Amit Sarker

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Education

University of Massachusetts Amherst — Amherst, Massachusetts
MS - College of Information and Computer Sciences; CGPA: 3.92/4.00 (ongoing) — *Sep. 2022 - May. 2025*
PhD - College of Information and Computer Sciences — *Sep. 2022 - Aug. 2027*

University of Dhaka — Dhaka, Bangladesh
Bachelor of Science - Computer Science and Engineering; CGPA: 3.77/4.00 — *Jan. 2016 - Dec. 2019*

Experience

University of Massachusetts Amherst, *Graduate Research Assistant* — *Sep. 2022 - Present*

- Exploring fairness implications within Differential Privacy (DP) algorithms to ensure fair and equitable treatment across all demographic groups. Working on designing and building a fair visual data exploration platform for DP data.
- Conducted interviews with DP practitioners to identify real-world challenges in deploying privacy-preserving systems and how data visualization can be utilized to make DP widely adopted.

University of Massachusetts Amherst, *Graduate Teaching Assistant*

- COMPSCI 325: Introduction to HCI (Fall 2024); CICS 110: Introduction to Programming (Fall 2023).

University of Dhaka, *Research Assistant* — *Jan. 2020 - Dec. 2020*

- Applied local search and particle swarm optimization algorithms to solve Continuous Distributed Constraint Optimization Problems (C-DCOPs) in multi-agent systems.
- Mentored two undergraduates and contributed to their thesis projects on multi-agent planning and scheduling.

TigerIT Bangladesh Ltd., *Software Engineer (QA)* — *Apr. 2020 - Jul. 2021*

- Enhanced system reliability and performance by identifying system requirements and integrating advanced technologies.
- Analyzed and tested methodologies for a COVID-19 contact tracing module, aiming to mitigate the spread of the virus.
- Designed and executed test plans and developed automation scripts to ensure software functionalities.

Projects

ICL Capabilities of LLMs (*NLP, In-Context Learning, Huggingface, CoT*) — *Mar. 2024 - May. 2024*

- Conducted evaluations of pre-trained language models on arithmetic tasks and sentiment analysis using synthetic datasets, employing zero-shot, few-shot, and chain-of-thought prompting strategies.
- Designed and implemented "Jumbled Arithmetic" tasks to test if models learn from prompts or rely on pre-trained knowledge, enhancing the understanding of model adaptability to altered operational symbols.

LLM Personalization (*Huggingface, Scikit Learn, Probabilistic and Neural Retrievers*) — *Oct. 2023 - Dec. 2023*

- Developed advanced retrieval strategies, including clustering and reranking, to enhance the personalization of LLMs by optimizing user-specific outputs from large data.
- Employed multiple retrieval models like BM25 baseline, topic-model based retrieval, and Contriever reranking to refine personalization, culminating in integration with the Flan-T5-base model to assess output effectiveness.

Privacy Risk of ML Models (*NN, RNN, Adversarial Regularization, MemGuard*) — *Oct. 2022 - Dec. 2022*

- Evaluated neural network-based models' vulnerability to membership inference attacks, developed and tested various defense mechanisms, including adversarial regularization and MemGuard.
- Assessed their effectiveness in protecting sensitive training data against attacks, introduced a novel privacy risk score that quantifies the privacy risks of individual data samples based on their likelihood of being part of the model's training set.

Publications

(* - Equal Contribution)

- L. Panavas*, **A. Sarker***, A. Sarvghad, C. Dunne, N. Mahyar. "Illuminating the Landscape of Differential Privacy: An Interview Study on the Use of Visualization in Real-World Deployments". IEEE Transaction of Visualization and Computer Graphics *(TVCG)* journal, 2024. (Paper Link)
- M. Choudhury, **A. Sarker**, S. Yaser, MAA. Khan, W. Yeoh, MM. Khan. "A Particle Swarm Inspired Approach for Continuous DCOPs". Engineering Application of Artificial Intelligence *(EAAI)*, 2023. (Paper Link)
- **A. Sarker**, M. Choudhury, and MM. Khan. "A Local Search Based Approach to Solve Continuous DCOPs". 20th International Conference on Autonomous Agents and Multi-Agent Systems *(AAMAS)*, 2021. (Paper Link)
- **A. Sarker**, AB. Arif, M. Choudhury, and MM. Khan. "C-CoCoA: A Continuous Cooperative Approximation Algorithm to Solve Functional DCOPs". In *AAMAS*, 2020. (Paper Link)

Skills Summary

Languages: Python, Java, C++, JavaScript, SQL
Frameworks: Scikitlearn, PyTorch, Pandas, Node, Flask
Tools: Git, MySQL, SQLite, MongoDB, Firebase
Research: DP, HCI, Visualization, OpenDP, Diffprivlib, D3

Honors and Awards

- James Kurose Scholarship in Computer Science, UMass Amherst — *May. 2023*
- Conference Scholarships (AAMAS 2021, AAMAS 2020)
- Runner's Up at Code Samurai (An inter-university hackathon organized by BJIT in Bangladesh) — *Dec. 2019*