- Libraries: PyTorch, Keras, Scikit-Learn, Numpy, Pandas, SciPy
- Frameworks: Postgres, MySQL, React, Bootstrap, Angular, Spring Boot
- Technologies: Android Studio, HTML, LATEX, Git, Atmega32 Microcontroller, Logisim circuit simulator

Achievements

- **BUET RISE Student Research Grant 2023 :** Research Award for Outstanding Research Projects by Undergraduate Students
- **Champion:** Girls' Mobile Application Development Contest 2021 organized by Bangladesh Open Source Network – BdOSN
- **Champion:** BWCSE Project Showcasing 2021
- **2nd Runner Up:** MIST Inter University ICT Innovation Fest 2021 (Hackathon)
- **2nd Runner Up:** HackNSU_Season 3 (Hackathon)
- **Media Interview:** Walton Laptop Campus Tech Talent Interview by Techshohor

Other Activities

- **Head of Decoration Committee**, BUET CSE Fest 2023
- **2022 bdapps Campus Ambassador**, Bdapps, Robi

Test Scores

- **TOEFL:** 114/120 (Reading: 30/30, Listening: 30/30, Speaking: 25/30, Writing: 29/30)
- **GRE:** 329/346 (Quant: 165/170, Verbal: 161/170, AWA: 3/6)