Max Liam Gross

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Professional Summary

Joint Honours student in Mathematics and Computer Science with strong research experience in program language theory, quantum computation, and natural language processing. Combining theoretical depth with practical software development skills. Particularly interested in the intersection of mathematical theory and computational applications in applications related to finance, machine learning, and optimisation.

Education

McGill University Aug. 2022 – May 2026

Joint Honours B.A. in Mathematics and Computer Science *Montréal, QC*

- Overall GPA: 3.73/4.00
- Honours & Awards: J. W. McConnell Scholarship (Academic Excellence 2022, 2023, 2024)
- Involvement: McGill A.I. Society, McGill Commodities Trading Group, McGill Trivia Club (Quizbowl Society)

The University of Edinburgh Jan. 2025 – May 2025

Visiting Informatics Student *Edinburgh, U.K.*

- Involvement: Quiz Society, Quantitative Finance Special Interest Group, Type Theory Special Interest Group

Academic Focus

Notable Coursework

- Mathematics: Analysis I-III, Abstract Algebra I-II, Graph Theory & Combinatorics, Probability Theory
- Computer Science: Algorithms & Data Structures, Operating Systems, Natural Language Processing
- Advanced Topics: Logic and Computability, Functional Programming (OCaml), Type Theory, Quantum Programming Languages, Algorithmic Game Theory, Artificial Intelligence

Research & Professional Experience

NSERC Undergraduate Student Researcher May 2024 – Aug. 2024

Université du Québec à Montréal *Montréal, QC*

- Lead researcher on "Mechanizing Quantum Programming Languages" project with the Computation and Logic Group
- Developed formal verification methods for quantum programming language Proto-Quipper using the Beluga proof assistant
- Implemented novel approaches to modeling quantum resources, resulting in improved safety guarantees
- Secured $9,000 in competitive research funding from NSERC and FRQ-NT

Course Assistant Aug. 2024 – Dec. 2024

School of Computer Science, McGill University *Montréal, QC*

- Led weekly office hours for COMP 302: Programming Languages and Paradigms, supporting 250+ students
- Created supplementary learning materials improving student comprehension of functional programming concepts
- Developed and implemented grading rubrics for assignments and oral presentations

Research Assistant Aug. 2023 – May 2024

.txtlab, McGill University *Montréal, QC*

- Developed novel NLP methodologies to quantify narrative surprise in detective fiction
- Implemented text analysis pipelines using NLTK and scikit-learn, processing 1000+ literary texts
- Collaborated with interdisciplinary team to integrate computational and literary analysis

Data Science Intern, Risk Department May 2023 – Aug. 2023

Propel Holdings *Toronto, ON*

- Developed machine learning models reducing loan default rates using XGBoost and sklearn
- Created real-time risk analysis benchmarks using Python and Pandas, processing 10,000+ daily transactions
- Collaborated with cross-functional teams to integrate risk models into fraud detection

Talks & Publications

Conference Presentations 2024

- **Full Talk:** "Structural Proto-Quipper: Mechanization of Quantum Programming Languages" - Eastern Canada Logic and Programming Seminar
- **Poster Presentations:**
  - "Structural Proto-Quipper: Mechanization of Quantum Programming Languages" - Undergraduate Computer Science Research Symposium
  - "Structural Proto-Quipper: Mechanization of Quantum Programming Languages" - Quantum – Science, Information, Technology, and Engineering Conference Toronto

Technical Projects

contwext | *JavaScript, Django, Python, BERT* Nov. 2023

- Developed Chrome extension combating misinformation by connecting social media posts to credible news sources
- Implemented BERT-based keyword extraction system identifying relevant news articles and connecting them to the New York Times API to return to users
- Won "Best Promotion of Social/Community Wellness" award at McGill Code Jam 12

The Poet Who Couldn't Know It | *Python, NLTK, R* Mar. 2023

- Conducted computational analysis of 500+ poems comparing human and AI-generated poetry
- Developed custom metrics for measuring semantic ambiguity and metaphorical density
- Research findings received top marks in class and invitation to research group

Technical Skills

Programming Languages: Python (Advanced), OCaml (Advanced), Java (Intermediate), C (Intermediate), SQL, JavaScript, R
Frameworks & Tools: Pandas, NumPy, scikit-learn, NLTK, Git, Docker, LaTeX
Areas of Expertise: Machine Learning, Natural Language Processing, Functional Programming, Type Theory
Human Languages: English (Native), French (Working)
Interests: Bouldering, crosswords, filmmaking, quizbowl