

AIDAN SWOPE

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RESEARCH

Representation Learning for Remote Sensing: An Unsupervised Sensor Fusion Approach

First-author paper on training neural networks unsupervised to understand many-sensor aerial imagery.
Open-source TensorFlow 2 code available at https://github.com/descarteslabs/contrastive_sensor_fusion.

EDUCATION

California Institute of Technology (Caltech)

2016 – 2020

B.S. in Computer Science. GPA: 3.8.

Pasadena, CA

- **Selected Classes (Mathematics and Statistics):** Machine Learning (various classes; Python), Representation Learning (TensorFlow), Numerical & Applied Linear Algebra (MATLAB), Bayesian Statistics, Probability Models
- **Selected Classes (Computer Science):** GPU Programming (CUDA), Algorithms, Operating Systems (C), FPGA Programming (VHDL), Computer-Assisted Theorem Proving (Coq), Introduction to Quantum Computing

EXPERIENCE

Caltech & NVIDIA

June 2020 - Present

Machine Learning Intern – Systematic Generalization Research

Remote

- **Systematic Generalization Research:** Part of a research group studying why neural networks fail to extrapolate in reasoning tasks. Developing and implementing models, running experiments, and communicating results.

Descartes Labs

Summer 2019

Machine Learning Intern – Unsupervised Learning Research

San Francisco, CA

- **Unsupervised Sensor Fusion Research:** Developed a new algorithm for training convolutional neural networks unsupervised on many sensors at once. Paper described under “Research” above.
- **Transfer Learning Model:** Trained a large sensor-fusion model on 20 TB of data with TPUs. Transfer learning from this model is the basis for Descartes Labs’ current computer vision models, improving performance on multiple vision tasks.

Caltech

Spring 2019 - Spring 2020

Student Lecturer

Pasadena, CA

- **Deep Learning Class:** Designed and led a class on deep learning with TensorFlow and Keras.

Descartes Labs

Summer 2018

Machine Learning Intern – Computer Vision

Santa Fe, NM

- **Tree Segmentation Model:** Developed a convolutional neural network to segment trees in overhead imagery. Deployed this model across California and urban areas worldwide, creating 15 TB of product data.
- **Pointcloud Ingest Pipeline:** Developed and deployed a point cloud data pipeline to preprocess and ingest over 100 TB of LIDAR heightmap data. Data used as ground truth for training multiple models since.

GE Digital

Summer 2017

Software Development Intern

San Ramon, CA

- **Distributed Ingest Software:** Developed a distributed Flink data ingestion and processing stream.

PROJECTS AND TECHNICAL SKILLS

AlphaZero Othello Bot: A strong game-playing bot trained with model-based reinforcement learning.

Reinforcement Learning with Binary Neural Networks: Applies gradient-free optimization to train binary neural networks with reinforcement learning. Implements fast binary neural networks with Cython on CPU and CUDA on GPU.

Music Accompaniment VAE: Adapts a variational autoencoder to add accompaniment to music.

Selected Technologies: TensorFlow (1 & 2), PyTorch, Keras, NumPy, Python, C, C++, Haskell, CUDA (basics), SQL (basics)