

Souvik Ghosh

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About me

I am Souvik Ghosh, a motivated and detail-oriented software developer and researcher, currently pursuing an M.Sc. in Computer Science and Engineering at BUET. I am passionate about software development, machine learning, and problem-solving. I am eager to leverage my skills in research and development while contributing effectively to academia and industry.

Education

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|-------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| MSc. | Bangladesh University of Engineering and Technology , Computer Science | Feb 2025 – Present |
| | <ul style="list-style-type: none">• Current Graduate Student• Research areas: Bioinformatics, Machine Learning, Deep Learning | |
| BSc. | Bangladesh University of Engineering and Technology , Computer Science | Feb 2020 – Feb 2025 |
| | <ul style="list-style-type: none">• CGPA: 3.85/4.0• Relevant Coursework: Compilers, Operating Systems, Computer Networks, Database, DSA, Software Engineering, Information System Design | |

Experience

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| BRAC University , Lecturer, CSE Department | Jun 2025 – Present |
| <ul style="list-style-type: none">• Teaching undergraduate courses in CSE and mentoring student projects.• Continuing research in bioinformatics and deep learning applications. | |
| Apurba Technologies , Full Stack Developer | Mar 2025 – May 2025 |
| <ul style="list-style-type: none">• Developed full-stack applications with ReactJS, Node.js, and PostgreSQL.• Built scalable REST APIs and optimized CI/CD pipelines with Docker and GitHub Actions. | |

Publications

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| ResLysEmbed: A ResNet-Based Framework for Succinylated Lysine Residue Prediction Using Sequence and Language Model Embeddings | 2025 |
| Souvik Ghosh, Md Muhaiminul Islam Nafi, Mohammad Saifur Rahman | |
| Bioinformatics Advances, vbaf198 (2025) 🔗 | |

Research Experience

- | | |
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| Generic Post-Translational Modification (PTM) Site Detection | Ongoing |
| Supervisor: Dr. Swakkhar Shatabda, Professor, BRAC University | |
| <ul style="list-style-type: none">• Developing a general framework for PTM site prediction using protein language model embeddings combined with structural data.• Modeling proteins as graphs where each amino acid is a node initialized with PLM-based embeddings.• Exploring Graph Neural Networks (GNNs) and related architectures for effective sequence-structure integration. | |

- Aiming for a unified approach that can be adapted to multiple PTM types instead of task-specific models.

Alignment-Free Phylogenetic Tree Construction using Syncmers and TF-IDF

Ongoing

Supervisor: Dr. Atif Hasan Rahman, Professor, BUET CSE

- Investigating a novel alignment-free method for phylogenetic inference by replacing traditional k -mers with **syncmers**.
- Introducing **TF-IDF scoring**, inspired by natural language processing, instead of raw frequency or binary presence/absence for sequence representation.
- Constructing syncmer TF-IDF matrices to capture discriminative sequence features.
- Exploring machine learning approaches to train on these representations for accurate phylogenetic tree reconstruction.

Undergraduate Thesis, CSE, BUET

Published 2025

Title: ResLysEmbed: A ResNet-Based Framework for Succinylated Lysine Residue Prediction Using Sequence and Language Model Embeddings

Supervisor: Dr. Mohammad Saifur Rahman

- Published in Bioinformatics Advances (2025).
- Achieved state-of-the-art performance in succinylation site prediction, surpassing existing benchmarks.

Deepfake Detection for IEEE SP Cup 2024

Submitted

Supervisor: Dr. Mohammad Saifur Rahman

- Developed hybrid deep learning models for generalizable deepfake detection.
- Explored generative approaches, including diffusion models, GANs, and VAEs for dataset augmentation.
- Evaluated advanced backbone architectures, such as **MaxViT**, **ConvNeXt**, and **EfficientNet**, with specialized loss functions like contrastive loss and focal loss for improved accuracy.

Projects

Bits Unplugged | Interactive CS Learning Platform

[Github](#) [YouTube](#)
[Website](#)

- Co-developed an innovative platform focused on enhancing problem-solving skills without coding, emphasizing strategy over syntax.
- Implemented features such as drag-and-drop interactive problem solving, real-time contests, personalized recommendations, and analytics dashboards.
- **Technologies:** Docker, GitHub Actions, Tailwind CSS, Sequelize, PostgreSQL, Supabase, ReactJS, NodeJS, ExpressJS, Render.com

Multimodal Breast Cancer Prognosis Prediction | Machine Learning Project

[Github](#)

- Designed a multimodal framework using mRNA expression, copy number alteration, and clinical data from the TCGA-BRCA dataset.
- Transitioned from MLP-based models to self-attention and cross-attention mechanisms for improved performance.
- Focused on contrastive learning techniques to handle feature embeddings without classification during training.

Awards & Achievements

Research Grant from RISE BUET

Received a research grant from BUET Research and Innovation Centre for Science and Engineering for an ongoing research project.

Deepfake Detection for IEEE SP Cup 2024

Selected as a finalist in the top 3 teams; the final competition will occur in April 2025.