

Tanjeem Azwad Zaman

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RESEARCH INTEREST

Computational Biology, Machine Learning, Algorithms

EDUCATION

BSc in Computer Science and Engineering (CSE)

2019 - 2024

Bangladesh University of Engineering and Technology (BUET)

CGPA: 4.00/4.00, Position: 1/113

PUBLICATIONS

Under Review

A. Rafi, A. M. S. Rumi, S. A. Hakim, Sohaib, M. T. Tahmid, R. J. I. Momin, **T. A. Zaman**, R. Reaz, and M. S. Bayzid. "wQFM-TREE: highly accurate and scalable quartet-based species tree inference from gene trees," *bioRxiv*, 2024, under review at *RECOMB-2025*. DOI: [10.1101/2024.07.30.605630](https://doi.org/10.1101/2024.07.30.605630)

Preprints

T. A. Zaman, R. J. I. Momin, and M. S. Bayzid, "On the robustness to gene tree rooting (or lack thereof) of triplet-based species tree estimation methods," *bioRxiv*, 2024. DOI: [10.1101/2024.11.22.624944](https://doi.org/10.1101/2024.11.22.624944)

M. T. Tahmid, **T. A. Zaman**, and M. S. Rahman, "GraFusionNet: Integrating Node, Edge, and Semantic Features for Enhanced Graph Representations," *bioRxiv*, 2024. DOI: [10.1101/2024.11.22.624875](https://doi.org/10.1101/2024.11.22.624875)

H. A. Z. Sameen Shahgir, K. S. Sayeed, **T. A. Zaman**, M. A. Haider, S. S. R. Jony, and M. S. Rahman, "Ophthalmic Biomarker Detection Using Ensembled Vision Transformers and Knowledge Distillation," DOI: [10.48550/arXiv.2310.14005](https://doi.org/10.48550/arXiv.2310.14005)

RESEARCH EXPERIENCE

Robustness to Gene Tree Rooting of Triplet-based Species Tree Estimation Methods

Supervised by Dr. Md Shamsuzzoha Bayzid

August 2023 - present

(Computational Biology, Phylogenetics)

- Conducted rigorous empirical testing with different phylogenetic rooting techniques on input gene trees to evaluate its effect on the species trees estimated by triplet-based estimation methods like STELAR.
- Evaluated key parameters like RF Distance, Triplet and Quartet Scores for simulated datasets with varying ILS, gene counts, and base pairs. Considered correctness of inter-clade relationships for biological datasets.
- Identified and explained conditions where STELAR with algorithmic rootings yielded better performances than with Outgroup rooting, even outperforming the state-of-the-art species tree estimation method ASTRAL.
- Suggested an avenue for the underrated triplet-based methods to excel even when the true root is unknown.

Highly Accurate and Scalable Quartet-Based Species Tree Inference from Gene Trees

Supervised by Dr. Md Shamsuzzoha Bayzid

August 2023 - July 2024

(Computational Biology, Phylogenetics, Algorithms)

- Addressed the scalability issues of the quartet-based species tree estimation method wQFM.
- Introduced wQFM-TREE, which uses graph theory, combinatorics, and data structures efficiently to avoid explicitly enumerating all possible quartets, as done in wQFM.
- Benchmarked against other state-of-the-art (SOTA) methods on simulated datasets (up to 2000 taxa), and empirical datasets (the One Thousand Plant Transcriptomes Initiative dataset).
- Showed that wQFM-TREE consistently outperformed or matched the accuracy of SOTA methods, ASTRAL and TREE-QMC - especially in cases with higher taxa; showcasing its competitiveness in large-scale phylogenetic analyses.

Ophthalmic Biomarker Detection using Ensembled Vision Transformers

Supervised by Dr. M. Sohel Rahman

October 2023 - present

(Medical Imaging, Machine Learning)

- Used extensive data augmentations and meticulous ensembling of vision transformers to detect ophthalmic biomarkers from OCT scans, placing 1st at the IEEE SPS VIP Cup 2023.
- Consulted an ophthalmologist to learn about local and global features. Ensembled MaxViT (utilizing its strided attention to focus on the former) and EVA-02 (that excels at detecting global features) for the winning idea.

- Used data augmentation strategies including random greyscale transformation, color jitter, random resized cropping, horizontal flipping, and random perspective shifts to enhance model robustness during training.
- Post-competition, utilized unlabelled data by adopting pseudolabeling and knowledge distillation to train a single MaxViT that matched our winning solution, while significantly reducing inference time and computational cost.

