Sutanu Bhattacharya, Ph.D.
Assistant Professor
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USA

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Education

Ph.D. in Computer Science and Software Engineering   Summer 2021
Auburn University, USA
Advisor: Dr. Debswapna Bhattacharya (Now at Virginia Tech)

M.Tech in Distributed and Mobile Computing   June 2014
Jadavpur University, India

B.Tech in Information Technology   June 2011
Bengal Institute of Technology, India

Employment

Assistant Professor, Department of Computer Science, Auburn University at Montgomery, USA, 16 August 2022 - ongoing.

Assistant Professor, Department of Computer Science, Florida Polytechnic University, USA, September 2021 – 15 August 2022.

Assistant Professor, Department of Computer Science and Engineering, Chaibasa Engineering College, India, July 2014 – Aug 2017.

Research Interest

My primary research interests are **computational biology** and applied machine learning with a particular focus on AI-powered molecular modeling. I am also interested in applications of data science in bioinformatics. My recent projects are focused on developing data-driven **machine learning** and **optimization algorithms** (such as **Dynamic Programming**) to elucidate complex relationships between macromolecular sequences, structures, functions, interactions, and pathways.Protein molecules are essential chemicals in our body. A protein is folded into a unique three-dimensional (3D) shape, which defines the functionalities of the protein. Determining the 3D structure of a protein is considered one of the hardest challenges in biochemistry in the last 50 years. However, the experimental determination of protein 3D structures is very time consuming and expensive, resulting in a very large gap (more than 1000 times) between the number of available protein sequences and the number of available protein 3D structures (aka templates) in the Protein Data Bank (PDB). Therefore, there is a need to develop computational approaches to predict the protein 3D structure from its amino-acid sequence, which is still an open problem. My primary research interest revolves around developing computational approaches to enlarge the scope of modellable proteins.

My secondary research interest is **Sentiment Analysis** for low-resouced languages using **deep learning**. Pretrained language models have been shown to perform well when there is a lot of data. This consequently leaves out a huge percentage of the world's languages as they are under-resourced. My research interest revolves around applying deep learning to train multilingual language models, which are viable on low-resource languages with small training data.

Honors and Awards

(9) Our group **Ranked 1** in AfriSenti-SemEval: Sentiment Analysis for African Language (Task 12) at 17th International Workshop on Semantic Evaluation.

(8) Work has been selected for **Highlight Talk** in the 12th ACM-BCB conference (Virtual), Aug 1-4, 2021.

(7) **Fellowship award** for ISMB/ECCB 2021 conference (Virtual), July 25 – 30, 2021.

(6) **Best Poster** award in the 11th ACM-BCB conference (Virtual), Sept 21-24, 2020.

(5) Work has been selected for **Highlight Talk** in the 10th ACM-BCB conference, Niagara Falls, NY, Sept 7-10, 2019.

(4) Paper got published as the **Front Cover Article** in the July 2019 issue of Proteins: Structure, Function, and Bioinformatics journal.

(3) Awarded **Young Research Excellence Award** (2nd place) at 16th Annual MCBIOS Conference, Birmingham, USA, 2019.

(2) Awarded Travel grant to attend 16th Annual MCBIOS Conference, Birmingham, USA, 2019.

(1) A.I.C.T.E. **National Scholarship** for M.Tech at Jadavpur University, Kolkata, India [2012 – 2014].

Peer-reviewed Publications

In-preparation

(2) N. Hughes+, K. Baker, **S. Bhattacharya***, "Task12 at AfriSenti-SemEval: Exploring the viability of pretrained multilingual language models for monolingual sentiment classification for low-resources languages", 17th International Workshop on Semantic Evaluation, 2023. (Officially **Ranked 1** in Task 12)

(1) K. Baker++, N. Hughes+, **S. Bhattacharya***, "GoFold: a real-time protein folding program", 2023. (Accepted for an oral presentation at the 19th Annual MCBIOS Conference, Dallas, USA, March 15-17, 2023)

* corresponding author
+ undergraduate research assistant
++ got **Travel Award** to present the work at the 19th Annual MCBIOS Conference, 2023.

Book Chapter

(1) **S. Bhattacharya,** R. Roche, M. H. Shuvo, B. Moussad, D. Bhattacharya, "Contact-assisted threading in low-homology protein modeling", Methods in Molecular Biology, by **Springer Nature**, 2022. *(Impact Factor: 10.71)*

Journals

(9) R. Roche, **S. Bhattacharya**, M. H. Shuvo, D. Bhattacharya, "rrQNet: protein contact map quality estimation by deep evolutionary reconciliation", **Proteins: Structure, Function, and Bioinformatics, https://doi.org/10.1002/prot.26394**, (2022). *(Impact Factor: 3.756)*

(8) **S. Bhattacharya**, R. Roche, B. Moussad, D. Bhattacharya, "DisCovER: distance- and orientation-based covariational threading for weakly homologous proteins", **Proteins: Structure, Function, and Bioinformatics**, (2021). [**First method to utilize inter-residue orientations to boost protein threading performance**], [**Fellowship Award for 29th ISMB/ECCB**]. *(Impact Factor: 3.756)*

(7) Kryshtafovych et al. (2021). Modeling SARS-CoV2 proteins in the CASP-commons experiment. ***Proteins: Structure, Function, and Bioinformatics***, (2021). *(Impact Factor: 3.756)*

