Souvik Ghosh

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Education

BSc. **Bangladesh University of Engineering and Technology**, Computer Science — Feb 2025

- CGPA: 3.85/4.0
- **Relevant Coursework:** Bioinformatics, Machine Learning, Artificial Intelligence, Compilers, Operating Systems, Computer Networks, DSA

Publications

ResLysEmbed: A ResNet-Based Framework for Succinylated Lysine Residue Prediction Using Sequence and Language Model Embeddings — 2025

Souvik Ghosh, Md Muhaiminul Islam Nafi, Dr. Mohammad Saifur Rahman

Bioinformatics Advances, vbaf198 (2025)

- Conducted as my undergraduate thesis, where I designed a ResNet-based framework combining sequence features with protein language model embeddings.
- Applied SHAP analysis to interpret residue-level contributions, highlighting the role of surrounding amino acids in lysine succinylation.
- Achieved state-of-the-art succinylation site prediction, surpassing prior benchmarks.

Research Experience

Generic Post-Translational Modification (PTM) Site Detection — April 2025 - Present

Supervisor: Dr. Swakkhar Shatabda, Professor, BRAC University

- Constructing a unified framework for PTM site prediction using protein language model embeddings and structural data.
- Representing proteins as graphs with amino acids as nodes to enable GNN-based sequence–structure integration.
- Targeting a generalizable solution adaptable to multiple PTM types beyond task-specific models.

Alignment-Free Phylogenetic Tree Construction using Syncmers and TF-IDF — April 2025 - Present

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

- Introducing **syncmers** as an alternative to k-mers for alignment-free phylogenetic inference.
- Designing TF-IDF-based sequence representations, inspired by natural language processing.
- Building machine learning pipelines to reconstruct phylogenetic trees from syncmer TF-IDF matrices.

Deepfake Detection for IEEE SP Cup 2024 — Submitted

Supervisor: Dr. Mohammad Saifur Rahman — Preprint

- Engineered hybrid deep learning models incorporating vision transformers and convolutional backbones.
- Leveraged generative augmentation (diffusion models, GANs, VAEs) to enrich training data.
- Enhanced performance using advanced architectures (**MaxViT, ConvNeXt, EfficientNet**) and specialized loss functions.

Work Experience

BRAC University, Lecturer, CSE Department — Jun 2025 – Present

- 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

- Developed full-stack applications with ReactJS, Node.js, and PostgreSQL.
- Built scalable REST APIs and optimized CI/CD pipelines with Docker and GitHub Actions.

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 2025
Achieved 1st Runner-up position in the IEEE Signal Processing Cup 2025 for the Deepfake Detection challenge, among 38 teams globally.

University Merit Scholarship and Dean's List Award (2020 - 2025)
Received BUET Merit Scholarship for consistent academic excellence. Honored with the Dean's List Award three times.

Skills

Programming: Python (PyTorch, Tensorflow, scikit-learn, Biopython), C/C++, Java, SQL
Tools & Development: Git, Linux, LaTeX, Docker, Full-stack web development

Projects

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.

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

References

– Dr. Mohammad Saifur Rahman, Professor
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