Sinclair Hudson *University of Toronto MSc of Applied Computing*

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Education

University of Toronto
Master of Science in Applied Computing, Artificial Intelligence Concentration *Sept '23 – Apr '25 (expected)*
- Vector Scholarship in Artificial Intelligence, worth $17 500 CAD.

University of Waterloo
Bachelor of Computer Science, Honours, Co-operative Program, AI Specialization *Sept '18 – Apr '23*
- 93.50 major average, with courses in computer vision, autonomous vehicles, and machine learning.

Peer-Reviewed Publications

Sim-to-Real Domain Adaptation for Lane Detection and Classification in Autonomous Driving *June 2022*
- Co-authored a peer-reviewed research paper on sim2real lane detection using the CARLA simulator, integrating current GAN research with state-of-the-art lane detection models.
- Presented the paper at a poster board session during the Intelligent Vehicles 2022 symposium.

Application of Machine Learning for Drone Classification Using Radars *April 2021*
- Authored a research paper and presented it at the SPIE 2021 Conference, with a follow-up peer-reviewed paper.
- Used a convolutional neural network to classify 5 different commercial drones based on a Fourier transform of their noisy RADAR return signal.
- Created a detailed physics-based simulation of RADAR returns bouncing off of a drone in flight, and used the simulated data to validate classification methods.

Relevant Work Experience

Cruise
San Francisco, CA
Model Deployment Platform Engineer *Sept '22 – Dec '22*
- Designed and developed debugging tools to assist in model deployment, reducing deployment time by days in some cases.
- Built a tool to automatically assess numerical divergence between the original PyTorch models and optimized TensorRT models, allowing deployment engineers to quickly identify optimization errors.
- Built a linter to map ONNX nodes to lines in PyTorch source code, saving deployment engineers hours of manual debugging every deployment.
- Created a tool to manually add outputs to exported ONNX graphs, allowing engineers to inspect intermediate activations while debugging models.

NVIDIA
Santa Clara, CA (remote)
Deep Learning Researcher for Autonomous Vehicles *Jan '22 – Apr '22*
- Designed and iterated on multiple experiments for a LiDAR object detection neural network, improving cyclist and pedestrian detections by 43% and 15%, respectively.
- Implemented sparse tensor object detectors using Minkowski Engine, outperforming the baseline model while using 70% less memory.
- Presented a 30-minute research overview to the organization, summarizing research findings of the whole term.
- Integrated confidence predictions into a LiDAR object detection auto-labeling pipeline, allowing human annotators to focus efforts on anomalous and challenging 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, working in cross-functional teams and presenting results to stakeholders weekly.
- Trained XGBoost and SVR systems to model the relationship between environmental conditions and yield for an agriculture client, giving the client insight into the impact of environmental conditions on their yield.
- Implemented the core functionality of Dataset Distillation using the autograd package, to pursue research in low-data machine learning contexts.
- Implemented VAE, VQ-VAE, and VQ-VAE-2 from scratch in PyTorch, demonstrating the effectiveness of autoencoders as anomaly detectors on client datasets.

Untether AI
<div align="right">Toronto, ON (remote)</div>

Software Developer
<div align="right">*Sept '20 – Dec '20*</div>

- Contributed to a customer-facing Python library to quantize and optimize TensorFlow computation graphs.
- Designed and implemented Non-Max Suppression for quantized values using only integer operations, allowing object detection pipelines to run 10x faster 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, allowing the Python library to support any activation function.

Huawei
<div align="right">Markham, ON</div>

LiDAR Perception Researcher
<div align="right">*Jan '20 – Apr '20*</div>

- 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, boosting mIoU by 2%.
- Wrote a data loader to spatially align sequential LiDAR scans for temporal pipelines, based on IMU data, enabling the research of multi-scan LiDAR segmentation pipelines.

Please refer to my Linkedin profile for a complete list of work experiences.

Skills

Languages: Python, C++, R, C, LaTeX, Java, JavaScript

Frameworks: PyTorch, TensorFlow, NumPy, Pandas, OpenCV, ROS, Gradio

Tools: Git, Docker, Conda, Bazel, CARLA, GCP, Linux, TensorRT