

Tahsen Islam Sajon

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Education

Rajshahi University of Engineering & Technology (RUET)

B.Sc. in Computer Science and Engineering

- GPA: 3.22 (3.57 in the Final 2 Years)

Rajshahi, Bangladesh

2018 - 2024

Notre Dame College (NDC), Dhaka

Higher-Secondary Certificate

- GPA: 5.00 out of 5.00

Dhaka, Bangladesh

2015 - 2017

Standardized Test Scores

Graduate Record Examination (GRE) – 327/340

17 August, 2024

QUANTITATIVE: 168/170, VERBAL: 159/170, ANALYTICAL WRITING: 5.0/6.0

Test of English as a Foreign Language (TOEFL) – Total: 113/120

5 October, 2024

READING: 30/30, LISTENING: 30/30, SPEAKING: 27/30, WRITING: 26/30

Research Experience

Undergraduate Research Assistant

YL Research Lab, RUET

- Conducted medical image processing research using deep learning for computer vision.
- Led machine learning outreach initiatives; mentored undergraduate students.
- Undergraduate Thesis: Skin Lesion Classification Using Metadata-Aware Attention Enhanced Memory Networks

Rajshahi, Bangladesh

June 2022 - July 2023

Publications

Scalable Multi-Teacher Gated Knowledge Distillation for Accurate & Efficient Leukemia Classification.

Extended Abstract Accepted in NeurIPS 2023 NewInML Workshop. First Author. (Non-Archival) (PDF [🔗](#))

Attention Mechanism-enhanced Deep CNN Architecture for Precise Multi-Class Leukemia Classification.

Springer LNNS Book Chapter. First Author. 2023 International Conference on Big Data, IoT and Machine Learning. (Paper [🔗](#))

Recognition of Leukemia Sub-types Using Transfer Learning and Extraction of Distinguishable Features Using an Effective Machine Learning Approach.

Conference Paper. First Author. 2023 International Conf. on Electrical, Computer and Communication Engineering. (Paper [🔗](#))

Large Ensemble of Transfer-Learned Models for Plant Disease Recognition from Diverse Leaf Images.

Taylor & Francis Book Chapter. Third Author. 2023 International Conference on Big Data, IoT and Machine Learning. (In Press)

Research Projects

3D Gaussian Splatting for Surgical Scene Reconstruction (Ongoing)

- Exploring dense 3D reconstruction and tracking in endoscopic videos using 3D Gaussian Splatting (3DGS) to capture geometry and material properties with physically-based rendering.
- Broadly, I am interested in how the explicit geometric representation of 3DGS can be leveraged for scene understanding in Digital Twins and also improve real-time performance on mobile devices.
- Implemented a barebones 3DGS rendering pipeline in CUDA with Python bindings and Vulkan Compute Shader [GitHub](#) [🔗](#). My notes on some recent 3DGS literature are available here: [Link](#) [🔗](#).

Adaptive Multi-Teacher Knowledge Distillation: A Framework for Efficient Model Compression - NeurIPS NewInML 2023 - [GitHub](#) [🔗](#)

- Introduced a learnable gate to dynamically weight distillation targets from diverse teachers, optimizing information transfer to the student.
- Employed Swin Transformer and ConvNext as complementary teacher models, utilizing transformer's global context modeling and CNN's local feature extraction capabilities to fine-tune a MobileNetV2 student model.
- Achieved SOTA leukemia classification performance, while significantly reducing computational overhead for real-world medical deployments.

Interpretable Leukemia Classification: Attention-Enhanced CNN Architecture - [Article](#) [🔗](#)

- Incorporated a Convolution Block Attention Module (CBAM) to enhance feature representation through channel-wise and spatial attention
- Evaluated the framework using four transfer-learned architectures (DenseNet201, ResNet50, EfficientNetB6, Xception) on an open multiclass leukemia dataset
- Analyzed intermediate feature maps to validate attention-based refinement, and used Grad-CAM to visualize regions of interest in peripheral blood smear (PBS) images, ensuring transparency in leukemia diagnosis.

