Amit Sarker

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Education

- **University of Massachusetts Amherst** — Amherst, Massachusetts
  MS/PhD - College of Information and Computer Sciences; CGPA: 3.92/4.00 (ongoing) — *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)

- Illuminating the Landscape of Differential Privacy: An Interview Study on the Use of Visualization in Real-World Deployments. Liudas Panavas*, **Amit Sarker***, Ali Sarvghad, Cody Dunne, Narges Mahyar. In *TVCG* journal, 2024.
- A Particle Swarm Inspired Approach for Continuous Distributed Constraint Optimization Problems. Moumita Choudhury, **Amit Sarker**, S. Yaser, MAA. Khan, William Yeoh, Md Mosaddek Khan. In *EAAI* journal, 2023.
- A Local Search Based Approach to Solve Continuous DCOPs. **Amit Sarker**, Moumita Choudhury, and Md. Mosaddek Khan. In Proceedings of *20th International Conference on Autonomous Agents and Multi-Agent Systems (AAMAS)*, 2021.
- C-CoCoA: A Continuous Cooperative Approximation Algorithm to Solve Functional DCOPs. **Amit Sarker**, Abdullahil Baki Arif, Moumita Choudhury, and Md. Mosaddek Khan. In *AAMAS*, 2020.

Skills Summary

- **Languages:** Python, Java, C++, JavaScript, SQL
- **Tools:** GIT, MySQL, SQLite, MongoDB, Firebase
- **Frameworks:** Scikitlearn, TensorFlow, PyTorch, Pandas, Node
- **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*

Volunteer Experience

- **Shabab-Murshid Development Foundation (SMDF)** (*Dhaka, Bangladesh*) — *Feb. 2016 - Jan. 2020*
  - Conducted mathematics classes for underprivileged high school children.
  - Motivated and prepared them for the national mathematics olympiad, Bangladesh.