Asadullah Hill Galib

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Ph.D. candidate in Computer Science specializing in Machine Learning, with a solid foundation in Software Engineering and a proven track record of multi-disciplinary research collaboration. Dedicated to advancing knowledge through innovative contributions in AI.

Education

Ph.D. in **Computer Science** *August 2020 - Present*
Michigan State University, MI, USA
Advisor: Pang-Ning Tan, Domain: Deep Learning, Extreme Events, Time Series, Spatiotemporal, Forecasting, Generative Model

M.Sc. in **Software Engineering** *January 2019 - December 2020*
University of Dhaka, Dhaka, Bangladesh
Thesis: Significant Features Analysis For Android Malware Detection Using Machine Learning Techniques

B.Sc. in **Software Engineering** *November 2014 - December 2018*
University of Dhaka, Dhaka, Bangladesh

Technical Skills (* Proficient)

Programming Languages: Python*, Java, C, C++, PHP, JavaScript, Assembly

AI & Machine Learning: PyTorch*, Lightning*, SK-learn*, Pandas*, NumPy*, Matplotlib*, Anaconda*, MATLAB, Keras

Miscellaneous: Android*, GCP*, MySQL, Oracle, SQLite, jQuery, React Native, Laravel, Selenium, Git*, Agile, MVC, SRS*

Experience

Researcher (Internship), *Frontier Development Lab (FDL) 2022 by NASA and the SETI Institute* *June 2022 - August 2022*
- Collaborated with a cross-disciplinary team on the NASA challenge: Seismic Insight from Geomagnetic and Ionospheric Data.
- Carried out a statistical analysis which shows promising links between major earthquakes and ionospheric perturbations.
- Created the first machine learning-ready dataset and statistical tool comprising spatiotemporally varying seismic precursors.
- Built machine learning models for forecasting and detecting earthquakes from heterogeneous multivariate time series data.
- Designed a probabilistic model to learn the spatial variability of ionospheric observations around seismic locations.
- Research outcomes: 3 AGU abstracts, 2 papers, 1 technical memo, and 1 NASA NTR.

Graduate Research Assistant, *Michigan State University (CSE)* *January 2022 - Present*
- Contributing to the NSF project - Prediction and Characterization of Extreme Events in Spatio-Temporal Data.
- Developing novel deep learning algorithms addressing extreme events within spatio-temporal and time series data.

Graduate Teaching Assistant, *Michigan State University (CSE)* *August 2020 - December 2021*
- Lead classes and labs of 260+ students in *CSE 102: Algorithmic Thinking and Programming (Python)*

Software Developer & Executive Assistant (Internship), *Brain Station 23* *January 2018 - June 2018*
- Developed from scratch and maintained a web application and a mobile application, using Laravel Framework, PHP, MySQL, React-Native, Redux-Saga, Android Studio, Postman and proper version-controlling (Git, SourceTree).
- Analyzed requirement specification and design of an existing system for re-engineering. Analyzed two e-commerce frameworks.

Selected Publications(* Equal contribution)

- Cullen*, L., Smith*, A. W., **Galib*, A.H.**, Varshney*, D., Brown, E., Chi, P. J., ... & Svoboda, F. (2024, Jan.). A Global Analysis of Pre-Earthquake Ionospheric Anomalies. arXiv preprint arXiv:2401.01773.
- **Galib, A. H.**, Tan, P. N. & Luo, L. (2023, Dec.). SimEXT: Self-supervised Representation Learning for Extreme Values in Time Series. In Proceedings of the 23rd IEEE International Conference on Data Mining, **ICDM 2023**, (pp. 1031-1036), IEEE.
- **Galib, A. H.**, McDonald, A., Tan, P. N. & Luo, L. (2023, Aug.). Self-Recover: Forecasting Block Maxima in Time Series from Predictors with Disparate Temporal Coverage using Self-Supervised Learning. In Proceedings of the Thirty-Second International Joint Conference on Artificial Intelligence, **IJCAI 2023** (pp. 3723-3731).
- Cullen*, L., **Galib*, A. H.**, Smith*, A. W., Varshney*, D., Brown, E., Chi, P., ... & Svoboda, F. (2022, Dec.). Can We Forecast And Detect Earthquakes From Heterogeneous Multivariate Time Series Data? In I Can't Believe It's Not Better Workshop: Understanding Deep Learning Through Empirical Falsification. (**ICBINB@ NeurIPS 2022**).

