Rashidul Islam

Curriculum Vitae

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Education

2018–2022 **Doctor of Philosophy**, *Department of Information Systems, University of Maryland, Baltimore County (UMBC), USA. CGPA 3.82/4.00.*
Title of Dissertation: Intersectional Fairness in Machine Learning: Measurements, Algorithms, and Applications; Doctoral advisor: Dr. James Foulds.

2018–2020 **Master of Science**, *Department of Information Systems, University of Maryland, Baltimore County (UMBC), USA. CGPA 3.82/4.00.*

2013-2014 **Master of Science**, *Department of Electrical & Electronics Engineering, University of Dhaka (DU), Bangladesh. CGPA 3.66/4.00.*

2009-2012 **Bachelor of Science**, *Department of Applied Physics, Electronics & Communication Engineering, University of Dhaka (DU), Bangladesh. CGPA 3.48/4.00.*

Research Interests

My research interests are primarily focused on the development and fine-tuning of large language models (LLMs) for a wide range of domain-specific applications. I aim to push the boundaries of what these models can achieve by exploring innovative use cases and enhancing their performance in specialized settings. While my focus is on LLMs, I continue to maintain a commitment to ethical AI practices, ensuring that the technologies I develop are both powerful and responsible.

Work Experience

Aug'22 - Present **Staff Research Scientist**, Visa Research, Visa USA Inc., Atlanta, GA

- Developing a multi-agent LLM system for automated code security vulnerability detection and repair
- Introduced a fine-tuning approach with MoE to align LLMs with tasks beyond text, particularly tabular data with few-shot examples
- Designing and prototyping a foundational payment model using massive financial data, driving innovative industry applications
- Building a post-processing fairness method for black-box LLM models that does not require access to LLM's parameters, original training data, or demographics
- Creating AI solutions addressing privacy concerns by developing methods that operate without demographic data

Impact: *Filed 5 U.S. patents and published in AAAI'24, WWW'24, and ICDM'24.*

Jan'18 - Jul'22 **Research Assistant**, Information Systems Department, UMBC, Baltimore, MD

- Developed deployment-ready fair AI technologies by removing practical barriers
- Designed stochastic learning algorithms and Bayesian modeling for intersectional fairness
- Mitigated demographic biases in social media-based career recommendation systems
- Created a sparse stochastic collapsed inference algorithm to scale up topic models
- Proposed fair survival models for equitable allocation of healthcare resources.

Impact: *Published in GoodIT'24, Entropy'23, TIIS'23, IUI'22, WWW'21, AIES'21, ICWSM'21, SDM'21, ICDE'20, SDM'20, and NAACL'19.*

May'19 - Aug'19 **Wavelet Development Intern**, The MathWorks Inc., Natick, MA
- Investigated proof of concepts for Gabor scattering transforms, mixed filters, pooling, and non-linearities to enhance feature extraction in ML workflows.

Aug'16 - Dec'17 **Graduate Assistant**, CSEE Department, UMBC, Baltimore, MD
- Conducted lab discussion sessions, and proctored exams for undergraduate courses
- Developed a low-power embedded system for artifact detection in brain signals
- Designed an FPGA-based scalable accelerator for high-throughput MCMC algorithms.

Dec'14 - Jul'16 **Core Network Engineer**, Huawei Technologies Ltd., Bangladesh
- Operated and managed core network systems operations, including troubleshooting, maintenance, and equipment upgrades to enhance product services.

Research and Technical Skills

Research:	Large Language Models, Deep Learning, AI Fairness and Ethics
Programming Languages:	Python, PyTorch, LangGraph, Hugging Face, TensorFlow, PyMC3, Gensim, Scikit-learn MATLAB, GNU Octave, Julia, R
Big Data:	Hadoop, Hive, Scala, PySpark, SQL.

Publications

For more recent publications, please see my Google Scholar.

Peer-Reviewed Conference Papers

- Z. Wu, Y. Cai, **R. Islam**. Rethinking Fairness in LLM Tabular Tasks: A Mixture of LoRA Experts Approach. *Under submission*, 2024.
- **R. Islam**, H. Chen, and Y. Cai. Fairness without Demographics through Shared Latent Space-Based Debiasing. *AAAI Conference on Artificial Intelligence (AAAI)*. Vol. 38. No. 11. 2024.***(Acceptance rate 23.75%)***
- **R. Islam**, S. Pan, and J.R. Foulds. Fair Inference for Discrete Latent Variable Models: An Intersectional Approach. *ACM International Conference on Information Technology for Social Good (GoodIT)*, 2024. ***(Acceptance rate 34.15%)***
- Y. Zhao, M. Xu, H. Chen, Y. Chen, Y. Cai, **R. Islam**, Y. Wang, T. Derr. Can One Embedding Fit All? A Multi-Interest Learning Paradigm Towards Improving User Interest Diversity Fairness. *The ACM on Web Conference (WWW)*, 2024. ***(Acceptance rate 20.2%)***
- S. Wang, X. Yang, **R. Islam**, H. Chen, M. Xu, J. Li, and Y. Cai. Enhancing Distribution and Label Consistency for Graph Out-of-Distribution Generalization. *IEEE International Conference on Data Mining (ICDM)*, 2024. ***(Acceptance rate 19.5%)***
- C. Wang, K. Wang, A. Bian, **R. Islam**, K. Keya, J. R. Foulds and S. Pan. Do Humans Prefer Debiased AI Algorithms? A Case Study in Career Recommendation. *ACM International Conference on Intelligent User Interfaces (IUI)*, 2022. ***(Acceptance rate 24.5%)***