(6) **S. Bhattacharya,** R. Roche, M. H. Shuvo, D. Bhattacharya, "Recent advances in protein homology detection propelled by inter-residue interaction map threading", **Frontiers in Molecular Biosciences**, 8, 377 (2021). *(Impact Factor: 4.620)*

(5) R. Roche, **S. Bhattacharya**, D. Bhattacharya, "Hybridized distance- and contact-based hierarchical structure modeling for folding soluble and membrane proteins", **PLOS Computational Biology, 17(2): e1008753**, (2021). [**Highlight Talk**]. *(Impact Factor: 4.428)*

(4) A. McGehee, **S. Bhattacharya**, R. Roche, D. Bhattacharya, "PolyFold: An interactive visual simulator for distance-based protein folding", **PLOS ONE**, 15(12): e0243331 (2020). [**Best Poster Award**]. *(Impact Factor: 2.740)*

(3) M. H. Shuvo, **S. Bhattacharya**, D. Bhattacharya, "QDeep: distance-based protein model quality estimation by residue-level ensemble error classifications using stacked deep residual neural networks", **ISMB Proceedings**, **Bioinformatics**, 36(S1): i285-i291 (2020). *(Impact Factor: 5.610)*

(2) **S. Bhattacharya**, D. Bhattacharya, "Evaluating the significance of contact maps in low-homology protein modeling using contact-assisted threading", **Nature Scientific Reports**, 10(1), 1-13 (2020). *(Impact Factor: 4.379)*

(1) **S. Bhattacharya**, D. Bhattacharya, "Does inclusion of residue-residue contact information boost protein threading?", **Proteins: Structure, Function, and Bioinformatics**, 87(7): 596-606 (2019). [**Front Cover Article**], [**Highlight Talk**], [**Top Downloaded Paper** of 2018-2019 by WILEY]. *(Impact Factor: 3.756)*

Abstracts

(3) R. Roche, **S. Bhattacharya**, D. Bhattacharya, "Hybridized distance- and contact-based hierarchical structure modeling for folding soluble and membrane proteins", **BCB '21**: Proceedings

of the 12th **ACM** International Conference on Bioinformatics, Computational Biology and Health Informatics, USA, August 2021, Pages 1 (2021).

(2) **S. Bhattacharya**, D. Bhattacharya, "How Effective is Contact-assisted protein threading?", **BCB'19**: Proceedings of the 10th **ACM** International Conference on Bioinformatics, Computational Biology and Health Informatics, September 2019, Pages 553 (2019).

(1) **S. Bhattacharya**, D. Bhattacharya, "Contact-assisted protein threading: an evolving new direction", **BCB'19**: Proceedings of the 10th **ACM** International Conference on Bioinformatics, Computational Biology and Health Informatics, September 2019, Pages 536 (2019).

Posters

(5) **S. Bhattacharya**, R. Roche, D. Bhattacharya, "DisCovER: distance- and orientation-based covariational threading for weakly homologous proteins", 29th **ISMB/ECCB** conference, Virtual Event, July 25-30, 2021. (**Fellowship Award**)

(4) A. McGehee, **S. Bhattacharya**, R. Roche, D. Bhattacharya, "PolyFold: An interactive visual simulator for distance-based protein folding", 11th **ACM-BCB** Conference, Virtual Event, Sept 21-24, 2020. (**Best Poster Award**)

(3) **S. Bhattacharya**, D. Bhattacharya, "Contact-assisted protein threading: an evolving new direction", 2019 Graduate Engineering Research Showcase, Auburn University, USA, November 7, 2019.

(2) **S. Bhattacharya**, D. Bhattacharya, "Contact-assisted protein threading: an evolving new direction", 10th **ACM-BCB** Conference, Niagara Falls, NY, Sept 7-10, 2019. [pdf of the poster]

(1) **S. Bhattacharya**, D. Bhattacharya, "Does inclusion of residue-residue contact information boost protein threading?", 16th Annual **MCBIOS** Conference, Birmingham, USA, March 28-30, 2019. [pdf of the poster]

Oral Presentations

(4) **S. Bhattacharya**, R. Roche, D. Bhattacharya, "DisCovER: distance- and orientation-based covariational threading for weakly homologous proteins", 29th **ISMB/ECCB** conference, Virtual Event, July 25-30, 2021. (**Fellowship Award**)

(3) **S. Bhattacharya**, D. Bhattacharya, "How Effective is Contact-assisted Protein Threading?", 10th **ACM-BCB** Conference, Niagara Falls, NY, Sept 7-10, 2019. (**Highlight Talk**)

(2) **S. Bhattacharya**, D. Bhattacharya, "Does contact information powered by deep learning boost protein threading?", Student Symposium, Auburn University, USA, April 9, 2019.

(1) **S. Bhattacharya**, D. Bhattacharya, "Does inclusion of residue-residue contact information boost protein threading?", 16th Annual **MCBIOS** Conference, Birmingham, USA, March 28-30, 2019. (**Won 2nd place in student oral presentation**). [News, Proceedings]

Service & Outreach

(7) Member of the departmental Curriculum Committee at AUM   2023 -

(6) Member of the Computer Science faculty search committee at AUM.   2023 -

(5) Reviewer of Public Health Reviews.   2023

(4) Reviewer of Bioinformatics, BMC Bioinformatics.   2022

(3) Member of the departmental Curriculum Committee at Florida Poly   2021-22

(2) Reviewer of Nature Scientific Reports.   2021

(1) External reviewer of IEEE-BIBM conference, San Diego, CA, USA.   2019