Lubna Zahan Lamia

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Research Assistant, Cognitive Agents and Interaction Lab (CAIL) — University of Dhaka, Bangladesh

Natural Language Processing • Computational Linguistics • Bias & Ethics in LLMs

Research Profile

My research focuses on **natural language processing** and **computational linguistics**, examining how **large language models** construct and frame human narratives. I aim to connect semantic representation, sentiment modeling, and ethical AI to understand how bias and perspective shape generative text. Current work spans analyzing narrative framing in large language models and developing sentiment-informed deep learning architectures that combine data-driven modeling with interpretive linguistic analysis to improve transparency and reliability in AI systems.

Research Interests

Natural Language Processing • Computational Linguistics • Deep Learning
Bias and Perspective in NLP • Ethical and Trustworthy AI • Responsible Language Technologies

Education

University of Dhaka — Dhaka, Bangladesh
Bachelor of Science in Computer Science & Engineering — *Jan 2020 – July 2025*
- Cumulative GPA: 3.53 / 4.00

Holy Cross College — Dhaka, Bangladesh
Higher Secondary Certificate (Science) — *June 2017 – June 2019*
- Result: GPA 5.00 / 5.00
- Government Scholarship (H.S.C.)

Savar Cantonment Public School and College — Dhaka, Bangladesh
Secondary School Certificate (Science) — *Completed 2017*
- Result: GPA 5.00 / 5.00
- Government Scholarship (S.S.C.)

Research Experience

Artificial Intelligence Research Assistant — Jan 2024 – Present
Cognitive Agents and Interaction Lab (CAIL), University of Dhaka — *Dhaka, Bangladesh*
- Conducting research in Natural Language Processing and Machine Learning, focusing on representation learning, linguistic framing, and interpretability of language models.
- Developed analytical frameworks for examining bias, perspective, and narrative framing in large language models.
- Designed sentiment-informed deep learning architectures integrating linguistic features with temporal modeling.

- Currently investigating narrative reliability and interpretive bias in generative systems, extending prior work on language model framing and semantic distortion.
- Collaborating on publications in top-tier venues, including EMNLP 2025 (Main Conference, Oral, SAC Highlight Nominee) and *Applied Intelligence (Springer)*.

Publications & Presentations

Published / Accepted

- **Lamia, L. Z.**, Hossain, M. F. B., & Khan, M. M. (2025). *Who Holds the Pen? Caricature and Perspective in LLM Retellings of History.* ***Conference on Empirical Methods in Natural Language Processing (EMNLP) 2025*** — Main Conference, Oral Presentation; **SAC Highlight Award Nominee.**

Under Review

- Hossain, M. F. B., **Lamia, L. Z.**, & Khan, M. M. (2025). *FinBERT-BiLSTM: A Deep Learning Model for Predicting Volatile Cryptocurrency Market Prices Using Market Sentiment Dynamics.* Under review at ***Applied Intelligence (Springer)*** — Equal Contribution.

Presentations

- **Upcoming Oral Presentation:** *EMNLP 2025, Suzhou, China (Nov 5–9, 2025).*

Research Projects

Who Holds the Pen? Caricature and Perspective in LLM Retellings of History | *Python, Hugging Face, Sentence-BERT, RoBERTa-MNLI, Detoxify, spaCy*

- Developed a computational framework to quantify narrative bias, caricature, and perspective asymmetry in large language model outputs.
- Constructed a 197-event persona-framed corpus and introduced metrics for exaggeration, contradiction, and grammatical agency.
- Published as first author in the *Conference on Empirical Methods in Natural Language Processing (EMNLP) 2025* — Main Conference, Oral; **SAC Highlight Award Nominee**.