- **R. Islam**, K. Keya, Z. Zeng, S. Pan, and J. R. Foulds. Debiasing Career Recommendations with Neural Fair Collaborative Filtering. *The ACM on Web Conference (WWW)*, 2021. ***(Acceptance rate 20.6%)***
- **R. Islam**, S. Pan, and J.R. Foulds. Can We Obtain Fairness for Free? *AAAI/ACM Conference on Artificial Intelligence, Ethics and Society (AIES)*, 2021. ***(Acceptance rate 37.3%)***
- K. Keya, **R. Islam**, S. Pan, I. Stockwell and J. Foulds. Equitable Allocation of Healthcare Resources with Fair Survival Models. *SIAM International Conference on Data Mining (SDM)*, 2021. ***(Acceptance rate 21.25%)***
- Z. Zeng, **R. Islam**, K. Keya, J. Foulds, Y. Song, and S. Pan. Fair Heterogeneous Network Embeddings. In *International AAAI Conference on Web and Social Media (ICWSM)*, 2021. ***(Acceptance rate 20%)***
- J. R. Foulds, **R. Islam**, K. Keya, and S. Pan. An Intersectional Definition of Fairness. *IEEE International Conference on Data Engineering (ICDE)*, 2020. ***(Acceptance rate 18%)***
- J. R. Foulds, **R. Islam**, K. Keya, S. Pan. Bayesian Modeling of Intersectional Fairness: The Variance of Bias. *SIAM International Conference on Data Mining (SDM)*, 2020. ***(Acceptance rate 24%)***
- **R. Islam** and J. R. Foulds. Scalable Collapsed Inference for High-dimensional Topic Models. *Annual Conference of the North American Chapter of the Association for Computational Linguistics (NAACL)*, 2019. ***(Acceptance rate 26.3%)***
- M. Hosseini,**R. Islam**, L. Marni, and T. Mohsenin. MPT: Multiple Parallel Tempering for High-throughput MCMC Samplers. *IEEE International System-on-Chip Conference (SOCC) (pp. 244-249)*, 2018.
- **R. Islam**, W. D. Hairston, T. Oates and T. Mohsenin. An Online EEG Artifact Detection and Removal System for Embedded Processors. *IEEE Signal Processing in Medicine and Biology Symposium (SPMB)*, 2017.
- M. Hosseini, **R. Islam**, A. Kulkarni and T. Mohsenin. A Scalable FPGA-based Accelerator for High-throughput MCMC Algorithms. In *IEEE Symposium on Field-Programmable Custom Computing Machines (FCCM)*, 2017.

Peer-Reviewed Journal Papers

- **R. Islam**, K.N. Keya, S. Pan, A.D. Sarwate, and J.R. Foulds. Differential Fairness: An Intersectional Framework for Fair AI. *Entropy*, 25(4):660, 2023.
- C. Wang, K. Wang, A. Y. Bian, **R. Islam**, K. N. Keya, J. R. Foulds, and S. Pan. When Biased Humans Meet Debiased AI: A Case Study in College Major Recommendation. *ACM Transactions on Interactive Intelligent Systems (TIIS)*, 13(3):17, 2023.

Peer-Reviewed Workshop and Symposium Papers

- K. Keya, **R. Islam**, S. Pan, I. Stockwell and J. R. Foulds. Equitable Allocation of Healthcare Resources with Fair Cox Models. *AAAI Fall Symposium on AI in Government and Public Sector (AAAI FSS)*, 2020.
- C. Wang, K. Wang, A. Bian, **R. Islam**, K. Keya, J. R. Foulds and S. Pan. An User study on a De-biased Career Recommender System. *Mid-Atlantic Student Colloquium on Speech, Language and Learning (MASC-SLL)*, 2020.

- **R. Islam**, K. Keya, S. Pan, and J. R. Foulds. Mitigating Demographic Biases in Social Media-based Recommender Systems. *The 25th ACM SIGKDD Conference on Knowledge Discovery and Data Mining (KDD) Social Impact Track (extended abstract)*, 2019.
- J. R. Foulds, **R. Islam**, K. Keya, and S. Pan. Differential Fairness. *NeurIPS 2019 Workshop on Machine Learning with Guarantees*, 2019.
- **R. Islam** and J. R. Foulds. Towards a Highly Efficient Online Inference Algorithm for Latent Dirichlet Allocation. In *Mid-Atlantic Student Colloquium on Speech, Language and Learning (MASC-SLL)*, 2018.

Thesis

- **R. Islam**. Intersectional Fairness in Machine Learning: Measurements, Algorithms, and Applications. PhD Thesis. University of Maryland, Baltimore County (UMBC), 2022.

Academic Services

Reviewer AAAI 2024, NeurIPS 2022, NeurIPS 2021, ICML 2020, ICTAI 2020.

Honors and Awards

- IS Department Student Research Symposium Awards 2022, UMBC: *Overall winner, PhD Student Research Award* (completed dissertation proposal category)
- IS Department Graduate Student Poster Day Awards 2021, UMBC: *Overall winner, PhD Student Research Award* (completed dissertation proposal category)
- IS Department Graduate Student Poster Day Awards 2021, UMBC: *1st place, Poster Competition* (completed research category)
- *Student Scholarship Award* from The Web Conference (WWW), 2021
- *GSA Professional Development* and *IS Department Grant* to attend in NAACL, 2019
- *NST Fellowship for M.S. Thesis* from Ministry of Science & Technology, Bangladesh, 2014.