Md. Goffar Hossain

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Research Interests:

My research interests are in Human–Computer Interaction, Computational Social Science, Natural Language Processing, and AI for healthcare. I work on machine learning and NLP models with a focus on explainability, and I am interested in designing decision-support systems informed by behavioral and social data to study mental health and human behavior.

Education:

Khulna University *Graduation: Jan 2025*
B.Sc. in Statistics **CGPA:** 3.29/4.00
Relevant Coursework: Statistical Data Mining; Probability Theory; Regression Analysis; Generalized Linear Models; Time Series Analysis; Experimental Design; Robust and Nonparametric Statistics; Epidemiology; Biostatistics.

Publications:

1. **Hossain, M. G.**, Hossain, Md. S., Arfin, Md. S., Zaman, Md. S., Asadujjaman, Md., Roy, T. K., Alauddin, S., & Maniruzzaman, Md. (2025). *Developing an ensemble model for predicting depression among school teachers: A cross-sectional study in Rajshahi and Khulna regions of Bangladesh*[Poster session]. International Conference on Applied Statistics and Data Science 2025, ISRT, University of Dhaka.

2. Shozol, S. A., **Hossain, M. G.**, & Mahdy, M.R.C. (2025, Dec). *Analyzing Media Narratives of the 2024 Bangladesh Mass Movement Using Topic Modeling, Machine Learning, and Explainable AI: News from Bangladesh, India, and Pakistan.* 28th International Conference on Computer and Information Technology (28th ICCIT 2025).

3. Barna, S. D., Quayyum, A., **Hossain, M. G.**, Islam, A., & Rahman, F. (2025). *Trends and determinants of antenatal care use and quality in Bangladesh: Insights from demographic and health survey data.* **PLOS ONE**, 20(11), Article e0337449. https://doi.org/10.1371/journal.pone.0337449

4. Barna, S. D., Quayyum, Md. A., & **Hossain, Md. G. (2025)**. Impact of COVID-19 outbreak on the food habits and nutritional status of Khulna's citizens. Poster presented at the IQAC-2025 Conference, Khulna University.

5. Shozol, S. A., & **Hossain, M. G**. (2025, July). Cross-national media framing of mass movements: A comparative study of the July 2024 uprising in South Asia [Poster session]. 1st International Conference on the July Revolution (ICJR-I 2025), University of Dhaka.

6. Shozol, S. A., **Hossain, M. G.**, & Sabbir, K. (2026). An interpretable fake news detection framework: From classical machine learning to transformers with LIME. In Proceedings of the International Conference on Machine Learning and Robotics Systems (ICMRS 2026).

Current Projects:

- **Depression and Anxiety Detection–Based Intelligent System (DADIS)**
  Progress: Developing an intelligent decision-support system for detecting depression, anxiety, and their co-occurrence among school teachers using machine learning, NLP, and explainable AI, building on a deployed ensemble-based prototype and incorporating behavioral and financial stress indicators.

- **Multimodal Breast Cancer Classification Using Thermal Imaging and Text-Based Diagnostic Data.**
  Progress: Developing a multimodal breast cancer classification model that integrates thermal imaging of the thorax region with textual diagnostic metadata to predict benign or malignant conditions. This approach leverages deep learning for visual feature extraction and language models for text embeddings, enhancing diagnostic reliability through multimodal fusion.

Research Experiences:

Undergraduate Thesis
Title: **Enhancing Fake News Detection Using Data Augmentation and Advanced Machine Learning Algorithms with Explainable AI (XAI)**
Supervisor: [Sutapa Dey Barna](KU)
- Developed a fake-news detection system using Logistic Regression, Decision Trees, XGBoost, AdaBoost, and BERT, augmented via synonym substitution and numerical-mapping, and made interpretability a priority through LIME. Achieved up to 99% accuracy, precision, and recall with BERT, and applied statistical tests to validate the significance of performance gains.
- **Tech used**: NumPy, Pandas, Scikit-Learn, BERT, Data Augmentation, LIME.