FinBERT-BiLSTM Hybrid Model for Cryptocurrency Forecasting | *Python, PyTorch, FinBERT, Bi-LSTM*

- Designed a dual bidirectional architecture integrating FinBERT sentiment embeddings with Bi-LSTM for cryptocurrency price forecasting.
- Benchmarked against TCN, Informer, and TFT models, achieving state-of-the-art accuracy across multiple forecasting horizons.
- Co-author (equal contribution); under review at *Applied Intelligence (Springer)*.

Sentiment-Aligned Dataset Construction & Backtesting Framework | *Python, Scikit-learn, FinBERT, Pandas*

- Constructed sentiment-aligned datasets linking daily financial news and asset prices for Bitcoin and Ethereum across an extended 585-day period.
- Developed preprocessing pipelines integrating FinBERT sentiment outputs with historical data, applying rolling-window validation to prevent leakage.

- Implemented transaction-aware backtesting simulations with variable fees for realistic performance evaluation.

Selected Coursework Projects (Undergraduate)

Representative software and system design projects completed as part of undergraduate coursework requirements.

- **HealSync — Telemedicine Platform** *React, Node.js, MongoDB* Built a secure telemedicine system supporting video consultations, chat, and EHR analytics.
- **WanderWonder — Travel Management System** *Django, JavaScript* Developed a full-stack travel planning and booking platform with optimized database workflows.
- **RemoteHorizon — Remote Access Application** *Java, JavaFX, Socket Programming* Implemented secure remote desktop and file access using socket-based communication.
- **Office Management System** *PHP, MySQL* Designed a multi-user office record management system with workflow tracking and authentication.
- **Esportes — Online Shopping Application** *Django, SQLite* Created an e-commerce platform featuring dynamic listings and optimized checkout flow.
- **MyApp — Your Daily Assistant** *Java, JavaFX* Developed a multifunctional personal productivity tool integrating task and budget tracking.
- **Invade the Maze — Arcade Game** *C++* Designed a maze navigation game focused on gameplay logic and level design fundamentals.

Technical Skills

- **Programming & Machine Learning:** Python, PyTorch, TensorFlow, Scikit-learn, NumPy, pandas
- **Natural Language Processing & LLMs:** Hugging Face Transformers, FinBERT, Sentence-BERT, RoBERTa-MNLI, LLaMA, Claude, Gemini, OpenAI GPT models
- **Deep Learning Architectures:** Bi-LSTM, TCN, Temporal Fusion Transformer (TFT), Informer, TimeGPT
- **Frameworks & Web Development:** Django, React, Node.js, FastAPI
- **Data Analysis & Visualization:** Matplotlib, Plotly, Seaborn, SQL
- **Tools & Cloud Platforms:** Git, Google Cloud Platform

Awards & Recognitions

- Awarded Government Scholarships for outstanding results in H.S.C., S.S.C., and J.S.C. examinations.
- Selected as **Student Volunteer** for the *Conference on Empirical Methods in Natural Language Processing (EMNLP) 2025* — In-person, Suzhou, China.
- Recipient of the **EMNLP 2025 Diversity & Inclusion Grant** (USD 1000).
- Granted a **full registration waiver** (USD 600) for EMNLP 2025 participation, including official ACL membership, through the conference volunteer program.

Co-Curricular & Leadership Activities

- **Event Organizer — Department of Computer Science & Engineering, University of Dhaka** Led planning and coordination for *Graduation Week 2024*, including scheduling, registration, volunteer management, and on-site logistics. Oversaw risk management and operational flow across multi-day departmental events.
- **Anchor & Host — University of Dhaka** Anchored departmental programs such as *Freshers' Reception*, *Movie Night*, *Graduation Ceremony*, and the *CAIL LLM Workshop*. Coordinated audiovisual arrangements and ensured timely, professional execution of formal sessions.

Academic Reference

- **Dr. Md. Mosaddek Khan**
  Associate Professor
  Principal Investigator, Cognitive Agents and Interaction Lab (CAIL)
  Department of Computer Science and Engineering, University of Dhaka, Bangladesh
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Additional references available upon request.