Alex Kazachek

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Education

University of Waterloo
Sep 2023 – Aug 2025

MSc in Applied Mathematics.

Western University
Sep 2019 – Apr 2023

Honours BSc in Mathematics & Data Science.

GPA of 3.91.

Work

Ontario Teachers' Pension Plan | Analyst Intern
May 2023 – Aug 2023

On the quantitative strategies and research (QSR) team, the algorithmic trading arm.

Research in portfolio construction on asset volatility estimation and scaling.

Western University | Research Assistant
Sep 2022 – Apr 2023

Conducting mathematical physics research on coherent quantum states and their entanglement.

Derived and published a non-trivial lower bound involving entanglement entropy.

Awards

Mervin Wass Scholarship
2022 School Year

Recognized by the math department as the highest-achieving student.

RBC Data Science Scholarship
2021 School Year

Awarded by RBC Tech & Ops for accomplishments and potential in machine learning.

Albert O. Jeffery Scholarship
2021 School Year

Attained the top average within third-year math.

Skills

Programming
Python (NumPy, SciPy, PyTorch, Pandas, Flask), R, MATLAB, Java

Tools
Jupyter, LaTeX, Beamer, Git, Excel

Areas
Mathematics, Statistics, Machine Learning, Data Science, Quantitative Finance

Projects

American Option Pricing Techniques
Aug 2022

Implemented a numerical method for pricing American call options from mathematical finance literature.

The optimal exercise strategy is parametrized and optimized. Monte-Carlo simulations then bootstrap low- and high-bias estimators of the option value.

Physics-Informed Neural Networks
Dec 2021 – May 2022

Studied the gradient flow of physics-informed neural networks (PINNs) under momentum-based optimizers (e.g. SGDM).

Proved momentum diminishes spectral bias in PINNs relative to SGD. Experimentally demonstrated PDE boundary conditions are high-frequency features and learned slower.

2021 Canadian Undergraduate Mathematics Conference
Jan 2021 – Aug 2021

Helped organize the conference, scouting professors and industry professionals for panels and plenary lectures.

Designed and built the website using React.js, including mobile support and language localization.

Clubs

Math Club at Western (MaCAW) | Vice President
Sep 2020 – Aug 2022

Started running biweekly math contests, both writing and grading them.

Introduced student seminars, events for undergraduates to deliver lectures on their research and thesis projects.

Papers

T. Barron and A. Kazachek. "Coherent states and entropy." Proceedings of Geometric Science and Information, 2023.

G. Farhani, A. Kazachek, and B. Wang. "Momentum diminishes the effect of spectral bias in physics-informed neural networks." arXiv:2206.14862.

T. Barron and A. Kazachek. "Entanglement of mixed states in Kähler quantization." Proceedings of Lie Theory and Its Applications in Physics, 2021.

Interests

Speedcubing (personal best of 12.55 seconds).

Math contests (top Putnam score in my cohort).

Callisthenics, rock climbing, and bouldering.