Research on Topic Modeling and NLP (Ongoing)
Title: **Topic Modeling and Sentiment Analysis of Mass Movement Coverage: A Comparative Analysis from South Asian Print Media**
Supervisor: [Dr. Mahdy Rahman Chowdhury](NSU)
- Conducting a comparative analysis of news coverage on the July Mass Uprising across Bangladesh, India, and Pakistan using sentiment-analysis (classical, ensemble, transformer-based) and topic-modeling (LDA) techniques. Employed web-scraping (BeautifulSoup4), LLM-prompting (few-shot, CoT, ToT), interpretability via LIME, data-augmentation, and ablation testing (PCA) to enhance model robustness and reveal evolving themes.
- **Tech used**: Python, NumPy, Pandas, BeautifulSoup4, LDA, LIME, advanced sentiment-analysis models, LLM prompting.

Research Assistant
Paper Title: **Trends and determinants of antenatal care use and quality in Bangladesh: Insights from demographic and health survey data.**
Supervisor: [Sutapa Dey Barna](KU)
- Published in PLOS ONE Journal.
- Responsibilities:
    - Data curation and preprocessing of large-scale Demographic and Health Survey (DHS) datasets.
    - Investigation and statistical analysis to identify determinants of antenatal care use and quality.
    - Methodology development using regression and multivariate statistical models.
    - Writing and contributing to the original draft and revisions of the manuscript.

Projects:

[01] Depression Severity Prediction with Explainable Ensemble Machine Learning
   Goal: To develop an explainable, research-oriented machine learning system for multiclass depression severity prediction (None/Minimal, Mild, Moderate, Moderately Severe) among school teachers using primary survey data, extending findings from a published conference poster into a deployable proof-of-concept web application.
   Methods/Tools: *Python, NumPy, Pandas, Scikit-learn, XGBoost, ensemble learning (stacking), SHAP for model explainability, Gradio, and Hugging Face Spaces.*
      Live demo — https://huggingface.co/spaces/goooofar/depression-severity-predictor

Skills:

Soft Skills for Teaching: Communication, Teamwork, Problem-solving, Time management, and the ability to explain complex   concepts in simple terms
Research Methods: Data Scraping, Surveying, Interviewing.
Programming Languages: Python, R.
Frameworks: PyTorch, BERT, TensorFlow, Keras
Libraries: NumPy, Pandas, Scikit-learn, Matplotlib, NLTK, BeautifulSoup4, SHAP
Tools & Software: Git, LaTeX, SPSS, Visual Studio Code, PyCharm, Google Colab, Gradio, Hugging Face Spaces

Training and Certification:

Applied Machine Learning/Applied Deep Learning/Artificial Intelligence (Natural Language Processing) Program.
   Mahdy Research Academy
      Supervisor: Dr. Mahdy Rahman Chowdhury(NSU)
- Gained in-depth knowledge of **machine learning algorithms** and their applications in real-world problems.
- Hands-on experience with **data preprocessing**, **feature engineering**, and applying both **machine learning** and **deep learning models** in Python.
- Gained proficiency in **research tools** such as **LaTeX**, **draw.io**, and other research methodologies.
- Developed problem-solving skills for **Natural Language Processing (NLP)** applications and learned how to approach these problems efficiently.
- Learned how to formulate methodologies in a structured and constructive manner for research projects.

Extracurricular Activities:

- **General Secretary**, Kristy – Cultural Organization, Khulna University   *(Jan 2024 – Jan 2025)*

   Elected chief student coordinator of the university's leading cultural organization; led a 50+ member core team and oversaw major events. Under this leadership, Kristy was awarded **"Best Cultural Organization of 2024"** by Khulna University.

Languages:

- Bangla – Native
- English – Professional Proficiency

References:

Dr. Md. Maniruzzaman, Associate Professor, Statistics Discipline, Khulna University – monir.stat91@gmail.com

Dr. Sharlene Alauddin, Assistant Professor, Statistics Discipline, Khulna University – sharlene.kst@gmail.com

Sutapa Dey Barna, Assistant Professor, Statistics Discipline, Khulna University – sutapa@stat.ku.ac.bd