Anika Tahsin

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RESEARCH INTERESTS

Computer Vision, Deep Learning, Machine Learning, Artificial Intelligence, Data Science, Image Processing, Cognitive science, Vision Language Model, Natural Language Processing, Large Language Model, Bioinformatics

EDUCATION

BRAC University, Dhaka, Bangladesh   April 2020 — May 2024
Bachelor of Science in Computer Science
    Cumulative GPA: 3.87/4.00 (Last 60 Credit: 3.92/4.0)
    Thesis Title: Unsupervised Semantic Segmentation for Localization of WetLand Area Fluctuations
        Supervisor: Md. Golam Rabiul Alam, PhD, Professor of CSE Department of BRAC University

BRAC University, Dhaka, Bangladesh   June 2025 — Present
Masters of Science in Computer Science & Engineering

ACADEMIC EXPERIENCE

Student Tutor, BRAC University, Dhaka   February 2023 — April 2023
PHY 111: Principles of Physics I of Mathematics and Natural Science Department
Actively assisted fellow students in comprehending complex topics within the field of physics.
Student Tutor, BRAC University, Dhaka   February 2024 — April 2024
MAT 110: MATH I Differential Calculus and Co-ordinate Geometry of Mathematics and Natural Science Department
Providing tailored assistance to fellow students, employing a personalized approach to address their unique learning needs.

WORK EXPERIENCE

Research Assistant, BRAC University, Dhaka   August 2024 — Present
As a Research Assistant at BRAC University, under the supervision of Prof. Dr. Md. Golam Rabiul Alam, I conduct advanced research in computer vision, deep learning, and machine learning. My work involves collaborating on and contributing to multiple research projects and academic publications, including studies on image segmentation, object detection, AI-driven data analysis, and review papers. I have presented research findings at international conferences, such as ICCIT 2024, and I assist in mentoring junior researchers.

Vice President, Computer Vision and Intelligent Systems Research Lab (CVIS Lab), BRAC University   July 2025 — Present
Conducted and facilitated the *CVIS Hands-on Training on Development of Machine Learning and Deep Learning Models* for undergrad students, focusing on practical skills for designing, implementing, and evaluating ML/DL models. Provided step-by-step guidance, curated datasets, and supervised participants through end-to-end project workflows.

PROJECTS

MRI Segmentation with U–Net (MobileNetV2 Encoder)   Project Link
Developed a lightweight medical image segmentation pipeline on Kaggle's MRI dataset for detection and analysis. Converted 3D NIfTI volumes to 2D slices, applied z–score normalization, and binarized masks (nearest–neighbor). Trained a U–Net with a MobileNetV2 encoder (PyTorch/SMP) using BCE+Dice, mixed precision (AMP), gradient clipping, cosine LR, and early stopping. Evaluated with Dice/IoU/Precision/Recall/F1, performed a threshold sweep to optimize inference, and produced clear overlay visualizations. Demonstrates strong skills in deep learning for medical imaging, data preprocessing, and reproducible ML engineering.

Multiple Sequence Alignment (MSA) with Genetic Algorithm + Qwen2.5   Project Link
Lightweight GA-based MSA on Kaggle's Sequence Alignment (Bioinformatics) Dataset, with GPU-accelerated fitness in PyTorch. Implemented affine gaps (PAM250/BLOSUM62), tournament selection, residue-preserving crossover, and improving mutations; computed entropy, gap, and identity metrics; generated heatmaps, dendrograms, and CLUSTAL/FASTA outputs. Integrated a local LLM (Qwen2.5-1.5B via llama-cpp, no API keys) to produce validated JSON reports of conserved regions, gap clusters, and closest/divergent sequence pairs.

Ship Detection in Aerial Images Using YOLOv10   Project Link

Undertook a project to detect ships in aerial images using the YOLOv10 object detection model. Leveraged a curated dataset to train the model, optimizing its performance to identify and localize ships in complex maritime environments. Designed a custom DataLoader and fine-tuned the model's hyperparameters to improve accuracy. This project demonstrates advanced proficiency in computer vision, model training, and handling real-world datasets for impactful applications like maritime monitoring and environmental safety.

Predicting Wildfires Using Machine Learning Models   Project Link

Led a project focused on utilizing machine learning models to predict wildfires. Investigated the efficacy of regression and neural network models in predicting the scale of wildfires by employing historical data to forecast wildfire occurrences and severity. The project aims to contribute to disaster prevention and environmental protection efforts by enhancing wildfire forecasting capabilities.

Intended Sarcasm Detection in English   Project Link

Spearheaded a project aimed at detecting sarcasm in English text, understanding its crucial role in analyzing sentiments and opinions. Considering the intricacies of sarcasm in online conversations, especially on social media, this project devised creative approaches to label data more accurately and reduce bias. This project aimed to empower computational systems to grasp better and interpret subtle forms of communication, ultimately driving progress in natural language processing and associated disciplines.

