

Quinn Fisher

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EDUCATION

MSc Mathematics (Applied)

University of Toronto

Supervisor: [Prof. Vardan Papyan](#)

Toronto, Canada

Nov 2023

Thesis topic: Inductive Biases in Deep Networks Trained with Mixup

Hon. BSc Mathematics & Physics

University of Toronto

Awards: High Distinction, Dean's List

Toronto, Canada

April 2022

EXPERIENCE

University of Toronto (Mathematics Department)/Vector Institute

Deep Learning Researcher/Faculty Affiliate Researcher

Toronto, Canada

September 2023 – Present

- Run experiments on a [GPU cluster](#), ensuring optimal resource utilization. Train of various deep network architectures (Vision Transformers, ResNets, etc.) using numerous data augmentation methods. Develop new fine-tuning methods for vision transformers and LLM's.
- Investigate mathematical properties of deep networks through analysis of intermediate representations.
- Maintain up-to-date knowledge through regular review of academic papers. Contribute to the academic community via publication and conference presentations.

University of Toronto

Teaching Assistant

Toronto, Canada

Sep 2022 – June 2023

- Lead tutorials, assist with lectures, grade homework/tests, and deliver office hours for MAT223 (Linear Algebra) and MAT133 (Calculus for Business).

Capco

Data Science/Consultant Intern

Toronto, Canada

May 2021 – Sept 2021

- Clean and performed feature engineering on a dataset of error reports from servers, including the creation of new temporal features
- Use PySpark to implement a random forest to classify severity of error reports.
- Map out technology architectures and research topics for clients looking to implement new products/features.

Dalla Lana School of Public Health

Biostatistics Research Assistant

Toronto, Canada

March 2021 – March 2022

- Supervised by [Osvaldo Espin-Garcia](#) in collaboration with the [GEM Project](#) for Crohn's and Colitis research.
- Write R and bash scripts to clean and implement quality control on genetic data as well as implement a multi-ancestry GWAS via a linear mixed effects model.

Greenhouse (Band)

Musician/Producer

Toronto, Canada

Jun 2016 – Present

- Write, produce, and record [music](#).
- Communicate with musicians, venue owners, and press to organize performances, finances, and creative projects.

PUBLICATIONS

Quinn LeBlanc Fisher, Haoming Meng, Vardan Papyan, "Pushing Boundaries: Mixup's Influence on Neural Collapse", *International Conference on Learning Representations (ICLR)*, 2024

CONFERENCE PRESENTATIONS

Quinn LeBlanc Fisher “Pushing Boundaries: Mixup’s Influence on Neural Collapse”, *Remarkable 2024 Conferece*, Vector Institute for Artificial Intelligence, 2024

SKILLS & INTERESTS

- **Python** (Pytorch, Numpy, Scikit-learn, Pandas)
- **SQL, Apache Spark**
- **Machine Learning, Data Science**
- **Deep Learning** (Generative Networks, LLMs)
- **Audio processing, Computer Vision**
- **Mathematical/Statistical Modelling**

RESEARCH

Pushing Boundaries: Mixup’s Influence on Neural Collapse | [Paper](#) | [Webpage](#)

- Published via ICLR 2024. Project in collaboration with [Prof. Vardan Papyan](#) and Haoming Meng.
- Investigate geometric configurations of last-layer activations for deep networks trained with mixup.
- Show empirically and theoretically that the when trained with mixup, the last-layer activations converge to a distinct configuration.

Optimal Transport in Diffusion Networks | [Webpage](#)

- Implement and evaluate [score-based generative models](#) for generating images.
- Investigate the path between images and noise. Using various metrics, we find evidence that the path is an optimal transport
- Project done with assistance from [Prof. Vardan Papyan](#) and [Prof. Adrian Nachman](#).

Mathematical Model of Opioid Addiction | [Webpage](#)

- Use python to implement and modify compartment model for prescription opiate addiction and examine transient behaviour.
- Fit the model to relevant Ontario opiate data in an attempt to gain insight into the rise in opioid related deaths during the COVID-19 pandemic.
- Supervised by [Prof. Adam Stinchcombe](#)