Md Tanzim Hossain

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PROFILE

I am a dedicated professional with a strong background in computer science and engineering, with extensive experience in both academia and research. Over the years, I have held various roles such as Lab Instructor, Lab Officer, and Lecturer at North South University and Presidency University, where I have effectively mentored students and led lab sessions. My expertise in deep learning in medical research and in data analysis, particularly in the development of algorithms for mathematical modeling and model order reduction, has been a key driver in solving complex problems. With strong proficiency in Python, MATLAB, Microsoft Excel and data visualization tools like Microsoft Power BI, I am able to derive actionable insights from large datasets, making me an invaluable asset to any data-driven project. My research has been published in high-impact journals, further solidifying my analytical capabilities and commitment to advancing innovative solutions.

PROFESSIONAL EXPERIENCE

Backend & AI/ML Lead (Django | Computer Vision | Healthcare AI), *BigMatrix Lab* 01/2023 – Present | Dhaka, Bangladesh

- Led and supervised backend development for a Django-based healthcare AI platform, ensuring scalable, secure, and high-performance system architecture.
- Designed and implemented end-to-end technical architecture, including backend APIs, AI pipelines, data flow management, and UI integration.
- Developed and integrated machine learning and computer vision models for medical image segmentation and diagnostic analysis using TensorFlow and PyTorch.
- Built containerized AI models to improve portability, performance, and reproducibility across development and production environments.
- Implemented load balancing strategies and managed Docker Swarm deployments to achieve high availability, optimized resource usage, and fault-tolerant performance.
- Collaborated with cross-functional teams to deliver scalable AI solutions aligned with healthcare requirements and compliance standards.
- Conducted code reviews, automated testing, and debugging, ensuring adherence to best practices and maintaining high-quality deliverables.
- Provided technical leadership by mentoring team members, guiding solution design, and overseeing UI/UX workflow integration with backend and AI services.

Research Assistant, *North South University* 01/2020 – 07/2024 | Dhaka, Bangladesh

- Conducted research on advanced medical image segmentation, computer vision, and AI-driven diagnostic techniques; contributed to innovative solutions for complex image analysis tasks.
- Published research papers in Q1 journals, focusing on AI applications in healthcare, medical imaging, and mathematical modeling.
- Designed and implemented machine learning algorithms, simulation pipelines, and data-driven optimization frameworks for large-scale dynamical systems.
- Generated high-fidelity simulation data using COMSOL Multiphysics® (v5.5) for projects involving physical systems modeling, aircraft wing shape optimization, and large-scale system dynamics.
- Performed literature reviews, identified new methodologies, and developed frameworks for model reduction, finite-frequency analysis, and time-interval approximation of dynamical systems.

- Created computer-oriented simulations and implemented custom algorithms to validate theoretical findings and apply them to real-world engineering and scientific problems.
- Developed and applied Model Order Reduction (MOR) techniques across domains including second-order descriptor systems, large-scale dynamical systems, and aerospace optimization.
- Assisted in designing and testing data-driven airfoil optimization models leveraging MOR approaches for aerodynamic performance improvement.
- Prepared detailed documentation, technical reports, and research deliverables, ensuring reproducibility and clarity for academic and industrial stakeholders.
- Mentored junior researchers and students, contributed to academic excellence, and supported interdisciplinary collaboration on funded research projects.

Lab Instructor, *North South University* 05/2021 – 07/2024 | Dhaka, Bangladesh

- Delivered laboratory lectures and guided students through hands-on session activities based on prepared lab manuals and course materials.
- Developed, updated, and maintained lab manuals, detailed lab syllabi, and marks distribution in coordination with course faculty.
- Conducted weekly 2 hr 40 min lab sessions, quizzes, viva exams, and lab-related assessments while ensuring structured learning outcomes.
- Evaluated lab reports, quizzes, exam papers, and overall student performance with fairness and academic integrity.
- Maintained 1.5 hours of weekly office hours per section to provide academic support, clarification, and consultation to students.
- Served as a proctor during exams, enforcing academic honesty policies and taking appropriate actions against unfair means.
- Ensured all exam questions and lab syllabus materials were verified and approved by faculty prior to administration.
- Supported smooth course operations through timely communication, documentation, and adherence to institutional academic policies.

Lecturer, *Presidency University* 01/2022 – 12/2022 | Dhaka, Bangladesh

- Taught Engineering Mathematics (Differential Equations) and Java Programming, delivering structured lectures and guiding students through theoretical concepts and practical problem-solving.
- Designed and delivered course outlines, weekly lesson plans, lab materials, and assessments, ensuring alignment with university academic standards.
- Conducted tests, quizzes, assignments, and exams, and evaluated student performance with fairness, transparency, and adherence to academic policies.
- Prepared detailed syllabi, grading schemes, and instructional resources and obtained required faculty approvals prior to distribution.
- Provided academic support and consultation through dedicated office hours, helping students understand complex mathematical concepts, programming logic, debugging, and algorithm design.
- Taught core Java topics, including OOP principles, data structures, control flow, file handling, and introductory software development practices.
- Facilitated lab sessions and hands-on coding activities, monitoring progress, identifying learning gaps, and ensuring students successfully implemented programming assignments.
- Served as an exam proctor, upholding academic integrity and enforcing examination rules and regulations.
- Contributed to enhancing the overall learning environment through effective communication, structured content delivery, and continuous student engagement.