- Cullen*, L., **Galib*, A.H.**, Smith*, A. W., Varshney*, D., Brown, E., Chi, P. J., ... & Svoboda, F. (2022, Dec.). Open-Source Data Pipelines and Statistical Tool for Studying Pre-Seismic and Post-Seismic Disturbances in the Ionosphere and Geomagnetic Field. In **AGU** Fall Meeting Abstracts (Vol. 2022, pp. IN25A-07).
- Cullen*, L., **Galib*, A.H.**, Smith, A. W., Varshney, D., Brown, E., Chi, P. J., ... & Svoboda, F. (2022, Dec.). Comprehensive Statistical Analysis of Ionospheric and Geomagnetic Signatures Before and After Earthquakes. In **AGU** Fall Meeting Abstracts (Vol. 2022, pp. NH13A-04).
- Varshney*, D., Cullen*, L., **Galib*, A.H.**, Smith, A. W., Brown, E., Chi, P. J., ... & Svoboda, F. (2022, Dec.). Multimodal Machine Learning for Earthquake Identification and Forecasting. In **AGU** Fall Meeting Abstracts (Vol. 2022, pp. INV44A-05).
- Wilson, T., McDonald, A., **Galib, A. H.**, Luo, L., & Tan, P. N. (2022, Aug.). Beyond Point Prediction: Capturing Zero-Inflated & Heavy-Tailed Spatiotemporal Data with Deep Extreme Mixture Models. In Proceedings of the 28th ACM **SIGKDD 2022** Conference on Knowledge Discovery and Data Mining (pp. 2020-2028).
- **Galib, A. H.**, McDonald, A., Wilson, T., Luo, L., & Tan, P. N. (2022, Jul.). DeepExtrema: A Deep Learning Approach for Forecasting Block Maxima in Time Series Data. In Proceedings of the Thirty-First International Joint Conference on Artificial Intelligence, **IJCAI 2022** (pp. 2980-2986).
- **Galib, A. H.**, & Bashyal, B. (2022, May.). On the Susceptibility and Robustness of Time Series Models through Adversarial Attack and Defense. arXiv preprint arXiv:2301.03703.
- Wilson, T., Tan P., Luo, L., & Galib, A. (2021, Dec.). Deep Learning With Extreme Value Theory for Modeling Precipitation Events. In **AGU** Fall Meeting Abstracts (Vol. 2021, pp. A15Q-07).
- **Galib, A. H.**, & Hossain, B. M. (2020, Jul.). Significant API Calls in Android Malware Detection (Using Feature Selection Techniques and Correlation-Based Feature Elimination). In Proceedings of the 32nd International Conference on Software Engineering Knowledge Engineering (**SEKE 2020**) (pp. 566-571).
- **Galib, A. H.**, & Hossain, B. M. (2019, Dec.). A Systematic Review on Hybrid Analysis using Machine Learning for Android Malware Detection. In 2019 2nd International Conference on Innovation in Engineering and Technology (**ICIET 2019**).
- **Galib, A. H.**, & Hossain, B. M. (2020, Jul.). A Review on Hybrid Analysis using Machine Learning for Android Malware Detection. In Dhaka University Journal of Applied Science and Engineering (DUJASE), Volume 5, Issue 1&2, pp. 49-55.
- Yasir, R. M., Asad, M., **Galib, A. H.**, Ganguly, K. K., & Siddik, M. S. (2019, May). GodExpo: an automated god structure detection tool for Golang. In Proceedings of the 3rd International Workshop on Refactoring (**IWOR 2019**) (pp. 47-50). IEEE.
- **Galib, A. H.**, Nahar, N., & Hossain, B. M. (2020). The Influences of Pre-birth Factors in Early Assessment of Child Mortality using Machine Learning Techniques. arXiv preprint arXiv:2011.09536.

Academic and Research Projects (Details and full list)

- **Predicting GitHub Issues Lifetime using Machine Learning and Topic Modeling (LDA):** It outperforms the previous approach with high precision and f1- measure. Also, it extracts distinguishable and comprehensible topics from issues. Manuscript.
- **Pre-birth Factors in the Early Assessment of Child Mortality using Machine Learning Techniques:** It achieves an AUC score of 0.947 which outperforms the clinical standards. Also, it assess the relative importance of the factors. Manuscript.
- **Optimizing Search Space in Code Smells Detection using a Novel Metric:** Significantly reducing search space (i.e., 93% to 21%) using a novel metric called - NCPC, while maintaining the performance of code smells detection. Manuscript.
- **Analyzing co-authorship network: Centrality Measure, Link Prediction, and Community Detection:** It analyzes a network of co-authorship relations, predicts missing link with 64% accuracy and detect community using the network modularity algorithm.
- **Image-to-Image Translation using Conditional GAN:** It generates colored images from sketches using a generative model - Conditional GAN. It incorporates the architecture and guidelines proposed by a CVPR 2017 study (Isola et al.).
- **LifeBlood:** A GPS based blood donor finder android app which sorts out nearer blood donors across the map. In addition, a user rating system, a review system and profiling of donors are being implemented.
- **AutoPilot-Web:** A web-based digital transformation of BTS (Base transceiver station) management. Its purpose is to optimize and automate the existing network management system.
- **AutoPilot-Mobile:** A mobile application (iOS and Android) for the digital transformation of BTS (Base transceiver station) management.

Leadership Activities

Organizer, First Software Industry-Academia Collaboration Session with 10 leading companies (2017), Boot Camp on technology for peace, Seminar on the fourth industrial revolution, Workshops on secured internet protocol and IT awareness for females.

Vice President & Treasurer, IIT Software Engineers' Community, University of Dhaka.
Editor & Author, Shoshikkha - A web-based knowledge platform in Bengali & English.