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https://matthew9655.github.io

EXPERIENCE

Machine Learning Engineer **Aug 2024 - Oct 2024**
Zapata.ai, Toronto (shut down Oct 2024)
- Created benchmarks for testing quantum-inspired compression techniques against current SOTA techniques for quantization.

Machine Learning Software Engineer Intern **May 2023 - Nov 2023**
Zapata.ai, Toronto
- Spearheaded design and implementation of RAG demos for clients' private data with Langchain, PGVector, Streamlit, and open-source LLMs. Demos garnered interest from more than ten clients.
- Implemented Python scripts for LoRA and qLoRA for compression benchmarks.
- Implemented CLIs and scripts, improving code quality and reducing installation time by 20%.

Graduate Researcher **Aug 2022 - Jun 2024**
University of Toronto
- Thesis: Generating Quantum Circuits with Finetuned Pretrained Large Language Models
- Worked with Professor Alán Aspuru Guzik to research using classical machine learning methods for quantum problems.
- Teaching Assistant for Web Programming and Parallel Programming. Created and graded assignments.

Software Engineer Intern **May 2020 - Apr 2021**
Modiface, Toronto
- Created web/mobile applications, features, and ads with VueJS, generating revenue for beauty product companies.
- Implemented DevOps scripts for Jenkins CI/CD, reducing deployment time by 17%.
- Production support and maintained web applications for existing clients.

Undergraduate Researcher **Sep 2019 - Apr 2022**
University of Toronto
- "Learning Quantum Dynamics with Neural ODEs" with Professor Alán Aspuru-Guzik.
  "Implicitly Guiding CS1 students with Analogous Problems" with Professor Michelle Craig and Professor Jennifer Campbell.

EDUCATION

University of Toronto, Master of Science in Computer Science **Sep 2022 – Jun 2024**
University of Toronto, Honours Bachelor of Science in Computer Science and Economics **Sep 2017 – Apr 2022**

PAPERS

- **Quantum linear algebra is all you need for Transformer architectures**. Naixu Guo, Zhan Yu, **Matthew Choi**, Aman Agrawal, Kouhei Nakaji, Alán Aspuru-Guzik, Patrick Rebentrost. (2024)
- **Large Language Models on Lexical Semantic Change Detection: An Evaluation.**. Ruiyu Wang, & **Matthew Choi**. (2023)
- **A composite measurement scheme for efficient quantum observable estimation.**. Zi-Jian Zhang, Kouhei Nakaji, **Matthew Choi**, & Alán Aspuru-Guzik. (2023)
- **Learning quantum dynamics with latent neural ordinary differential equations. Matthew Choi**, Daniel Flam-Shepherd, Thi Ha Kyaw, & Alán Aspuru-Guzik. (2022)

PROJECTS

- **RAG for high school chemistry**: Teamed with high school students to research whether RAG + LLMs would help high school students better understand chemistry questions. (2024)
- **Red Wine End-to-End**: Red wine classification model pipeline which includes EDA with pandas, model training with scikit, API creation with FastAPI and deployment with Railway or AWS ECS, CI/CD with CircleCI. (2024)
- **Autonomous Vehicle Missing Track Solver**: Union-find algorithm that uses cost heuristics to improve vehicle tracklet mismatches using Python and Pytorch. (2022)

PROGRAMMING SKILLS

Languages: Python, C, TypeScript, Javascript, HTML/CSS, Java

Tools and Frameworks: Pytorch, Scikit, Pandas, OpenMP, MPI, React, VueJs, AWS