Tawhid Bhuiyan

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Education

Columbia University — *New York, USA*
PhD in Electrical Engineering — Sept. 2024 – Present

Bangladesh University of Engineering and Technology — *Palashi, Dhaka, Bangladesh*
Masters of Science in Computer Science and Engineering — July 2021 – Aug. 2024

Bangladesh University of Engineering and Technology — *Palashi, Dhaka, Bangladesh*
Bachelor of Science in Computer Science and Engineering — Mar. 2016 – Feb. 2021

Experience

Columbia University — *New York, USA*
Graduate Research and Teaching Assistant — Sept. 2024 – Present

Bangladesh University of Engineering and Technology — *Dhaka, Bangladesh*
Lecturer, Department of CSE — Sept. 2021 – Aug. 2024

- **Courses Taken**: Operating System, Database Management System, Software Development, Computer Graphics, Computer Programming, Digital Logic Design

Brac University — *Mohakhali, Dhaka, Bangladesh*
Lecturer, Department of CSE — Jun. 2021 – Sept. 2021

- **Courses Taken**: Discrete Mathematics, Algorithms, Computer Graphics, Microprocessors

United International University — *Badda, Dhaka, Bangladesh*
Lecturer, Department of CSE — Feb. 2021 – Jun. 2021

- **Courses Taken**: Database Management System, Computer Graphics

Publications

- **Mohammad Tawhidul Hasan Bhuiyan**, Muhammad Rashed Alam and M. Sohel Rahman, **Computing the Largest Common Almost-Increasing Subsequence**, *Theoretical Computer Science, Volume 930, 2022, Pages 157-178, ISSN 0304-3975*, https://doi.org/10.1016/j.tcs.2022.07.021
- **Mohammad Tawhidul Hasan Bhuiyan**, Irtesam Mahmud Khan, Sheikh Saifur Rahman Jony, Renee Robinson, Uyen-Sa D. T. Nguyen, David Keellings, M. Sohel Rahman, and Ubydul Haque, **The Disproportionate Impact of COVID-19 among Undocumented Immigrants and Racial Minorities in the US**, *International Journal of Environmental Research and Public Health, Volume 18(23): 12708, 2021, PubMedID 34886437, ISSN 1660-4601*, https://doi.org/10.3390/ijerph182312708

Projects

Parallelization Suggestion for Python Programs | *Python, Systems* — *Jan. 2022 – Aug. 2024*

- We are profiling Python programs to provide suggestions to run it in a distributed environment.
- We have prepared a prototype and testing it.
- The prototype performs the parallelization task as fast as a manually parallelized program for a set of inputs.

Incorporating local search into ACO based many-objective optimization | *Meta-heuristics* *Apr. 2022 – Aug. 2022*

- Incorporated local search into one type of ACO-based many-objective optimization algorithms, iMOACO$_{\mathbb{R}}$.
- Tested the new algorithm against iMOACO$_{\mathbb{R}}$ and found out it sometimes gives us two times improvement and always stays competitive.

A Hybrid Approach to DNS Cache Poisoning | *Security, Networking Protocols* *Dec. 2021 – Mar. 2022*

- Here, we proposed a novel hybrid approach to DNS cache poisoning. In contrast to classical DNS poisoning attacks that target resolvers, our proposed attack targets client-side caches with the help of an unprivileged malware residing in the client machine. To improve the reliability of our attack, we also exploit the Response Rate Limiting (RRL) feature present in most nameservers. Combining these two ideas gives us an attack method that is surprisingly effective.

Connect4 AI | *Python, Numba, Tensorflow, Colab* *Oct. 2020 – Dec. 2020*

- Developed AI to play Connect4.
- Used different AI algorithms: Minimax Search and Reinforcement Learning approaches such as Mote Carlo Tree Search, Deep Q Network, Categorical Deep Q Network.
- Used *Numba* to make everything run fast.

Survey of Feedback Arc Set Problem | *Python, Numpy, Matplotlib, Numba* *Apr. 2020 – Dec. 2020*

- Surveyed Feedback Arc Set Problem; it's complexity, approximability etc.
- Implemented some algorithms with *Numpy* and *Numba* for faster execution.

Relevant Courses

Online Courses: Natural Language Processing (Stanford University); Mathematics for Machine Learning (Imperial College London); Deep Learning, Tensorflow Developer (DeepLearning.AI); Bioinformatics (University of California San Diego); Reinforcement Learning (University of Alberta)

Technical Skills

Languages: C/C++, Java, Python, Rust, Haskell, Bash, SQL, JavaScript
Frameworks: Django, Django-REST API, JavaFX, OpenGL, Bootstrap
Tools: Unix Shell, Git, VS Code, NetBeans, PyCharm
Libraries: Scikit-Learn, Tensorflow, PyTorch, Pandas, NumPy, Matplotlib, Numba
Database: Posgres, Redis

Scholarships, Awards, and Grants

- BUET Alumni Association Award for securing top position in the department
- Dean's Honor List, BUET in all 8 undergraduate semesters
- University Merit Scholarship, BUET
- General Grade Scholarship in Higher-Secondary School Certificate Exam

Community Services

Organizing Committee Member of NSysS 2021, 2022, 2023