Alex Kazachek

alexdkazachek@gmail.com
www.akazachek.com

Education

University of Western Ontario
2019 – 2024 (Projected)

HBSc in Mathematics & Data Science.

GPA of 3.92.

Awards

NSERC USRA
2021 & 2022 Summers

RBC Data Science Scholarship
2021 Fall

Albert O. Jeffery Scholarship
2021 Fall

Cecil G. Gracey Scholarship
2020 & 2021 School Years

Borwein Memorial Prize
2020 Winter

Skills

Programming

Fitting models in R with various numbers of factors and types of effects.

Using Python to evaluate Bayesian hypotheses by permutation testing.

Implementing machine learning procedures with NumPy and PyTorch.

Creating static web sites using React.js.

Academics

MaCAW x PASA Coffee Seminar Talk
2021 Fall

Title How to Differentiate a Function That Has No Derivative

Modified Abstract A Sobolev space consists of functions which admit weak derivatives. Being a Banach space, it is more well-behaved than the space of differentiable functions. Its definition is motivated by the Dirichlet problem, then solved via Stampacchia's theorem.

CUMC Student Talk
2021 Summer

Title A Mathematical Definition of Entanglement and Its Measurement

Modified Abstract Entangled states are formalized as operators over the tensor products of Hilbert spaces. On certain states, known as pure, the level of entanglement may be measured by entanglement entropy. This value may be extended to all states by the convex roof construction, yielding entanglement of formation.

Work Experience

University of Western Ontario | Volunteer Researcher
2022 Winter (on-going)

Studying physics-informed neural networks. Specific focus on convergence in wide networks, developing theory for why certain optimizers (Adam and SGDM) train faster than SGD. Supervised by Boyu Wang and Ghazal Farhani.

Manuscript to be submitted to NeurIPS 2022.

University of Western Ontario | Undergraduate Marker
2021 School Year

Marking assessments and proctoring examinations for Math 2155F (Fall), Calc 1301B and AM 1201B (Winter).

University of Western Ontario | Research Assistant
2021 Summer

Assisted research in quantum state geometry and information theory. In particular, examined entanglement of states associated to certain Kähler manifolds. Supervised by Tatyana Barron and funded by NSERC.

T. Barron and A. Kazachek. "Entanglement of mixed states in Kähler quantization". To appear in: *Lie Theory and Its Applications in Physics*. Springer Proc. Math. Stat., 2021.

Clubs & Committees

Canadian Undergraduate Mathematics Conference | Committee Member
2021 Summer

Created new website for this and forthcoming CUMCs. Implemented desktop and mobile support, and bilingual localization (English & French).

Organized the career and mathematical communication panels, as well as the Lean and Beamer workshops.