Sinclair Hudson *University of Waterloo Computer Science, class of 2023*

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Skills

Languages: Python, C++, R, C, LaTeX, Java, Javascript
Frameworks: PyTorch, TensorFlow, NumPy, Pandas, OpenCV, ROS
Tools: Git, Docker, Conda, Bazel, CARLA, VIM, GCP, AWS, Linux

Experience

NVIDIA — Santa Clara, CA (remote)
Deep Learning Research for Autonomous Vehicles *Jan '22 – Apr '22*

- Designed and iterated on multiple experiments for a LiDAR object detection neural network, improving cyclist and pedestrian F-scores by 43% and 15%, respectively.
- Implemented sparse tensor object detectors using Minkowski Engine, outperforming the baseline model while using 70% less memory.
- Integrated confidence predictions into a LiDAR object detection auto-labeling pipeline, allowing human annotators to focus efforts on anomalous data instances.

DarwinAI — Waterloo, ON (remote)
Machine Learning Developer *May '21 – Aug '21*

- Built and tested defect detection deep learning solutions for clients in the manufacturing industry, focusing on defect detection.
- Implemented the core functionality of Dataset Distillation using the autograd package, to pursue research in low-data machine learning contexts.
- Trained XGBoost and SVR systems to model the relationship between environmental conditions and yield for an agriculture client, achieving 11% median error by weight.
- Created an anomaly detection research repository in PyTorch, for detecting anomalies in images.
- Implemented VAE, VQ-VAE, and VQ-VAE-2 from scratch in PyTorch, evaluating each autoencoder as an anomaly detector.

Untether AI — Toronto, ON (remote)
Software Developer *Sept '20 – Dec '20*

- Built a customer-facing Python API to optimize, format and quantize TensorFlow computation graphs.
- Designed and implemented Non-Max Suppression for quantized values using only integer operations, allowing Single-Shot Detector pipelines to be run on-chip.
- Experimented with different quantization schemes to improve the mAP of an SSD-ResNet-34 by 5%.
- Implemented a lookup table class to represent arbitrary non-linear functions in a quantized space.

Huawei — Markham, ON
LiDAR Perception Researcher *Jan '20 – Apr '20*

- Built DBLiDARNet and focal loss from scratch in PyTorch to use in semantic segmentation experiments.
- Implemented key modules from 12 different research papers in PyTorch, summarizing state-of-the-art techniques and enabling further research.
- Analysed the SemanticKITTI dataset to produce optimal class loss weights, increasing mIoU by 2%.
- Wrote a data loader to spatially align sequential LiDAR scans for temporal pipelines, based on IMU data.

Extra-Curricular Projects

CANSOFCOM: RADAR return drone classification *Jan 2021*

- Used a convolutional neural network to classify 5 different commercial drones based on a Fourier transform of their noisy RADAR return signal.
- Authored a research paper and presented it at the SPIE 2021 Conference.
- Came 1st place in the Hack The North 2020++ CANSOFCOM Drone ML challenge.

WATonomous student design team, Technical Lead *2019 – 2022*

- Co-Authored a research paper on training a lane detection model using only simulated data from CARLA, integrating current GAN research with state-of-the-art lane detection models. Paper accepted to the Intelligent Vehicles 2022 symposium.
- Deployed a lane detection model into the production C++ stack, using ROS and Intel OpenVINO, increasing model throughput by 200%.