Ayesha Binte Mostofa

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Research Interest

Natural Language Processing, Computer Vision, Systems, Security, Robotics, Software Engineering

Education

Bangladesh University of Engineering and Technology (BUET) CGPA : 3.63/4.00
B.Sc.Engg. in Computer Science and Engineering; 29 April 2019 – 1 July 2024 *Last 2 years CGPA : 3.86/4.00*

- **Dean's list award and university merit scholarship recipient in levels 3 and 4**
- **Lab coursework webpage :** ayeshathoi.github.io/ugrad.html
- **Notable Courses :**
  Machine Learning, Artificial Intelligence, Bioinformatics, Software Engineering, Information System Design, Computer Security, Operating Systems, Computer Networks, Data Structures and Algorithms, Database Systems, Computer Graphics, Numerical Methods, Discrete Mathematics, Object Oriented Programming

Feni Girls' Cadet College (FGCC) GPA : 5.00/5.00
Higher Secondary Certificate (Science) *Jul 2016 - Jul 2018*

- **Board talentpool scholarship recipient, Comilla board 5th position (1st among Girls)**
- Awards : Best in Academics award, Best Journal award, 1st Runner-up in Intra College Math Olympiad

Feni Girls' Cadet College (FGCC) GPA : 5.00/5.00
Secondary School Certificate (Science) *Jan 2014 - May 2016*

- **Board talentpool scholarship recipient, Comilla board 8th position**

Work Experience

Full-time Lecturer, Canadian University of Bangladesh July 2024 – Present
Department of Computer Science and Engineering *Dhaka, Bangladesh*
Courses Taken : Computer Graphics, Structured Programming Language, Numerical Analysis
Work Email : ayesha.binte@cub.edu.bd

Machine Learning Intern (Part-time) May 2023 – June 2023
Red.Digital Limited *Remote*
Contributed to developing an Android App for Client-side verification of National ID Card images

Research Experience

Advancing Code Review and Code Refinement Automation Using LLMs July 2023 - Present
Undergraduate Thesis (Ongoing), NLP Group, CSE-BUET | Abstract | Manuscript under Preparation

- Designing prompts augmenting static program metadata (function call graph) and natural language summary, and qlora fine-tuning to improve code review comment and code refinement generation tasks
- **Tools and Technology:** Python (Pytorch), TreeSitter, OpenAI GPT API, CodeT5, CodeLlama, Llama 3
- **Supervisor :** Dr. Anindya Iqbal, CSE, BUET, Dr. Toufique Ahmed, PhD, UC Davis

Detecting Attack Behavior in Computer Logs Feb 2024 - Present
Research Project, Security X NLP

- Working on detecting attack behaviors whether benign or malicious, analyzing raw log data from the DARPA OPTC and DARPA TC E3 datasets using postgresql sql files, with the help of provenance graphs. We are using various LLM models to generate attack behaviors from the raw log data.
- **Supervisor :** Dr. Md. Shohrab Hossain, CSE, BUET, Dr. Shahrear Iqbal, National Research Council, Canada

Low Resource 2D Image Style Transfer Jan 2024 - Present
Research Project, Computer Vision

- Generating a new image by combining the content of one image with the style of another image while optimizing for minimal computational resource usage. Now, We are trying to transfer artistic style of calligraphy to an image.
- **Tools & Technology: Python, VGG16, CycleGAN, ResNet-50**
- **Supervisor** : Sheikh Azizul Hakim, Lecturer, CSE, BUET

Technical Skills

Languages : C/C++, Python, Java, Javascript, x86 Assembly, Bison/Flex, Bash, MySQL, LaTeX

Frameworks : React.js, Node.js, SpringBoot, Oracle, PostgreSQL, Docker, NS2, xv6, Git, Wireshark

Libraries : NumPy, Keras, Matplotlib, OpenCV, OpenGL, Pandas, Scikit Learn

Academic Projects

Vehicle Object Detection in the Context of Bangladesh Road Traffic Jan 2024 - Feb 2024

Field : Computer Vision, DEEP LEARNING ENIGMA FINALIST

- Finetuned vision transformer based modern deep learning models (YoloV6L6, YoloV8, Faster-rcnn, CoDETR) .
- Tools & Technology used : Python (PyTorch), Ultralytics YOLO, Pandas, MMDetection

Forecasting Ground level water System June 2024 - Present

Machine Learning Research Project

- It is a funded project by WARPO. We used Data Preprocessing, Regression Models, Arima models, LSTM in this project to predict ground water level. Supervised by : Dr. A. B. M. Alim Al Islam, CSE, BUET

ML Algorithm, FNN, PCA and EM | 2024 *Python* Source Code

- Implemented FNN from Scratch, Adaboost algorithm with Logistic Regression
- Implemented PCA & clustering with EM algorithm on gaussian mixture models from scratch.

Hardware : ALU, FPA, MIPS Implementation | 2022 *C++, Logisim, Assembly* Source Code

- Implemented 4-bit Arithmetic logic unit, Floating Point Adder, and Microprocessor without interlocked Pipelines with ATmega32, Logisim

Hardware Project : Health Monitoring System | 2022 *C++* Source Code | Youtube Demo

- Monitors heart rate, body temperature and blood oxygen saturation level of a patient body, room humidity and room temperature of the patient room.
- Tools : Arduino Uno, Max 30102, LCD 1602, I2C Adapter ,GSM Module 900A, DHT11, Buzzer , Power Bank - 5V 2A

MISP Tool, Cryptography and Malware Analysis | 2023 *Python, Docker, Azure Cloud* Source Code | Youtube Demo

- Implemented cryptography (AES, Diffie Hellman, RSA) algorithms, and pedagogical malware functionalities
- Documented the functionalities of Open Source Tool, MISP in a report.

C Compiler | 2022 *Lex, Yacc, Assembly, C* Source Code

- Built a simple compiler from scratch in compiler sessional using yacc, c, assembly etc.

TCP CUBIC-FIT, Packet Tracer and Network Simulator | 2022 *Java, NS2* Source Code

- Implemented server-client socket programming, designed LANs, and simulated wireless networks
- Modified TCP Cubic-Fit algorithm in NS2 and documented improvement in a report.

Ray Tracing & Raster Based Pipelines | 2023 *C++, OpenGL* Source Code | Youtube Demo

- 3D Transformation with OpenGL, Raster Based Graphics Pipeline with Z-buffer Algorithm, Ray Casting and Ray Tracing using Illumination Techniques

E-pathshala : An Online School | 2022 *Spring Boot, BootStrap, JavaScript, JSTL, Oracle* Source Code | Youtube Demo

- Developed an MVC web application with raw SQL queries as database sessional project.

Leadership Activities

IEEE Computer Society BUET Student Branch Chapter 2021 - 2023

Publicity Committee Co-ordinator (2022-2023) ; Media Committee Executive (2021-2022)

Competitions & Awards

Dean's list award in Level 3 and Level 4: received university merit scholarship for excellent grades.

DEEP LEARNING ENIGMA 1.0 Finalists, 2024 : Object Detection Contest for Autonomous Vehicles [LearderBoard]

10th NSysS Research Poster Presentation, 2023 [Poster]

RISE-BUET Internal Student Research Grant, 2023 : Undergraduate Thesis Grant centrally awarded by University

Merit Scholarships [2014-2024] : granted for outstanding performance in University, HSC, SSC, JSC level