Feature Engineering vs Deep Learning: A Comparative Study in Leukemia Classification - Article [↗](#)

- Identified and validated key features: Haralick (texture), Hu moments (shape), and threshold adjacency statistics (structure), to improve feature representation for PBS images
- Evaluated multiple classifiers (e.g., SVM, Extra Trees, Gaussian Process) to ensure robustness of engineered features, and outperformed existing handcrafted feature-based methods
- In parallel, developed transfer-learned models with optimized hyperparameters as deep learning benchmarks, addressing regularization issues identified in the literature

Autonomous Driving: Predicting Imminent Car Accidents from Dashcam Footage - GitHub [↗](#)

- Implemented a video classification system for predicting imminent car accidents from dashcam footage; with challenging factors such as varying road types, lighting conditions, and accidents occurring outside the vehicle's immediate path.
- Explored pretrained CNN encoders with RNNs, as well as transformer-based models VidSwin and ViViT, to capture better temporal dynamics and long-range dependency in video sequences.
- Our most effective method integrated EfficientNetV2M for frame feature extraction with a Transformer block for modeling temporal dependencies, enabling end-to-end training and improved spatial-temporal feature learning.

Skin Lesions Analysis: Integrating Patient Metadata with Attention Enhanced Memory Networks

- Adapted memory-augmented neural networks from language modeling to integrate image features and patient metadata, enabling the model to dynamically query a memory bank for the most relevant information.
- Addressed class imbalance and demographic bias. Worked with skin lesion images from a diverse range of Fitzpatrick skin types to improve model generalization and fairness across underrepresented skin tones in dermatological AI.
- Manuscript under preparation for submission to a peer-reviewed journal.

Professional Experience

Machine Learning Engineer

Dhaka, Bangladesh

Advanced Chemical Industries (ACI) Limited

August 2023 - Present

- **PERSONNEL TRACKING & HEATMAP WITH VISION-BASED MICROSERVICES.** Deployed customer tracking and analytics systems across multiple outlets in Bangladesh's largest retail chain. Used homography transforms to map detections onto floorplans. Implemented containerized microservices for personnel detection using YOLOv8, with RabbitMQ for messaging and Redis for frame caching to process multiple camera feeds efficiently. [Project Details](#) [↗](#)
- **TIME SERIES ANALYSIS & FORECASTING.** Led predictive analytics for long-term forecasts, using SARIMA, Prophet, and LSTM to inform crop and seed business planning. Integrated meteorological data with crop knowledge base to provide actionable agricultural insights. Additionally, analyzed data to assess and predict Sales Representative performance. [Project Details](#) [↗](#)
- **DOCUMENT KEYWORD EXTRACTION FOR SUPPLY CHAIN.** Leveraged multimodal LLMs with Gemini Vision API and Google Cloud Platform (GCP) to process proforma invoices. Extracted structured information—e.g., beneficiary details, product specifications, and financial data—enabling supply chain entities to automatically cross-verify manual entries. [Project Details](#) [↗](#)
- **MERCHANDIZING VISIBILITY & ANALYTICS.** Implemented a pipeline to monitor retail product visibility and distribution. Photos from field agents are stored in AWS S3 and processed using a custom object detection model. The system integrates location data to provide a granular view of market presence and guide product placement strategies. [Project Details](#) [↗](#)
- **AUTOMATED VEHICLE LICENSE PLATE RECOGNITION.** Employed YOLOv5 for vehicle and license plate detection from factory CCTV footage. Integrated with SQL database for automated rent billing and security logging. This system monitors truck entry-exit times, streamlines billing, and enhances factory security, significantly reducing manual work. [Project Details](#) [↗](#)
- **THEFT DETECTION WITH ACTION RECOGNITION.** Developing a system to identify Point of Sale (POS) theft in Shwapno retail stores. This uses action recognition to detect specific sequences, aiming to classify videos from the action embeddings.
- **Technology Stack:** Computer Vision, Time Series Forecasting, Object Detection, Data Analysis & Automation, Model Deployment

Associate Software Engineer

Dhaka, Bangladesh

Brain Station 23 LTD

June 2021 - April 2022

- Contributed to the development of a suite of security applications for law enforcement agencies. Implemented the frontend using React and worked on the FeathersJS socket-based backend to meet real-time requirements.
- Designed and implemented an enterprise data validation engine, translating 300+ client-provided rules into a high-performance pipeline. Optimized server read/write requests for on-the-fly validation, and integrated conditional validation across multiple data sources in the dashboard interface.
- Learnt to balance professional responsibilities with academic studies. Leveraged this experience as a catalyst for broader engagement, actively participating in coding communities, research projects, and conferences.
- **Technology Stack:** Node.js, FeathersJS, React, Microsoft SQL Server