Undergraduate Teaching Assistant, 01/2019 – 04/2022 | Dhaka, Bangladesh
North South University

- Served as a UGA for four core courses: C Programming, Data Structures & Algorithms, Digital Logic Design, Computer Architecture
- Conducted weekly tutorial sessions (4+ hours per course) to reinforce key concepts, provide problem-solving support, and guide students through programming, logic design, and hardware architecture topics.
- Assisted faculty in preparing lesson plans, instructional materials, programming tasks, and problem sets for all assigned courses.
- Taught fundamental and advanced concepts including C syntax, memory management, pointers, recursion, algorithm design, complexity analysis, logic circuits, combinational & sequential systems, CPU organization, pipelining, and architectural design principles.
- Graded assignments, quizzes, lab work, and exam scripts, ensuring accuracy, fairness, and alignment with faculty guidelines.
- Proctored quizzes and exams, actively enforcing academic integrity.
- Provided one-on-one student support during office hours, helping learners troubleshoot code, understand algorithms, and master digital logic and computer architecture fundamentals.
- Supported faculty with course-related administrative tasks, contributing to smooth course delivery and improved student performance.

RESEARCH & SOFTWARE DEVELOPMENT PROJECTS

AI-Based Learning Management & Analytics Platform (Healthcare) 03/2023 – 12/2023

- Developed AI-enabled Learning Management and Radiology Training platforms for medical colleges, supporting over 1,200 students and professionals
- Designed and implemented real-time analytics dashboards to monitor assessments, learner engagement, and radiology case performance
- Automated grading and reporting workflows using AI-driven evaluation, reducing instructor workload by approximately 60% while improving consistency

RadAnalysis – Medical Imaging & Radiotherapy Planning Platform 01/2024 – 12/2025

- Developed a medical imaging and radiotherapy planning platform to support clinical decision-making in real hospital environments
- Integrated the system with clinical workflows (DICOM RT-STRUCT) and deployed it at multiple hospitals, enabling analysis of 200+ scans per day
- Optimized batch processing pipelines and data handling, reducing export and processing time from ~15 minutes to ~30 seconds

EDUCATION

Friedrich-Alexander University, 10/2025 – present
Masters of Science in Data Science Erlangen-Nuremberg, Germany
Ist Semester Running

North South University, *Bachelor of Science in Computer Science & Engineering (B.Sc in CSE)* 05/2016 – 01/2021
Bashundhara-Dhaka, Bangladesh
Minor in Mathematics
CGPA: 3.75/4.00

NOTABLE PUBLICATIONS

OncoVision: Integrating Mammography and Clinical Data through Attention-Driven Multimodal AI for Enhanced Breast Cancer Diagnosis, *arXiv Preprint* 11/2025

Pioneering precision in lumbar spine MRI segmentation with advanced deep learning and data enhancement,
Machine Learning with Applications, Elsevier 06/2025

Integrating Mamba Sequence Model and Hierarchical Upsampling Network for Accurate Semantic Segmentation of Multiple Sclerosis Lesion, *International Conference on Life System Modeling and Simulation, Springer Nature Singapore* 12/2024

Efficient aerodynamic design using BézierGAN and model order reduction: A computational study,
Results in Engineering, Elsevier 09/2024

From pixels to pathology: A novel dual-pathway multi-scale hierarchical upsampling network for MRI-based prostate zonal segmentation,
Intelligent Systems with Applications, Elsevier 06/2024

Topology-aware anatomical segmentation of the Circle of Willis: HUNet unveils the vascular network,
IET Image Processing 05/2024

Optimizing Universal Lesion Segmentation: State Space Model-Guided Hierarchical Networks with Feature Importance Adjustment, *arXiv Preprint* 04/2024

Automated Segmentation of Multiple Sclerosis Lesions using Deep Learning, *26th International Conference on Computer and Information Technology (ICCIT), IEEE* 12/2023

A computationally effective time-restricted stability preserving H_2-optimal model order reduction approach, *Results in Control and Optimization, Elsevier* 06/2023

Reduced Order Modeling of a Class of Descriptor System on Certain Domains with the Application to Blood Flow Through the Carotid, *SSRN* 06/2023

Estimating Aerodynamic Data via Supervised Learning, 12/2022
25th International Conference on Computer and Information Technology (ICCIT), IEEE

Sparsity-Preserving Two-Sided Iterative Algorithm for Riccati-Based Boundary Feedback Stabilization of the Incompressible Navier–Stokes Flow, 11/2022
Mathematical Problems in Engineering, Wiley

Computational techniques for H2 optimal frequency-limited model order reduction of large-scale sparse linear systems, 10/2021
Journal of Computational Science, Elsevier

Iterative Rational Krylov Algorithms for model reduction of a class of constrained structural dynamic system with Engineering applications, 01/2021
American Institute of Mathematical Sciences (AIMS)

SVD-Krylov based sparsity-preserving techniques for Riccati-based feedback stabilization of unstable power system models, 2021
Journal of Engineering Advancements

CERTIFICATIONS & ONLINE SPECIALIZATIONS

- Deep Learning Specialization – Coursera
- Machine Learning Specialization – Coursera
- Microsoft Power BI Data Analyst – Coursera

SKILLS

Programming Language
Python, C, C++, Java, JavaScript

Data Science & Analytics
Data Mining, Data Wrangling, Exploratory Data Analysis (EDA), Data Visualization (Matplotlib, Seaborn, Plotly), Microsoft Excel, Power BI, Applied Mathematics for ML (Linear Algebra, Calculus, Optimization)

Frameworks & Libraries
PyTorch, TensorFlow, Scikit-Learn, Pandas, NumPy, Django, ReactJS

Tools & Technologies
Git, GitHub, Docker, Jupyter Notebook, Google Colab, REST APIs, Matlab

Software Engineering Fundamentals
Data Structures & Algorithms, Problem-Solving Techniques, Software Design Patterns & Principles, System Design Basics