SoundTrove: A Musical Instrument Rental Platform   Project Link

During my software engineering course, I led the development of SoundTrove, a musical instrument rental platform using Laravel, MySQL, CSS, and JavaScript. SoundTrove simplifies instrument rental, offering users a seamless experience to explore, rent, and review instruments. It streamlines communication between administrators, users, and vendors, making instrument leasing more accessible and convenient. Through SoundTrove, I demonstrated proficiency in Laravel framework and project management skills, contributing to a dynamic and vibrant musical community.

RESEARCH PAPERS AND PUBLICATIONS

GeoSemantic Flux: Unsupervised Semantic Segmentation for Localization of Wetland Area Fluctuations from Satellite Image

Submitted for journal review to the *IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing*

Q-learning based Automated Message Multicast in Gossip Protocol for Node Confirmation in IOTA Tangle

Accepted at the *27th International Conference on Computer and Information Technology (ICCIT'24)*

A Real-Time ETP Outlet Monitoring Framework Leveraging Environmental IoT, Colorimetry, and Learning Theory

Accepted at *IEEE Access*

Explainable Multimodal Fusion for Breast Carcinoma Diagnosis: A Systematic Review, Open Problems, and Future Directions

Submitted for journal review to the *Clinical Imaging*

A Systematic Review on Machine Learning Paradigms: Taxonomy, Models, Purposes, Applications, Comparative Benefits, and Future Research Opportunities

Submitted for journal review to the *PeerJ Computer Science*

A Comprehensive Review on Statistical and AI-Driven Approaches for Time-Series and Time-Sequential Data

Submitted for journal review to the *SN Computer Science*

A Diversiform Brain Tumor Classification Leveraging Hybrid Recursive MRI Image Enhancement Pipeline for T1, T2, and T1C+ Images and Utilizing A Coalition of CoatNet-HorNet Transformers

Submitted for journal review to the *Biomedical Signal Processing and Control*

Wildfire Scale Prediction Using Regression and Neural Network Models: An Experimental Study with MTBS Dataset

Submitted for conference review to the *International Conference on Multidisciplinary Computer Science, Electrical, Business & Literature (ICMCEL2025)*

Biologically Plausible Learning for NLP Using Spiking Neural Networks

Submitted for conference review to the *International Conference on Multidisciplinary Computer Science, Electrical, Business*

& Literature (ICMCEL2025)

Generative AI Meets Responsible AI and Affective Computing
Submitted for conference review to the *International Conference on Multidisciplinary Computer Science, Electrical, Business & Literature (ICMCEL2025)*

AWARDS

First Runner Up in Natural Language Processing Hackathon in Bangladesh 2023   January 2023
The NLP hackathon was a task of Named Entity Recognition (NER). NER involves tagging tokens in text to identify entities like people, organizations, and locations. The competition involves developing two models, one of which must be a feature-based model, and the other can be a deep learning-based model. During the competition, my team and I crafted two models: one harnessing deep learning with the XLM-RoBERTa model fine-tuned on our dataset and another using a feature-based approach with RandomForest. The official evaluation metric is Macro F1, with a weighted scoring scheme based on the model's performance, the report documentation and development log, and the source code quality. Overall, participating in the NLP Hackathon showcased my ability to tackle real-world NLP challenges and collaborate effectively within a team to achieve shared objectives.   Link

Received Scholarship on the Merit Scholarship Based on BracU Academic Results Summer 2021 — Spring 2024

27th International Conference on Computer and Information Technology (ICCIT 2024)   December 2024
Received the '2024 ICCIT Best Technical Presentation of the Session - 29 IOS' award   Link

Best Thesis Award, BRAC University   February 2025
Recognized for outstanding undergraduate thesis based on panel evaluation, supervisor's recommendation, and publication quality.

OTHER EXPERIENCES

Intra University Programming Contest, Fall 2022   BRAC University
     Participated in the contest and was in the top 7.   November 2022
DL Sprint 2.0 - BUET CSE Fest 2023   kaggle Competitions
     Participated in Bengali Document Layout Analysis Competition   September 2023
Robi Datathon 3.0, 2024   kaggle Competitions
     Participated in the Qualifier Round   April 2024
RSNA 2024 Lumbar Spine Degenerative Classification   kaggle Competitions
     Participated in the Competition   May - November 2024

ONLINE COURSE CERTIFICATIONS

DataCamp Machine Learning Scientist with Python Track   Certification Link
I completed an extensive machine learning course on DataCamp, where I delved into a wide range of topics, including regression, classification, clustering, and data cleaning. Throughout the course, I actively participated in various projects, gaining hands-on experience and honing my skills in applying machine learning algorithms to real-world problems. This experience has equipped me with a strong foundation in machine learning principles and techniques.

SKILLS

Languages	Python, JavaScript, C#, C++, HTML, CSS, SQL, Assembly
Machine Learning	PyTorch, Tensorflow, Keras, OpenCV
Software	LATEX, Bash, Flex
Frameworks	FastAPI Django, Flask, Laravel
Databases	MySQL, PostgreSQL, MariaDB, MongoDB
OS	Linux, Windows

REFERENCES

Md. Golam Rabiul Alam, Ph.D.
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Scholar Profiles: Google Scholar — BRAC University - Personal Page

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