Tyler Kowalski

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Technical Skills

Programming Languages: C, C++, GLSL, Python, Bash, Agda, Racket, LaTeX
Technologies/Frameworks: CUDA, Vulkan, Pytorch, TensorFlow, NumPy
Developer Tools: Linux, VS Code, Visual Studio, Git, Juypter Notebook, Google Collab, Vim, JIRA
Linguistic Languages: English, Mandarin, Japanese

Work Experience

University of Waterloo, Faculty of Mathematics **Sept. 2023 - Dec. 2023**
*CS 246 Instructional Support Assistant (OOP in **C++**)*

- Migrated CS 246 sandbox environment from **C++14** to **C++20**
- Developed all scripts for automatic testing of assignments via **Bash**
- Individually coordinated demoing and marking of the final project (> 500 students)
- Taught multiple tutorials and provided office hours each week to help students with **object-oriented programming** in **C++**

Core Avionics, Research and Innovation **Jan. 2023 - Apr. 2023**
Embedded ML/AI Developer

- Overhauled **GPU**-accelerated neural network inference engine to support multiple execution branches with emphasis on GPU parallelization and optimizing CPU-GPU synchronization in **Vulkan** using **C**
- Re-engineered **NNEF compiler** for inference engine to support multiple execution branches on a team of 2 co-op students
- Wrote efficient **GLSL** shaders to do *Local Response Normalization, Concat, addN,* and *maxPool2d* with data packing
- Added support for *AlexNet, DenseNet, ResNet, InceptionNet* and *Graph Neural Networks* to neural network inference engine and debugged using **Pytorch**

Core Avionics, Research and Innovation **May. 2022 - Aug. 2022**
Embedded ML/AI Developer

- Reverse engineered **Pytorch ONNX** *MobileNetV2SSDLite* model and ported it to as afety-crtical **Vulkan** implementation using **C**, demoed at a trade conference
- Designed and optimized compute shaders in **GLSL** to do *softmax, leakyReLu, convTranspose2d, padding,* and various *Blas* functions with data packing, with similar if not better performance than **Pytorch**
- Researched segmented inference of CNNs to reduce memory cost on embedded systems

Projects

Stockshark **Dec. 2022**
Chess Application and Engine

- Worked on a team of 3 to create a chess application in **C++** with **object-oriented** design patterns, where users could play against others and various AIs
- Created a chess engine using a hand-crafted evaluation function and minimax with alpha-beta pruning, playing at ≈ 1000 ELO

Pokemon ML **Sept. 2021**
Neural Net from Scratch

- Implemented CNN inference and training using only **Python** and **NumPy**
- Predicted whether Pokemon was grass-type with high validation accuracy

Education

University of Waterloo **Sep. 2021 - Apr. 2026**
Bachelor of Computer Science *Waterloo, Canada*

Professional Development (Online Courses)

DeepLearning.AI **Sep. 2021**
Improving Deep Neural Networks: Hyperparameter Tuning, Regularization and Optimization

Volunteering

Mentouring the Stars **Jan. 2023 - Present**
Providing no-cost academic support in mathematics for secondary students on Zoom