Md Anisujjaman

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github.com/Shohan093 | linkedin.com/in/anisujjaman-shohan | ResearchGate

Education

Bangladesh University of Engineering and Technology (BUET) Sept. 2024 – Present
M.Sc. in Data Science, Dept. of Computer Science and Engineering *Dhaka, Bangladesh*
CGPA: 3.1/4.00 (Expected)

Shahjalal University of Science and Technology (SUST) Feb. 2019 – Apr. 2024
B.Sc. in Mathematics, Dept. of Mathematics *Sylhet, Bangladesh*
CGPA: 2.99/4.00

Research Interests

Mathematical Optimization, Machine Learning Systems, Federated Learning, LLM Reasoning, Generative AI, Reinforcement Learning

Research & Publications

Journal Articles

[1] **Md Anisujjaman**, Subrata Sarker, Md Alamgir Kabir, Bornaly Ghosh, Md Azizul Fazal, Deen Mohammed, "Stability and Chaos in a Multi-Species Stochastic Plankton Model: Spectral Bifurcation Analysis Under Temperature-Dependent Metabolic Scaling." (manuscript submitted in *Elsevier*)

[2] S. M. Sayedur Rahman, Ritu Mondal, Sarmin Santa, **Md Anisujjaman**, Kanis Fatema Ferdushi, Md Rejwanul Haque, "Mathematical Analysis of a SEIRD Model for the Spread of Tuberculosis in Bangladesh," *International Journal of Advanced and Applied Science*, Vol. 12, Issue 12, pp. 229–236, DOI.

Conference Proceedings

[3] **Md Anisujjaman**, Nishat Tafannum, Bornaly Ghosh, Md Samio Haque, Tariful Islam, "Multimodal Semantic Image Clustering through Adaptive Fusion of Visual and Textual Representation" *29th International Conference on Computer and Information Technology (ICCIT 2026).* (submitted)

[4] Md Samio Haque, **Md Anisujjaman**, Md Tariful Islam, "Seeing Beyond Binary Labels for Pleural Effusion Detection with Rich-Label Pretraining," *29th International Conference on Computer and Information Technology (ICCIT 2026).* (submitted)

[5] Md Samio Haque, Syed Ashir Abrar, **Md Anisujjaman**, Sadia Sharmin, Md Jamal Uddin, "Interpretable Machine Learning for Predicting Child Stunting in Bangladesh: Division-Wise Insights from the BDHS 2022," *International Conference on Applied Statistics and Data Science (ICASDS)*, 2025. (Accepted for Contributory Talk)

[6] Md Samio Haque, Rakibul Hasan, **Md Anisujjaman**, "Behind the Meter: A Machine Learning Framework for Taxi Fare Fairness with a Hybrid Metric to Identify Route-Level Pricing Bias," *International Conference on Applied Statistics and Data Science (ICASDS)*, 2025. (Accepted for Poster)

[7] Bornaly Ghosh, **Md Anisujjaman**, "Hybrid Modeling of Marine Ecosystem: Integrating Dynamical Systems and Deep Learning for Robust Biomass Forecasting," *International Conference on Applied Statistics and Data Science (ICASDS)*, 2025. (Accepted for Poster)

Academic Thesis

Undergraduate Studies

Projects in Mathematics and Related Fields MAT 433

Project Title: Numerical Simulation of Plankton Dynamics in a Noise-Induced System

- Simulated population trajectories using a stochastic model and applied statistical techniques to estimate population growth in a noise-induced ecological system.
- Introduced a new parameter for model conversion and incorporated noise into system parameters to model trajectories across varying conditions.
- Executed Monte Carlo simulations to assess adequate carrying capacity.

Postgraduate Studies

Thesis CSE 6000

Title: Symbolically Grounded Process Reward Model for Mathematical Reasoning

Research Projects

VectorFed Ongoing

Federated Learning aggregation algorithm

- Designing a novel Federated Learning aggregation algorithm that achieves causal consistency independent of physical NTP synchronization.
- Developing a fully asynchronous aggregation scheme using Vector Clocks in place of NTP for ordering updates across distributed nodes.
- Benchmarking against FedAvg, SyncFed, FedBuff, and OracleFed as baseline comparisons.

Tools: Federated Learning, CloudOps, Vector Clocks, PyTorch, Distributed Systems.

Drift Compensated Distributed RAG for Streaming Analytics Private Repository

Query-side embedding-drift compensation framework for distributed RAG

- Developed a framework for embedding compensation for RAG systems, using orthogonal Procrustes alignment to recover retrieval quality after upgrading/changing embedding models, without re-embedding the corpus.
- Deployed and benchmarked the system across a 5-node distributed shard architecture, achieving **$\sim$97.6% and $\sim$93.5% of oracle NDCG@10** across two embedding-version transitions while avoiding full corpus re-embedding costs.
- Diagnosed and resolved key distributed-systems performance issues, including a $\sim 2\times$ **latency penalty from sequential shard fan-out** (fixed via parallelized request handling) and validated shard-side vs. router-side adaptation trade-offs.

Technical Skills

- **Programming Languages:** C/C++, Python, MATLAB, FORTRAN, HTML/CSS
- **Libraries & Frameworks:** Pandas, Seaborn, Plotly, Geopandas, Statsmodels, Selenium, Playwright, Scikit-learn, TensorFlow, PyTorch, NLTK, LangChain, LangGraph, LlamaIndex, FAISS, PySpark
- **Database & Cloud:** MySQL, PostgreSQL, BigQuery, GCP, VectorDB
- **Data & Systems Engineering:** Big Data Analytics, Distributed Systems (Federated Learning, Distributed RAG), Linux
- **Tools:** LaTeX, Generative AI, Hugging Face, Power BI, Apache Airflow, LLM Fine-tuning, GitHub
- **Languages:** Bengali (Native), English (Full Professional Proficiency)
- **Other:** Statistical Data Analysis, Time-Series Analysis, Hypothesis Testing

Professional Experience

Data Analyst Jan. 2026 – Mar. 2026
Barikoi Technologies Ltd. *Dhaka, Bangladesh*

- Improved geospatial data quality by applying machine learning and spatial validation techniques.
- Developed automated data collection workflows to streamline ingestion of raw geospatial data.
- Maintained syslogs and data warehouse pipelines, ensuring a clean and reliable data flow.

Teaching Assistant June 2025 – Dec. 2025
Bangladesh University of Engineering & Technology *Dhaka, Bangladesh*

Programming Activities

Competitive Programming: Solved 400+ problems across Codeforces (max rating 1149), Leetcode (max rating 1556), CodeChef (max rating 1264), LightOJ, and others.

Kaggle: Notebook Contributor; achieved 3 notebook bronze medals.

Affiliations

Euclid Programming Club, Dept. of Mathematics, SUST

- General Secretary *Mar. 2023 – May 2024*
- Assistant Organizing Secretary *Feb. 2020 – Mar. 2023*

Certifications

5-Day GenAI Intensive Certification

- Acquired knowledge in prompt engineering and image/text embeddings utilizing the Gemini API.
- Applied vector search and hybrid search in a vector database to retrieve relevant information.
- Applied probabilistic methods to retrieve images based on user queries.

References

Dr Md Alamgir Kabir akabir-mat@sust.edu
Professor, Dept. of Mathematics, SUST *Undergraduate Supervisor*

Dr Subrata Sarker subratasrk-ocg@sust.edu
Associate Professor, Dept. of Oceanography, SUST *Research Supervisor*

Sukarna Barua sukarnabarua@cse.buet.ac.bd
Associate Professor, Dept. of Computer Science and Engineering, BUET *Graduate Supervisor*