SHOAIB AHMED DIPU

shoaibahmeddipu@gmail.com | https://shoaibdipu.github.io

RESEARCH INTEREST

Medical Image Processing · Data Efficient Deep Learning · Multimodal Deep Learning (Vision + X) · Trustworthy Machine Learning · Foundation & Large Language Models · Computational Biology

EDUCATION

Master of Science in Computer Science and Engineering
January 2023 - Ongoing
BRAC University, Dhaka, Bangladesh
CGPA : 4.00 / 4.00. (18 Credits Coursework Completed. 18 Credits Thesis Ongoing)

Bachelor of Science in Computer Science and Engineering
January 2017 - December 2020
BRAC University, Dhaka, Bangladesh
CGPA : 3.91 / 4.00

RESEARCH

Undergraduate Thesis

• **An Active-Learning based Training-Schedule for Biomedical Image Segmentation on Deep Neural Networks.**
[Link]   Spring 2020 - Fall 2020
— Developed an Active Learning-based training schedule, utilizing an entropy-based uncertainty metric to minimize iterations and reduce the computational cost of training neural networks.
— Supervisors: Dr. Mahbubul Alam Majumdar, Sowmitra Das, Shahnewaz Ahmed

Journal Publication

• **CDSImpute: An Ensemble Similarity Imputation method for single-cell RNA sequence dropouts**. (2022) [Link]
— Developed a novel method for imputing dropout events in single-cell RNA-seq data, enhancing cell-type identification and differential gene expression analysis.
— Authors : Dr. Riasat Azim, Shulin Wang, **Shoaib Ahmed Dipu**
— Published in **Computers in Biology and Medicine**, **Q1** Journal, IF : **7.0**.

• **A patient-specific functional module and path identification technique from RNA-seq data**. (2023) [Link]
— Developed a patient-specific network construction method from RNA-seq data, integrating differential gene expression and mutations to identify regulatory modules, driver genes, and personalized disease networks for improved therapeutic insights.
— Authors : Dr. Riasat Azim, Shulin Wang, **Shoaib Ahmed Dipu**, Nazmin Islam, Munshi Rezwan Ala Muid, Md Fazla Elahe, Mei Li
— Published in **Computers in Biology and Medicine**, **Q1** Journal, IF : **7.0**.

• **A Comprehensive Review on Machine Learning Paradigms: Taxonomy, Models, Purposes, Applications, Comparative Benefits, and Future Research Opportunities**. (2024)
— Proposed a new taxonomy, evaluated ML's transformative impact in healthcare, e-commerce, and education, addressed ethical concerns like bias and privacy, and synthesized recent findings to guide future research, emphasizing its potential while mitigating risks.
— Authors : Mohammed Julfikar Ali Mahbub, **Shoaib Ahmed Dipu**, Rakibul Hasan, Md. Fahim-Ul Islam, Md. Mahadi Hasan, Anika Tahsin, Dr. Md. Golam Rabiul Alam, Md Zia Uddin
— Under Review in **PeerJ Computer Science**, IF : **3.8**.

Conference Publication

• **A Deep Learning Based Ensemble Approach for Gastrointestinal Disease Detection with XAI**. (2024) [Link]
— Proposed an ensemble deep learning model combining a unique CNN architecture with pre-trained models for gastrointestinal disease classification on the Kvasir dataset and enhancing interpretability using LIME-based Explainable AI.
— Authors : Dewan Ziaul Karim, Tasfia Anika Bushra, **Shoaib Ahmed Dipu**
— Published in IEEE International Conference on Artificial Intelligence in Engineering and Technology (**IICAIET**).

Manuscript Under Preparation

• **For a Few Accuracies More: A Critical Analysis of Generalizability, Reproducibility, and Interpretability in Single-Cell Multi-Omics**. (2025).

— Critically evaluated existing works of Single Cell Multi-Omics through the lenses of Generalizability, Reproducibility, and Interpretability to advance trustworthy and translational bioinformatics research.

— Authors : **Shoaib Ahmed Dipu**, Dr. Riasat Azim, Dr. Swakkhar Shatabda, Dr. Salekul Islam

— To be submitted to **Briefings in Bioinformatics** (*Special Issue*), **Q1** Journal, IF : **7.7**.

• **GAIN-Med: Gradient-Driven Angle-Informed Learning for Efficient Biomedical Image Segmentation**. (2025).

— A Model-Centric Curriculum Approach for Reducing Annotation and Training Cost based on GAIN-RL.

— Authors : **Shoaib Ahmed Dipu**

• **FetalSIFT-CNN: Fetal Brain Plane Classification Enriched by SIFT and Enlightened Through Grad-CAM-based Explainability**. (2024-25)

— Proposed a novel fetal brain plane classification architecture that integrates CNN-extracted global features with Dense SIFT local features, classifies them using LightGBM, and enhances interpretability through Grad-CAM for global feature visualization and SIFT key points for local feature representation.

— Authors : A.M. Tayeful Islam, **Shoaib Ahmed Dipu**, Md Abu Ibrahim, Dr. Md. Golam Rabiul Alam

— To be submitted to **Neural Computing and Applications**, **Q1** Journal, IF : **5.1**.

• **FedMedFMC: A Federated Learning Framework for Multi-Institutional Medical Image Classification.**. (2024-2025).

