UNIVERSITY OF TORONTO

THOMAS TRENTY

2024-2025 Resume

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EDUCATION

Doctor of Philosophy in Quantum Computing, University of Toronto ***09/2025 - 11/2030***

AI - Quantum Machine Learning - Distributed Quantum Computing - Research Integrity - Management

Master of Computer Science, ENSEIRB-MATMECA School of Engineering ***(GPA: 4.0/4.0)*** **09/2022 - 09/2025**

AI - Machine Learning / Deep Learning - Quantum Information - Algorithms and Data Structures - Software Engineering - Data Science - Computer Architecture - Parallel Computing - Team Projects - Computer Networking - Sustainable Development - Management - English

French Preparatory Classes, CPGE Lycée Michel-Montaigne ***(GPA: 3.6/4.0)*** **09/2020 - 07/2022**

Mathematics - Fundamental/Experimental Physics - Electrical/Mechanical Engineering - Chemistry - Philosophy

High-School Diploma, Lycée Sud Médoc - La Boétie ***(GPA: 4.0/4.0)*** **09/2017 - 07/2020**

Mathematics - Physics - Chemistry - Engineering - History - English - Philosophy

EXPERIENCE

Research Intern, University of Toronto, MSRG Research Group **05/2024 - 10/2024**

- Developed a novel trainable feature map for Quantum Machine Learning (QML) models using pulse-level control of quantum systems. Leveraged the flexibility of pulse control to optimize the mapping between classical data and quantum states, enhancing the representational capacity of QML models.
- Demonstrated exceptional adaptability across diverse machine learning tasks, consistently outperforming traditional static feature maps in multiple regression tasks while reducing circuit depth by half.
- Currently continuing collaboration with the research group on QML/AI projects as a research volunteer.

Temporary Worker, BAM Works **07/2023 - 08/2023**

- Engaged in intensive agricultural labor, consistently working 45 hours per week. Demonstrated strong commitment and work ethic, earning the trust of clients and achieving a 100% satisfaction rate. Additionally, improved my English language skills and cultural awareness through immersion in the Netherlands.

Study Coordinator, TransPerfect **07/2022 - 08/2022**

- Managed a voice recording studio for sample collection to enhance our clients' voice recognition AI solutions. I actively participated in online training sessions to maintain quality standards, resulting in an excellent 98% client acceptance rate of the recordings.

RESEARCH CONTRIBUTIONS

Thomas, T., Sylvain, L. (2024). AI-Assisted Quantum Encoders for Efficient Operations (Poster).

- Investigated small neural network-assisted quantum encoders to enhance control capabilities and improve accuracy in quantum machine learning.

Thomas, T., Grier, J., Viki Kumar, P., Hans-Arno, J. (2024). Parametrized Pulse Encoder and Efficient Circuit Growth for Quantum Machine Learning (Journal Draft).

- Developed pulse-based control and implemented adaptive circuit growth for improved efficiency and accuracy in quantum machine learning.

Thomas, T., Victor, L., Michaël, C. (2023). Reimplementation of CycleGAN: Unpaired Image-to-Image Translation (Academic Report).

- Reimplemented and evaluated the CycleGAN approach, validating results from the original paper on smaller scale datasets.

SKILLS AND INTERESTS

Programming Languages: Python - C/C++ - Bash - Mojo - Java - Typescript - SQL - PHP - HTML/CSS/JS
Technologies: Git - Linux - PyTorch - TensorFlow - Sklearn - Qiskit - Pennylane - JAX - MPI - PostgreSQL
Areas Of Expertise: Machine Learning/AI - Quantum Computing - Data Science - Algorithms and Data Structures - Computer Architecture - Software Development - Distributed Systems - Computer Networking - Management
Soft Skills: Collaborative mindset - Curiosity - Self-motivated - Effective communication - Analytical thinking

PROJECTS

KEY PROJECTS

Go Board Game Winning AI Player - *Convolutional Networks - Minimax Algorithm* 2024

Participated in a Go tournament against fellow students, securing 1st place out of 50 teams. The result was achieved through a strategic, time-based thinking approach tailored to different phases of the game, leveraging optimized neural network architectures under limited computing resources.

Bias Prevention in LLMs - *Large Language Models Training* 2024

Led a small research team to address and mitigate biases in training large language models. Defined bias criteria, evaluated multiple bias reduction techniques, and conducted a case study where the LLM played a role in a decision-making scenario, assessing the success of various approaches in reducing unwanted biases.

Contrastive Learning for Image Representation- *Self-supervised Pre-training* 2024

Reimplemented the SimCLR method on an image classification dataset to pre-train on large unlabeled data and fine-tune on a smaller labeled dataset. Achieved similar accuracies to those reported in the original paper and analyzed performance across different aspects of the experiments, including the size of the pre-training dataset.

Foundations of Reinforcement Learning - *Model-Based and Model-Free Approaches* 2024

Completed an in-depth course on Reinforcement Learning, covering foundational RL algorithms and their applications. Topics included model-free methods like Q-learning, SARSA, and Deep Q-Networks, as well as model-based approaches and policy gradient methods.

Advanced AI and ML Projects - *Symbolic AI - Machine Learning - Deep Learning* 2022-2024

Worked on various AI projects, including reproducing a CycleGAN style transfer model using convolutional networks, performing image classification by fine-tuning deep convolutional networks, conducting text sentiment analysis on Twitter messages, efficiently utilizing knowledge representation frameworks such as ASP and PDDL, and implementing efficient search algorithms, among others.

Video Game Action Planning - *Knowledge representation* 2024

Developed an iterative method using the PDDL (Planning Domain Definition Language) to model and identify a sequence of actions that leads the player to victory in the popular open-world game Minecraft. Several simplifications were applied, and an iterative search method was implemented to find optimal paths for subsets of the problem in a reasonable time.

Twitter Sentiment Analysis - *Natural Language Processing - Support Vector Machines* 2023

Applied Natural Language Processing and Machine Learning to classify the five primary emotions in 40,000 tweets, achieving an average accuracy and recall rate of 65% across the sentiments.
Ensured dataset quality through critical data cleaning, applied text vectorization using gensim library, and employed linear Support Vector Machine for modeling.

OTHER NOTABLE PROJECTS

User Space Thread Library - *Computer Architecture - Parallel Computing* 2024

Headed a team in the development of a C library with advanced features such as mutexes and user space signals. Achieved the highest performance among all student groups and professors' implementations. Implemented n-to-m multiplexing of user threads on kernel threads to leverage multiprocessing.

Visualgo: An Algorithms Teaching Website - *Project Management - WebAssembly* 2024

Coordinated the organization of a team of 7 students over 4 months to develop a fully functional website using cutting-edge WebAssembly technologies. We presented the project during the 2024 ENSEIRB-MATMECA partners' evening.

REFERENCES

References available upon request