Reza Arabpour

Born to be a problem solver and to dare mighty things

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Highlight

- M.Sc. in Computational Science and Engineering with **4/4 GPA and full scholarship**
- B.Sc. in Applied Mathematics with lots of research projects and a startup experience in machine learning and finance
- **Bronze Medal winner in ACM ICPC 2018** and three times Excellent in term award during my undergraduate
- Udacity scholarship award from Amazon reinforcement learning competitions (Deep Race 2022)

Education

- Master of Science, Computational Science and Engineering **Sep. 2023 – Aug. 2025**

McMaster University *Hamilton, Canada*

Thesis Topic: Geometric Deep Learning for Fine-Tuning Large Models and Computational Finance

- Bachelor of Science, Applied Mathematics **Sep. 2018 – Mar. 2023**

University of Tehran *Tehran, Iran*

Final Project: Text-Based Emotion Detection using Deep Learning and Transformers

Publications

- [Under review] **Reza Arabpour**, John Armstrong, Luca Galimberti, Anastasis Kratsios, Giulia Livieri, "***Low-dimensional approximations of the conditional law of Volterra processes: a non-positive curvature approach***," Analysis and Applications, May 2024

Research and Teaching Experience

- Research Assistant **June 2023 – Present**

Vector Institute and McMaster University

Working on **geometric deep learning and computational finance** under the supervision of Dr. Anastasis Kratsios

- Developed and optimized **hyper networks to approximate stochastic processes** by parallelizing matrix operations across multiple GPUs and machines, using PyTorch and TensorFlow for **parallel distributed learning** on compute clusters, **reducing compute time by 60x**
  Pre-print available at arXiv: https://arxiv.org/abs/2405.20094
- Currently working on **Parameter Efficient Fine Tuning (PEFT)** for large-scale models to reduce GPU memory and computation costs. **Researching methods to fine-tune by selecting a subset of parameters and using hyper networks**. Aiming to prove the existence of such subsets and design algorithms that **minimize memory usage, promoting fast and sustainable AI**

- Teaching Assistant **Sep. 2023 – Present**

McMaster University

Serving different roles from having teaching sessions to grading and exam invigilating

- MFM 713, Computational Finance II, Dr. Anastasis Kratsios
  Currently TA-ing this graduate level course which involves numerical solutions to PDEs and SDEs, exotic and path-dependent options, free boundary for American options
- MFM 714, Topics in Risk Management, Dr. David Lozinsky
  Graduate level course with topics ranging from credit risk capital, counterparty Risk, and Risk in Retail portfolios to algorithmic and high-frequency trading (HFT), and other financial technologies
- Math 1MP3, Introduction to Mathematical Scientific Computation, Dr. Erin Clements
  Chosen for this course 4 times in a row, assisting more than 500 students due to my excellent performance and resulting in both students and supervisor satisfaction
- Finance MFIN 704, Numerical Methods in Finance, Dr. Michael Milewski
  Graduate level course focusing on financial data processing pipelines from reading data from different sources like Yahoo Finance API or Bloomberg and processing them to make insightful analysis and reliable forecasts

- Quantitative Researcher and Co-Founder **Jan. 2021 – Jan. 2023**

QuantEdge.ir

Founded a startup gathering five dedicated professionals to research statistical arbitrage in foreign exchange and gold markets

- created multiple baskets of strategies using genetic algorithms and fuzzy logic applied to 24 well-rounded trading agents and optimized their performance using our proprietary framework of different time frames and 500 augmented datasets and then performed Monte-Carlo simulation to check performance in metrics like Drawdown, Sharp-ratio, Sortino ratio, and etc.

- Undergraduate Research Assistant **June 2022 – Jan. 2023**
University of Tehran

Working on deep learning techniques like **convolutional neural networks for vision** applications under the supervision of Dr. Hedieh Sajedi

- Used different pre-trained models like **ResNet, VGG, and own designed architecture** to recognize grape breeds based on their leaf images. Resulting in about 90% accuracy on validation data and **85% on out-of-sample test data**. We also tried to improve performance by using image denoising and dimension reduction **auto-encoder networks**
A complete report and codes available at: https://github.com/arabporr/Grapevine_Leaves_Classification_CNN

- Undergraduate Teaching Assistant **Jan. 2020 – Dec. 2022**
University of Tehran

- CS, Data Structures and Algorithms, Dr. Mohammad Ganjtabesh
- CS and Math, Advanced Programming in C++, Dr. Hedieh Sajedi
- Math, Introduction to Graph Theory, Dr. Morteza Mohammad Nouri
- CS and Math, Fundamentals of Computer Science and Programming, Dr. Zaynab Mousavian
- Physics, Fundamentals of Programming, Dr. Zaynab Mousavian

Seminars and Internship

- Eastern Conference on Mathematical Finance | *Fields Institute* **September 2024**
- Presented my research on forecasting stochastic processes at the 8th Eastern Conference on Mathematical Finance seminar hosted by Fields Institute in Toronto

- DLRL Summer School | *CIFAR and Vector Institute* **Summer 2024**
- The 20th DLRL (Deep Learning and Reinforcement Learning) summer school held by CIFAR (Canadian Institute for Advanced Research) hosted by Vector Institute in Toronto

- AWS Machine Learning Foundations | *By Amazon at Udacity* **October 2022**
- Algorithmic trading with Python | *IFC* **July 2022**
- Product Management Bootcamp | *Bana Talent Accelerator* **Winter and Spring 2021**
- Internet of Things Summer School | *IEEE branch at University of Tehran* **Summer 2019**
- Software Engineering Summer Internship | *Rahnema College* **Summer 2018**

Relevant Coursework

- Probabilities
- Data Mining
- Data Structures
- Mathematical Analysis
- Artificial Intelligence
- Algorithms Design
- Optimization
- Statistical Learning
- Graph Theory
- Game Theory
- Advanced Linear Algebra
- Object Oriented C++

Technical Skills

Languages and Apps: C, C++, Python, R, MATLAB, Bash Script, SQL, MS Excel
Machine Learning Libraries: HuggingFace, PyTorch, TensorFlow, Keras, Scikit-Learn, Statsmodels
Development Tools: Git, Linux Servers, Web Scraping, Docker, AWS, Scrum Methodology

Leadership / Extracurricular

- CSE Seminar Committee | *McMaster University* **Fall 2024**
- Organized bi-weekly talk sessions in the fall 2024 semester; Contacted and invited guest speakers from various fields and universities, planned their commute, and handled all the booking and catering responsibilities

- Head of Editorial Board for Applied Mathematics section | *"Jong-e Riazi", University of Tehran* **Winter 2022**
- Worked on a university-level student publication named "Jong-e Riazi," published the 12th number ("Jong-e Riazi" is one of the oldest publications in the faculty of mathematics, statistics, and computer science)

- Coordinator of Volunteers and Sales Assistant | *Iranian Hemophilia Association* **Fall 2018**
- I have the great honor of inviting more than 20 members and collecting enough money to help the families of a group of children fighting Hemophilia to stay in the city of Tehran and pay for medical expenses.