

ZAYAAN MULLA

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I want to work on building creative mathematical solutions to important problems. I think big and I love to learn.

Education

University of Waterloo

Sep. 2022 - April. 2026

B. Math. Triple Major in Computer Science, Combinatorics/Optimization, Pure Mathematics

- All **Advanced Courses with 120% course-load** to fast-track graduation
- Recipient of Nortel Networks Institute Scholarship, President Scholarship Of Distinction
- Selected Coursework: **Intro to Optimization** (Advanced), **Probability + Statistics** (Advanced), **Linear Algebra II** (Advanced), **Object-Oriented Software Development**, **Real Analysis**,

Technical Skills

Languages: Python, C++, C, HTML/CSS, JavaScript, SQL

Technologies: Linux, PyTorch, Pandas, Numpy, JAX, React, Docker, MySQL Jupyter Notebooks, AWS, Git

Mathematics: Linear Programming, Convex + Continuous Optimization, Graph Theory + Combinatorics, Combinatorial Optimization, Abstract Algebra

Projects

MicroGrad Clone | *Python, PyTorch, Numpy, Jupyter Notebooks*

September 2023

- Implemented the Micrograd library built by Andrej Karpathy
- Built **multi-layer perceptron** neural network library with **backpropagation** functionalities
- Performed **gradient descent optimization** + trained neural network on collected parameters

Makemore Clone | *Python, Pytorch, Numpy, Jupyter Notebooks*

December 2023

- Implemented large parts of the Makemore library built by Andrej Karpathy
- Used **Torch.Tensor** to efficiently evaluate neural networks
- Read and analysed the **Bengio et al. 2003 (MLP language model)** paper as a base to build a multilayer perceptron (MLP) character-level language model which included implementations of **negative log likelihood loss function**, **embedding lookup table** and the **hidden/output layers**.
- Implemented training loop and used **under/overfitting** to perform training
- Currently building on top of project by implementing tree-based structures to arrive at CNN architecture, similar to **Wavenet (2016)** by Deepmind

GPT Model following "Attention is All You Need" | *Python, Pytorch, Numpy, Google Colab*

May 2023

- Read and analysed the **Attention is All You Need paper** and **OpenAI GPT-3 paper**
- *In progress: implementing and training model on **Google Colab GPU**

AQA EPQ: Calculus of Variations and The Brachistochrone Problem | *Latex, TikZ*

May 2022

- Completed an expository physics research project in high school utilizing techniques from **Multi-Variable Calculus** and the **Calculus of Variations** to derive the **Euler Lagrange Equation** to determine a solution to the problem of fastest descent
- Achieved grade A* for the final project

Achievements/Extra-Curriculars

- **UAE Ministry of Education High Achievers Award** Top 5 A-Level Students graduating in 2022 (Awarded Golden Visa + 10,000 AED in financial rewards)
- **FastAI Course: Part II** Working on implementing the **Stable Diffusion** algorithm from scratch. Learning about **Hugging Face**, **transformer models**, **auto-encoders**, **CLIP embeddings**, **latent variables**, **u-nets**, **resnets**, and much more on the way!
- **Canadian Senior Mathematics Contest** Honour Roll
- **Google CodeJam** Second Round
- **Facebook Hacker Cup** Second Round
- **Putnam Mathematical Competition** (Results Pending, Expecting Top 500)
- **Pure Math, CO and Applied Math Club @ UWaterloo** Selected speaker at SASM Seminar Fall 2023 (Topics: **Cauchy Davenport Theorem**, **Polynomial Method**)