GraFusionNet: Dual Graph Autoencoders for Enhanced Graph Representations

Supervised by **Dr. Mohammad Saifur Rahman**

November 2023 - present

(Cheminformatics, Machine Learning, Graph Neural Networks)

- Developed a Dual-Graph Autoencoder framework that effectively utilizes both node features and the traditionally overlooked edge features in graph-structured data.
- Made graphs using node and edge features from RDkit. Final features were composed of latent layers of separate Autoencoders trained on the graphs and their line-graphs, and the Embeddings extracted by ChemBERT from SMILES.
- Benchmarked on the Tox-21 dataset (a multi-label binary classification task) and the HIV dataset from MoleculeNet. Our approach was more accurate than other GNN-based methods using edge features (like Graph Transformers)
- Conducted ablation studies with different feature combinations, gaining insights into the efficiency of structural vs. semantic features in each classification task.

WORK EXPERIENCE

Adjunct Lecturer - Department of CSE, BUET

August 2024 - present

Courses:

- [CSE211] [Theory of Computation](#) (Theory)
- [CSE326] Information Systems Development and Management (Lab)
- [CSE322] Computer Networks (Lab)
- [CSE210] Computer Architecture (Lab)
- [CSE200] Technical Writing and Presentation (Lab)

Machine Learning Intern - North-West Power Generation Company Limited, BD

April 2023 - June 2023

- Part of an internship program organized by the Department of CSE, BUET
- Collected data from several sensors installed around the NWPGL plant, and used ML models to predict the operational state of machinery

Software Development and Data Analytics Intern - Infolytx

May 2023 - June 2023

- I was part of a team in charge of developing an app with real-time data analysis and visualization for a foreign client.
- Built a full-stack module from scratch: Data-Analysis (pandas), Backend (FastAPI), and Frontend development. (Javascript)

PROJECTS

Implementing Paging and Copy-on-Write Techniques in xv6 - Operating System Sessional [\[Link\]](#)

Building a Subset C - Compiler - Compiler Sessional [\[Link\]](#)

Implementing Ray-Tracing - Computer Graphics Sessional [\[Link\]](#)

Brainlytic: an Interactive Problem Solving App in Bengali - Head of Content Team - under [Dr. Anindya Iqbal](#) [\[Link\]](#)

DoctorAid: organized EHRs for Doctors - using NodeJS, React, PostgreSQL - Software Development Sessional [\[Link\]](#)

GRANTS, AWARDS & HONORS

IEEE Upsilon Pi Epsilon Award 2023 - Winner - by IEEE Computer Society [Link]	2023
IEEE SPS Video and Image Processing Cup 2023 - Champion - by IEEE SPS [Link]	2023
University Gold Medal - awarded to the highest CGPA holder in a graduating batch - by BUET	2024
Prime Minister's Gold Medal - awarded to highest CGPA holder in each faculty of grad. batch	2024
University Merit Scholarship and Dean's List Award - by BUET Authority	2020 to 2023
Robi Datathon 3.0 - Runner-up - by Robi, Axiata	2024
International Physics Brawl - 36th, Category O - by Charles University, Prague, Czechia	2022
AI for Bangla 2.0 - Honorable Mention - by the Govt. of Bangladesh (BD)	2023
Inter University AI Contest - 1st Place - by BUET CSE Dept.	2022
Bangladesh Mathematical Olympiad (BdMO) - National Champion and Camper	2011 to 2018
Bangladesh Physics Olympiad (BdPhO) - National Winner and Camper	2014 to 2018
Bangladesh Biology Olympiad (BdBO) - National Champion and Camper	2017
Bangladesh Olympiad in Informatics (BdOI) - 3rd Place, Nationals	2016
Creative Talent Hunt - National Winner, Math and ICT, Class 9-10 - by Govt. of BD	2015
Board Talentpool Scholarship (HSC and SSC) - by the Education Ministry of Bangladesh	2018, 2017
International Assessment for Schools - Gold in Math, Science and English - by UNSW	2016, 2015, 2008

AFFILIATIONS AND VOLUNTEERING

IEEE Computer Society Student Branch Chapter, BUET

Technical Committee, Chair	2022-2023
Treasurer	2021-2022
Technical Committee, Executive	2020-2021
Class Representative for 7 semesters	2019-2024

TEST SCORES

GRE Verbal: 165 (95%) Quant: 170 (92%) AWA: 4.5 (83%) November 7, 2024	TOEFL (iBT) Score: 120/120 August 24, 2024
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SELECTED PROGRAMMING LANGUAGE LITERACY

Python (PyTorch, Pandas, NumPy, Scikit-learn, Seaborn, Matplotlib), C/C++, Bash, Java, JavaScript

HOBBIES

Playing the violin, competitive football (soccer)

REFERENCES

Dr. Md. Shamsuzzoha Bayzid Professor, Department of CSE Bangladesh University of Engineering and Technology Contact: +8801841234464 email: shams_bayzid@cse.buet.ac.bd	Dr. M. Sohel Rahman Professor, Department of CSE Bangladesh University of Engineering and Technology Contact: +8801552389480 email: msrahman@cse.buet.ac.bd
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