— Extending federated learning across the MedFMC dataset for privacy-preserving and non-IID federated learning across multiple clinical domains. Evaluates aggregation strategies (FedAvg, FedProx, FedDyn) and transformer-based encoders for improved generalization across heterogeneous medical institutions. *(Extended work from Course Project)*

— Authors : **Shoaib Ahmed Dipu**

Supervision

• **Exploration and Mitigation of Gender Bias in Word Embeddings from Transformer-based Language Models**. (2023). [Link]

— Investigated gender bias in transformer-based language models like BERT by employing various bias detection methods, introducing a novel metric called MALoR, and mitigating bias through continued pretraining on a gender-balanced dataset created via Counterfactual Data Augmentation.

— Co-supervised Undergraduate Thesis with Dr. Farig Yousuf Sadeque

APPOINTMENT

Lecturer — June 2022 - Present
Department of Computer Science and Engineering, BRAC University — *Dhaka, Bangladesh*
- Courses Currently Teaching : Algorithms, Neural Networks
- Courses Taught : Database Systems, Artificial Intelligence, Object Oriented Programming, Operating Systems

Lecturer — May 2021 - May 2022
Department of Computer Science and Engineering, Northern University Bangladesh — *Dhaka, Bangladesh*
- Courses Taught : Object Oriented Programming, Theory of Computation, Compiler Design, Introduction to Computer, Web Programming, Database Programming

Student Tutor (Undergraduate Teaching Assistant) — September 2019 - December 2020
Department of Computer Science and Engineering, BRAC University — *Dhaka, Bangladesh*
- Courses Taught : Structured Programming, Object Oriented Programming

Student Tutor (Undergraduate Teaching Assistant) — July 2020 - September 2020
Department of Mathematics and Natural Sciences, BRAC University — *Dhaka, Bangladesh*
- Course Assisted : Linear Algebra and Fourier Analysis

Student Mentor of First Year Advising Team (FYAT) — January 2019 - December 2019
Office of Academic Advising, BRAC University — *Dhaka, Bangladesh*

TECHNICAL SKILLS

Programming Languages: Python, Java, C/C++, R
Other Languages: MATLAB, Mathematica, LaTeX, x86 Assembly, Bash, Verilog
Web Programming: PHP, MySQL, HTML5, CSS
Library: TensorFlow, Keras, PyTorch, Scikit-learn, Pandas, NumPy, Matplotlib, JOGL
Software & Tool: Git, Altera Quartus, Microwind, PSpice, emu8086

HONOR & AWARD

- **Quality Journal Publication Award, BRAC University** (Amount : **50,000 BDT / 415 USD**. Awarded to the Authors who published Q1 Journal Articles in 2023)
- **Conference Fund, BRAC University** (Amount : **50,000 BDT / 415 USD**. Awarded for publishing in Conference.)
- Completed Bachelor's with **Highest Distinction** (Awarded to candidates whose CGPA is 3.80 or higher)
- Got placed on **Vice Chancellor's List for 6 times** during Bachelor's (Awarded as recognition of achieving a GPA of 3.90-4.00 on a particular semester)
- Got placed on **Dean's List for 5 times** times during Bachelor's (Awarded as recognition of achieving a GPA of 3.70-3.89 on a particular semester)
- **Special Recognition Award** (Vice Chancellor's Certificate) for Residential Semester (Top **4.4%**. Awarded as recognition of high standard of Discipline and Devotion during Residential Semester)
- Merit Based Scholarship (**70% waiver**) on Tuition Fees in every semester of Undergraduate
- Postgraduate Scholarship (**40% waiver**) and Merit Based Scholarship (**75% waiver**) on Tuition Fees in every semester of Postgraduate)

UNDERGRADUATE ACADEMIC PROJECT

- Automation on Agriculture Field by Creating Mesh Network using esp8086 (Microprocessors) [Link]
- Employee Management & Performance Tracker System (Database Systems) [Link]
- Automated Restaurant Management System (Software Engineering [Link] & System Analysis & Design [Link])
- Maze Solver & Android based Bluetooth Controlled Robot (Digital System Design) [Link]

SERVICE

- **Lab Course Coordinator** [Summer 2022, Fall 2022, Spring 2023, Summer 2023, Fall 2023, Spring 2024, Summer 2024, Fall 2024], BRAC University. (Coordinated with Lab Faculty Members of 10-20 different sections & approximately 400-800 students to conduct the Lab Course of those particular semesters)
- **Pre Thesis II Panel Judge** [Summer 2022, Fall 2022, Spring 2023], BRAC University. (Evaluated & provided feedback to the Posters & Presentations of the Undergraduate Thesis groups)
- **Final Thesis Defense Panel Judge** [Summer 2023, Spring 2024, Summer 2024, Fall 2024, Spring 2025, Summer 2025], BRAC University. (Evaluated & provided feedback to the research works of Undergraduate Thesis groups)
- **Final Project & Thesis Defense Panel Judge** [Summer 2021, Fall 2021, Spring 2022], Northern University Bangladesh. (Evaluated & provided feedback to the research works of Undergraduate Project & Thesis groups)
- **Academic Advisor of Probationary Students** [Spring 2023, Summer 2023], BRAC University. (Consulted and advised undergraduate students who are on academic probation)
- **Organizing & Hosting Webinars** [2021], Northern University Bangladesh. (Invited guests both from Academia & Industry to share their journey & experience with the Undergraduate students) [Link]

TALKS AND PRESENTATIONS

- Paper Presentation at IEEE International Conference on Artificial Intelligence in Engineering and Technology, 2024. [Slides] [Paper]
- Contributed Talk : Short Introduction to Neural Networks & Deep Learning, BRAC University. [Link]

MISCELLANEOUS

- Champions of Earth : Season I, North South University. **Top 2.7%**. Participated in an Environmental based Idea Generation Competition. Around 296 teams participated in first round & 8 teams made it to the Grand Finale. [Link]