Sina R. Baghal

sinabaghal.github.io

ABOUT ME

I am a quantitative finance self-learner. My PhD was in numerical analysis, optimization, and machine learning methods. Later, during my internship at CMRM, CIBC, I had an invaluable exposure to quantitative finance which sparked my interest in the field. I started by reading Shreve's "Stochastic Calculus for Finance II" and have kept studying from other sources since. Also, I have 7 years of coding experience in Python and MATLAB (also familiar with C++), enjoy implementing algorithms and have work experience in neural network implementation (Pytorch).

WORK EXPERIENCE

- **TD (Full Time Permanent)** — Toronto, CA
  Data Scientist II — *July 2023 - Present*
    - **Delivery**: Data extract pulls in SAS and SQL (Oracle). Data analytics (*e.g.,* ML algorithms) on transaction data. Data cleaning. Time sensitive ad-hoc projects.
    - **Technical Skills**: Database programming in SQL and SAS , Oracle, Python

- **CIBC (Full Time Internship, 1 Year)** — Toronto, CA
  Quantitative Analyst — *Aug 2022 - July 2023*
    - **Delivery (FRTB IMA)**: Non-Modellable Risk Factor Time Series Construction: Developed tools and methodology for time series construction of credit derivative risk factors such as single-name CDS spreads, Sector CDS spreads, CDS Index Spreads and CDS Index Volatilities. Developed methodology to identify proxy/reduced-set time series. Developed OOP style Python package using bash scripting and parallel processing to handle large data and ensure maintainability
    - **Technical Skills**: Mathematical finance, FRTB, Python, Performance optimization, Parallel processing, OOP
    - **Weakly Presentation**: Applications of Graph Neural Networks in finance, Chapters 1&2 of Bergomi's SV book
    - **Self-Study**[1]: Studied topics include: stochastic calculus, risk-neutral pricing, BSM, pricing using PDEs, exotic options, American derivatives, term structure models (Vasicek, CIR, Hull-White, Forward LIBOR), volatility smile, volatility surface (Heston, SABR) calibration and credit risk. Last but not least, I authored solutions to exercises from Shreve's "Stochastic Calculus for Finance II".

- **Huawei Noah's Ark Lab (Full Time Internship, 6 Months)** — Montreal, CA
  Research in neural network quantization based on product team's requirements — *Feb 2022 - Aug 2022*
    - **Delivery**: Acceleration of neural networks' SoftMax layer for both training and inference in Pytorch. Achieved baseline accuracy using only the optimal number of bits required for classification i.e., $\lceil \log_2 c \rceil$ where c is the number of classes
    - **Technical Skills**: Pytorch, Python, Customized training of neural networks
    - **Research and Collaboration**: Ideal bit-allocation for training different layers of nns, batch-norm quantization, impact of weights distributional assumptions on quantization, exploding/vanishing gradients, binarization of transformers

- **University of Waterloo** — Waterloo, CA
  Postdoctoral (at CS dept.) and Graduate Researcher (at C& O dept.) — *May 2016 - Feb 2022*
    - **Research**: Conducted research in stochastic optimization and graph neural networks
    - **Technical Skills**: Numerical Analysis, Optimization, Statistics, Machine learning, Python, CPU/GPU, C++, MATLAB, Parallel processing, Dask, Spark, Code performance optimization, Object oriented programming
    - **Tutorial Sessions**: Numerical Computation, Linear Algebra, Introduction to Optimization, Fundamental of Optimization, Semi-definite Programming, Portfolio Optimization, Deterministic OR Models

- **Young Scholars Club (Seasonal - Part Time)** — Tehran, IR
  Mathematical Olympiad Coach — *Sep 2006 - May 2016*
    - **Teaching**: Algebraic Combinatorics, Analytic Number Theory, Probability Theory, and Algebra
    - **Problem Solving**: Held challenging problem solving (e.g., Putnam) sessions so students develop their math. skills
    - **Problem Design**: Part of problem designing committee for Iranian mathematical Olympiad exams

EDUCATION

- **University of Waterloo** — Waterloo, CA
  PhD in Mathematical Optimization at the department of Combinatorics & Optimization — *May 2016 - Apr 2021*

  Thesis: Simple Termination Criteria for Stochastic Gradient Descent Algorithm

- **Sharif University of Technology** — Tehran, IR
  Bachelor's and Master's degree in Fundamental Mathematics — *Sept 2006 - July 2012*

  I studied Algebraic Geometry and Number Theory during this time.

SELECTED HONORS AND AWARDS

Iranian Mathematical Olympiad (Silver Medal, 2005)[2]

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[1] I started learning quantitative finance at CIBC and have continued my studies independently since starting a non-quant position

[2] Olympiad medals are awarded annually to 40 out of 320,000 competing students