Shazzad Hasan

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About

I love learning from first principles, writing efficient code, training machine learning and deep learning algorithms on large datasets, and exploring causal effects and science that connects the dots.

Education

- **Durham University** — Durham, UK
  MSc in Scientific Computing and Data Analysis — *Sept 2023 - Sept 2024*
  Specialization: Financial Technologies
  Courses: Introduction to statistics and data analysis, Introduction to Machine Learning, Introduction to Scientific Computing, Introduction to High-Performance Computing, Performance Engineering, GPU Programming, Advanced Algorithms, Discrete Systems, Financial Mathematics, Financial Technologies, Professional Skills

- **North South University** — Dhaka, Bangladesh
  BSc in Electrical and Electronic Engineering; CGPA: 3.25/4.00 — *Fall 2015 - Fall 2020*
  Thesis: Predicting Pulmonary Fibrosis Progression Using Deep Learning
  Specialization: Artificial Intelligence
  Specialization Courses: Artificial Intelligence, Machine Learning, Pattern Recognition and Neural Network, Introduction to Multi-Agent Systems and Control

Skills Summary

- **Fields of Interest**: Financial Engineering, Machine Learning, Blockchain Technology, Software Development
- **Kay Skills**: Financial Mathematics, Mathematical Modeling and Simulation, Developing Machine Learning and Deep Learning Models, Data Analysis and Storytelling
- **Programming Languages**: Python, C, C++, MATLAB, Solidity
- **Frameworks and Libraries**: PyTorch, Keras, scikit-learn, OpenCV, pandas, NumPy, SciPy, Matplotlib, CUDA, OpenMP, MPI, likwid, gprof, FastAPI
- **Database**: SQL, PostgreSQL, MySQL
- **Software**: Building RESTful APIs, Web Scraping, HTML, CSS, Git and Github, Continuous Integration and Build System, Unit Testing, Docker, macOS, Unix/ Linux, Bash

Experience

- **North South University** — Dhaka, Bangladesh
  Research Assistant, Advisor: Dr. Mohammad Monir Uddin — *Jan 2017 - Dec 2017*
  - Expanded the PDEG method for model order reduction of structured dynamical systems and the RKSM method for solving second-order structured Lyapunov matrix equations.
  - Conducted experiments with various feedback stabilization techniques, with a particular focus on reduced model-based feedback stabilization.

Projects

Current Projects:

- **Exploring Ethereum with Machine Learning**: Working as part of my MS Thesis and Project.

Completed Projects:

- **Performance Analysis and Efficient CUDA Implementation of Matrix Arithmetic**: In this project, I initially utilized gprof to analyze and visualize execution times of serial code functions, identifying hotspot functions. Further performance insights were gained using the likwid tool to profile memory and floating point operations of the hotspot functions, accompanied by a roofline model visualization. Subsequently, I implemented CUDA to harness loop parallelism within compute functions. This was extended to task parallelism, enabling simultaneous execution of independent compute functions.
- **Parallelization and Scaling Analysis of 2D Reaction-diffusion System**: In this project, I simulated serial and parallelized versions of a variant of FitzHugh-Nagumo model namely, the 2D reaction-diffusion system using OpenMP and MPI. My goal was to compare the performance of the serial code against the parallelized version and investigate weak and strong scaling of the parallel implementations.
- **Predicting Pulmonary Fibrosis Progression Using Deep Learning**: In this project, we developed a model for patients suffering from pulmonary fibrosis disease using CT scan images of their lungs, clinical metadata, and baseline FVC values. We determine the prognosis of the disease based on the model's predicted FVC value. (Part of my BS thesis and project) [Methods: CNN, Linear Regression]
- **A Machine Learning Approach for Future Career Planning in IT in Bangladesh**: Determining whether a job is suitable for a person seeking employment based on their specialization, skills, background, and job descriptions can be challenging. In this project, we collected job-circular data in Information Technology in Bangladesh and developed a model to assist job seekers in comprehending and securing their most desired jobs. [Methods: k-means clustering, PCA]
- **Gray-Scott Reaction-diffusion System Simulation Software**: In this project, our goal was to build agile, responsible, and collaborative software. We created a build system for the Gray-Scott reaction-diffusion system and implemented continuous integration for our git repository. Additionally, we used GoogleTest framework for unit testing.

- **Software Project Management**: In this project, we developed a project management plan by creating a Gantt Chart for the software development of a client company. The tasks carried out during the project's lifecycle included hiring a data scientist, defining project requirements, reviewing the data provided by the company, selecting the best methods based on the state-of-the-art review, code development, and addressing safety issues.

Publications

1. **S Hasan**, AM Fony, MM Uddin (2019). Reduced Model-Based Feedback Stabilization of Large-scale Sparse Power System Model. In Proceedings of the International Conference on Electrical, Computer and Communication Engineering.

2. **S Hasan**, MM Uddin (2017). Solution of Large-Scale Lyapunov Matrix Equations for PDEG-Based Model Reduction of Structured Dynamical Systems. In Proceedings of the 6th International Conference on Computing, Communication and Sensor Network.

Professional Education

- **MITx** edX, Online
  Micro Masters Program in Statistics and Data Science *Sept 2021 - Present*
  5 instructor-led MIT graduate-level courses: 6.431x: Probability - The Science of Uncertainty and Data, 18.6501x: Fundamentals of Statistics, 6.86x: Machine Learning with Python: from Linear Models to Deep Learning, 14.310x: Data Analysis for Social Scientists, 14.310Fx: Data Analysis in Social Science - Assessing Your Knowledge (assessment course of 14.310x), DS-CFx: Capstone Exam in Statistics and Data Science

- **MITx** edX, Online
  XSeries Program in Computational Thinking using Python *Jan 2022 - May 2022*
  2 instructor-led MIT undergraduate-level courses: 6.00.1x: Introduction to Computer Science and Programming Using Python, 6.00.2x: Introduction to Computational Thinking and Data Science

- **edX and Coursera** Online
  MicroBachelors Program in C++ Programming & Data Structures - NYU (edX)
  Deep Learning Specialization - deeplearning.ai (Coursera)
  AI for Medicine Specialization - deeplearning.ai (Coursera)

- **Oxford Machine Learning Summer School** University of Oxford (Virtual)
  Machine Learning × Health track *2022*

References

- **Dr Ioannis Ivrissimtzis, ioannis.ivrissimtzis@durham.ac.uk**
  Associate Professor, Department of Computer Science, Durham University, UK

- **Dr. Mohammad Monir Uddin, monir.uddin@northsouth.edu**
  Associate Professor, Department of Mathematics and Physics, North South University, Dhaka, Bangladesh