Mai Jacob Peng

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Education

McGill University — *Montréal, Québec*

Master of Science in Computer Science — *Sept 2020 - April 2023 (Expected)*

- Teaching Assistant for ***Programming Languages and Paradigms*** (COMP 302) and ***Compiler Design*** (COMP 520)
- *GPA: 4.0/4.0*

University of Toronto — *Toronto, Ontario*

Honours Bachelor of Science — *Sept 2014 - August 2019*

- Specialist in Computer Science (***High Distinction***) with PEY

Experience

Compiler and Accelerator Synthesis Lab, McGill University — *Montréal, Québec*

Graduate Researcher — *Sept 2020 - Present*

- Explored intersection of compiler infrastructure, static analysis, and code transformations to generate high performance code.
- Developed LAGrad, an MLIR-based automatic differentiation system that uses several novel static optimizations to achieve 2.8× speedup while using 35× less memory than existing state-of-the-art systems. **Published at CC '23**. Presented at US LLVM Dev Meeting '22, CDP '22, and CC '23.
- **Skills:** *MLIR, LLVM, C++, C, Python, NumPy, PyTorch, Matplotlib, Pandas*

From Rachel — *Montréal, Québec*

Full Stack Developer — *Sept 2019 - Sept 2020*

- Responsible for full stack development, QA, deployment, and monitoring of customer-facing and internal web applications as one of two engineers in the company.
- Led research and development into in-house search solution built on Elasticsearch to track orders and order fulfillment.
- Wrangled raw time-series data on subscriber history from PostgreSQL databases to perform churn and value analysis.
- **Skills:** *TypeScript, JavaScript, React, Node, Express, Elasticsearch, PostgreSQL, Heroku*

University of Toronto — *Toronto, Ontario*

Undergraduate Researcher — *May 2019 - August 2019*

- Implemented deep generative models to automatically compose MIDI piano music, including GRU-based Recurrent Neural Nets and Transformers.
- Collected and preprocessed data, ran experiments, and designed caching mechanism to reduce Transformer memory consumption and yield a generation speedup of 6×.
- **Skills:** *PyTorch, TensorFlow, Keras, NumPy*

Indigo Books & Music — *Toronto, Ontario*

QA Developer Co-op — *May 2017 - August 2018*

- Conceptualized, designed, and built web based data visualization dashboard to analyze automated test history throughout Indigo, converting millions of test records into actionable insights.
- Pioneered research in mobile automation solutions and extended test harness to reach 100% automated test coverage for several iOS applications.
- Architected and developed real-time web application to automate management and execution of tests run across the entirety of Indigo Online.
- **Skills:** *Java, Swift, C#, XCUITest, .NET Core, SignalR, JavaScript, React*

Projects

Enzyme — *Distributed, Worldwide*

MIT, Technical University of Munich, Google, McGill University — *Nov 2022 - Present*

- Extended Enzyme, a high performance automatic differentiation system for LLVM, to support MLIR.
- Developed the first ***extensible*** AutoDiff system that can be ergonomically extended to arbitrary MLIR dialects by users without AD expertise. Presented at Enzyme Conference 2023.
- **Skills:** *MLIR, LLVM, C++.*

HelpMeHelp.Me — *Toronto, Ontario*

Development Lead, Students Mental Advocacy and Resource Team — *July 2021 - Sept 2022*

- Led volunteer engineering team to build website to assist University of Toronto students with navigating mental health resources.
- Collaborated with interdisciplinary team of UX researchers, designers, and mental health support workers to aid students seeking care.
- **Skills:** *TypeScript, React, Node, Express, PostgreSQL*