Arul Rhik Mazumder

39 Steele Lane, Boxborough, Massachusetts 01719
1-978-710-1802 arul.rhik@gmail.com Arul (Rhik) Mazumder Arul Mazumder

Education

Carnegie Mellon University **Aug. 2023 – May 2026**
Bachelor of Science in Computer Science, Dean's List High Honors *Pittsburgh, Pennsylvania*
Coursework: Linear Algebra, Discrete Mathematics, Imperative Programming
Functional Programming, Theoretical Computer Science, Probability
Activities: President of Quantum Computing Club, Quant Club, ACM@CMU, Project Olympus

Harvard Extension School **Aug. 2022 – Dec. 2022**
College Credit *Cambridge, Massachusetts*
Coursework: Data Structures in Java, Vector Calculus

Experience

International Business Machines (IBM) **May 2024 – August 2024**
Research Intern *Cambridge, Massachusetts*
- Implemented a novel learning algorithm for discrete graphical models using samples generated from Glauber Dynamics.
- Using dynamically generated samples, we demonstrate an exponential reduction of learning sample complexity.

Quantum Technologies Group **May 2023 – Current**
Research Intern *Pittsburgh, Pennsylvania*
- Produced tutorial paper that aids users in developing and implementing their solutions to their optimization problems on current IBM and DWAVE quantum machines. Work has been submitted to INFORM Tutorials 2025
- Implemented novel SDP representations and warm-start methods for identifying entangled quantum states. Using Picos and CVXPY, we numerically establish the superior performance of these representations.

George Mason University Algorithms Lab **May 2021 – January 2023**
Research Intern *Fairfax, Virginia*
- Developed quantum string-matching algorithm using Qiskit and tested it on IBM Quantum Backends
- Researched and developed a novel quantum-hybrid algorithm for the Traveling Salesman Problem which was run on DWAVE Quantum Annealers. This algorithm performed 3 times better than best classical and quantum counterparts.
- Implemented four novel heuristic classical and quantum heuristics using DWAVE Leap Solvers for the Ship Rerouting Problem. This work has been submitted to SIAM Symposium on Algorithm Engineering and Experiments

Projects/Publications

Benchmarking Metaheuristic-Integrated QAOA | *Python, Qiskit, OpenQAOA* **October 2023**
- Implemented novel metaheuristic-integrated QAOA circuits decreasing solution error from 15% to 1%.
- Published in Intelligent Computing Proceedings of the 2024 Computing Conference, Volume 3
- Accepted to Quantum Information Processing (QIP) 2024 as Poster Presentation

Differential Evolution based Hyperparameters Selection of Transformer | *Python, Transformers* **August 2023**
- Applied metaheuristics like Differential Evolution to select hyperparameters for a Transformer Model to produce more accurate results when load forecasting
- Paper accepted by the 14th IEEE International Symposium Series on Computational Intelligence (SSCI 2023)

Comparisons of Metaheuristics for Hyperparameter Selection | *Python, ANN, ARIMA, LSTM, GRU* **May 2023**
- Applied metaheuristics across a range of forecasting models (ANN, ARIMA, LSTM, GRU) to produce more accurate results in weather forecasting
- Paper accepted by the 15th International Conference on Evolutionary Computation Theory and Applications (ECTA 2023) to be held as part of IJCCI 2023

A Hybrid Quantum Algorithm for the Metric Traveling Salesman Problem | *Python, Ocean* **January 2023**
- Published in 2023 IEEE International Parallel and Distributed Processing Symposium (IPDPS)

Comparisons of Classic and Quantum String Matching Algorithms | *Python, Qiskit* **August 2022**
- Published in proceedings of the 4th International Conference on Advanced Information Science and System (AISS)

Awards

Olympiads: USA(J)MO (2021-22), USAPhO Bronze (2022), USACO Gold (2023), USNCO National Finalist (2022)

Other Competitions: Regeneron Science Talent Search Scholar [Top 300] (2023), Purple Comet 5th Place (2022),
International Math Modelling Competition National Finalist (2022)
United States Math Talent Search Honorable Mention and Bronze (2021-22), Eagle Scout (2023)