Hao-Ning Wu

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Education

New York University (Courant Institute) — New York, NY
Master of Science in Computer Science; GPA: 3.9/4.0 — Sept. 2019 – May 2021

National Tsing Hua University — Hsinchu, Taiwan
Master of Science in Computer Science; GPA: 4.0/4.0 — Sept. 2016 – Sept. 2018

National Taiwan University — Taipei, Taiwan
Bachelor of Science in Electrical Engineering — Sept. 2010 – June 2014

Publication

H-N Wu and C-T Huang, "Data Locality Optimization of Depthwise Separable Convoluions for CNN Inference Accelerators," *2019 IEEE/ACM Design, Automation and Test in Europe (DATE)*

Work Experience

PicCollage — Taipei, Taiwan
Machine Learning Intern — July. 2020 – Sept. 2020

- Developed an image retrieval system for 20K unlabeled stickers and demonstrated it with **Flask**
- Researched and performed **semi-supervised learning** on stickers using **OpenCV** and **Pytorch**
- Enabled queries of color names by comparing color histograms using earth mover's distance
- Extracted relationships among words with **ConceptNet embedding** and **Conceptual Captions dataset**

National Tsing Hua University — Hsinchu, Taiwan
Research Assistant — Jan. 2019 – June 2019

- Designed a layer transformation tool for pre-trained DNNs in **Pytorch**, allowing users to perform **neural architecture search** without the need of retraining the network every time
- Reduced 25% parameters in VGG16 while retaining its accuracy on ImageNet by L1-norm filter pruning

Projects

Optimizing Transposed Convolutions on GPUs — Nov. 2020 – Dec. 2020

- Parallelized transposed convolutions with input-stationary reuse policy using **CUDA**
- Devised an output-grouping dataflow to prevent synchronization overhead of partial sums accumulation
- Achieved 747x and 1.53x speedup compared to CPU's and PyTorch's implementations as reported by **nvvp**

Self-supervised Pre-training for Images (SELFIE) — Oct. 2020 - Nov. 2020

- Build the 1st open-source implementation of SELFIE, a CNN-transformer that predicts the missing patches.
- Improved 14% accuracy while finetuning the pre-trained weights on 5% of Cifar-10 dataset.

Imbalanced Classification for Fake Review Detection — Apr. 2020 - May 2020

- Developed an NLP pre-processing pipeline using **Scala**, **Spark** and **MLlib** on 300K Yelp's reviews
- Solved imbalanced dataset problem by class weighting and various data re-sampling methods
- Ensembled logistic regression, SVM and gradient boosted trees models using **SKlearn** and **XGBoost**
- Improved the classification result by 5% AP and 2% AUC with 5 innovative new features

Data Locality Optimization of Convolutions — Mar. 2018 - Sept. 2018

- Invented new computation orders for tiling to increase data reuse in convolutions
- Generalized layer fusion technique to eliminate unnecessary data transfer between consecutive layers
- Reduced 67% DRAM energy and 65% DRAM access latency for MobileNet V2 as reported by DRAMSim2

Text to Photo-Realistic Flower Image Synthesis — Dec. 2017 – Jan. 2018

- Constructed from scratch StackGAN, a two-stage conditional GAN with VAE objective using **Tensorflow**
- Augmented skip-thought word embeddings with seq2seq embeddings and ranked 5/120 on Kaggle.

Image Captioning on MS COCO Dataset — Oct. 2017 – Nov. 2017

- Implemented from scratch a CNN-RNN model with various cell types (LSTM, GRU, Highway) using **Tensorflow**
- Boosted performance with attention, curriculum learning and beam search and ranked 3/120 on Kaggle.

Skills

Languages: Python, Scala, C/C++, Java, SQL, Verilog, HTML/CSS, Bash Script
Tools: TensorFlow, PyTorch, Hadoop, Spark, XGBoost, MPI, CUDA, OpenMP, Pthread, OpenCV, Numpy, Pandas, Scikit-learn, Matplotlib, Flask, Tableau, OpenGL, GCP, Git