Competitions

2024	Champion , Robi Datathon 3.0 - the Country's Largest Data Science Competition (Press Release ↗)	Dhaka, Bangladesh
2024	3rd Place , 2nd AVA Challenge@IEEE MIPR - Risk Prediction from Dashcam Footage (Competition ↗)	San Jose, CA, USA
2024	Broze Medal , 3D Segmentation Notebook for Kidney Vasculature - SenNet + HOA (Notebook ↗)	Kaggle
2019	6th Place , GyanJam - Programming Contest	Rajshahi, Bangladesh
2018	4th Place , CodeSmash - Programming Contest	Rajshahi, Bangladesh
2016	Champion , NDC Dhaka STEM ICT Contest	Dhaka, Bangladesh

Selected Academic and Other Projects

Competitive Programming

C, C++, Data Structure & Algorithms

- Passionate about problem-solving. Actively participated in both on-site and online programming contests.
- Solved 900+ algorithmic problems across leading competitive programming platforms including Codeforces, LightOJ, UVa, SPOJ, and URI
- Achieved a maximum rating of 1608 on Codeforces (Title: Expert [🔗](#)); placed within the top 2% in Div. 2 contests.

Selected Coursework

- CSE-4101 Compiler Design: Wrote a custom Lexical Analyzer and Semantic Parser in C++.
- CSE-3203 Computer Architecture: Designed a 4-bit CPU with a 13-bit instruction set and 128x13 SRAM in Logisim. Built the complete system from flip-flops to ALU, including a register set and memory
- CSE-2100 Project: Built an interactive Space Shooter Game with gesture-based controls using Pygame, Arduino Uno and LDRs

OpenBooks Bookstore API - GitHub [🔗](#)

Node.js, Express, MongoDB, Mongoose

- Built a scalable, feature-rich RESTful API including filtering, sorting, and pagination.
- Implemented authentication and authorization systems with JWT-based user management and password reset functionality.
- Integrated security measures: encryption, sanitization, and rate limiting.
- Applied MVC architecture with MongoDB and Mongoose for CRUD operations and data aggregation.

Open Source Contributions

- Contributed to INCF Impact Visualization Portal: Implemented .env file support for API secret management, enhancing project security and deployment flexibility. [PR #15](#) [🔗](#)
- Contributed to RUXAILAB: Fixed bug in Vue Frontend, improving user interface functionality. [PR #441](#) [🔗](#)

Awards and Achievements

2023	Award of Excellency for Reseach Contributions , YL Research Lab, RUET	<i>Rajshahi, Bangladesh</i>
2021	Certificate For Outstanding Leadership , RUET	<i>Rajshahi, Bangladesh</i>
2015	Government Scholarship for Academic Excellency , Board of Intermediate and Secondary Education	<i>Kushtia, Bangladesh</i>

Leadership and Volunteering Experience

Department of CSE, RUET

Class Representative

Rajshahi, Bangladesh

2018 - 2023

RUET Analytical Programming Lab

Student Mentor

Rajshahi, Bangladesh

2019 - 2020

Notre Dame English Club

Group Representative

Dhaka, Bangladesh

2016 - 2017

Technical Skills Summary

Programming Languages Python, C, C++, JavaScript

Machine Learning Domain Computer Vision, Biomedical Image Processing, Time Series Forecasting, Predictive Analysis, Object Detection, Recommendation Systems, Sequence to Sequence Learning

ML-DL Frameworks TensorFlow, Keras, Pytorch, NumPy, Scikit-learn, Pandas, OpenCV

Back-End Frameworks Django, Django REST Framework, Node ExpressJS

Front-End Frameworks ReactJS, VueJS, HTML5, CSS3, Bootstrap

Databases Microsoft SQL Server, PostgreSQL, MongoDB

System Administration & Tools Linux, Shell (Bash/Zsh), Containerisation (Docker), Redis, RabbitMQ, \LaTeX , Git, Markdown