Reza Arabpour

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Highlight

- Currently doing an internship at **BMO Capital Markets** as machine learning quantitative researcher
- M.Sc. in Computational Science and Engineering with **3.9/4 GPA and full scholarship**
- **Bronze Medal winner in ACM ICPC 2018** West Asia and 3 times Excellent in term award during bachelor's
- Published 2 papers during master's degree in top venues, **ICML (ES-FoMo) and Analysis and Applications**

Education

- Master of Science, Computational Science and Engineering **Sep. 2023 – Sep. 2025**
McMaster University *Hamilton, Canada*
Thesis: Geometric Deep Learning For Financial Data & Efficient Fine-Tuning of Foundation Models

- 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

- **Reza Arabpour**, Haitz Sáez de Ocáriz Borde (Oxford University), Anastasis Kratsios, "***LoRA Fine-Tuning Without GPUs: A CPU-Efficient Meta-Generation Framework for LLMs***," July 2025, Workshop on Efficient Systems for Foundation Models at **ICML 2025**, available at arXiv: https://arxiv.org/abs/2507.01806
- **Reza Arabpour**, John Armstrong (King's College), Luca Galimberti (King's College), Anastasis Kratsios, Giulia Livieri (LSE), "***Low-dimensional approximations of the conditional law of Volterra processes: a non-positive curvature approach***," May 2024, available at arXiv: https://arxiv.org/abs/2405.20094

Research and Experience

- Machine Learning Quantitative Researcher (Internship) **June 2025 – Present**
BMO Capital Markets and Mitacs
Working on adapting advanced deep learning models to financial time series data and **extracting alpha-generating features**

- Created a comprehensive and realistic **synthetic data generation module** that efficiently generates high-quality data using a **regime-switching rough Bergomi (stochastic) volatility model with Hawkes jumps**
- Currently working on designing and implementing a new transformer-based architecture for feature extraction

- 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

- Designed and published a novel framework for **efficiently fine-tuning large language models (LLMs)** on a laptop device **using only CPU**, drastically reducing computation costs by eliminating the need for GPU memory and calculations. Although not matching GPU performance, achieved **150% improvement in Rouge-L metric** over base models. Enabled accessible fine-tuning for individuals with limited hardware or edge devices with privacy constraints.
- 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 Vector Institute's compute clusters, **reducing compute time by 60x**

- Teaching Assistant **Sep. 2023 – May 2025**
McMaster University
Serving different roles from having teaching sessions to grading and exam invigilating

- MFM 713, Computational Finance II, Dr. Anastasis Kratsios
  Graduate level course which involves numerical methods for PDEs and SDEs, exotic and path-dependent options, free boundary for American options
- MFM 714, Topics in Risk Management, Dr. David Lozinski
  Graduate level course with a focus on credit risk. Developed students' Python coding skills to implement credit risk measurement on a debt portfolio, including tutoring and grading.

- 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

Worked on Convolutional Neural Networks for computer 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

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