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Fang Chen

Professional Skills

- Programming Language: Python, MATLAB, C/C++, JavaScript
- Deep Learning Framework: PyTorch, TensorFlow, Keras
- Parallel and Distributed Computation: CUDA C, PyCuda
- Paper Writing: Latex

Educational Background

University of Southern California (USC) **08/2021-05/2023**
Master of Science, Electrical Engineering Cumulative GPA: **3.75**/4.0

Chongqing University of Posts and Telecommunications (CQUPT) **09/2016-06/2020**
Bachelor of Engineering, Digital Media Technology Cumulative GPA: **3.85**/4.0

Work Experience

Graduate Technical Intern | Intel AI Labs US **06/2022 -- NOW**

- ***Advisor name:*** Anthony Sarah
- ***Job description:*** 1. Propose a quantization-aware and neural architecture jointly searching method. Implement the mixed precision quantization module, which is deployed to Intel Dynamic Neural Architecture Search framework. Compared with float point model, the quantized model achieves 75% reduction of model size, 90% reduction of inference time with only 3.75% reduction of accuracy. 2. Investigate and design effective Quantization-Aware-Training algorithm (on-going).

Research Experience

Directed Research | Energy Efficient Secure Sustainable Computing Group of USC **12/2021 -- NOW**

- ***Advisor name:*** Peter A. Beerel & Gourav Datta (Ph.D. student)
- ***Project 1: Self-Attentive Pooling for Efficient Deep Learning***
  - ***Achievement:*** Paper titled ***Self-Attentive Pooling for Efficient Deep Learning*** is currently under WACV 2022 revision (the 1st author).
  - ***Project description:*** A non-local self-attentive pooling method is proposed to address the issue that current pooling works mainly focus on the only local context of the activation maps and might perform poorly on aggressively aggregating features. Extensive experiments on standard object classification (STL10, VWW, ImageNet) and detection (Microsoft COCO) tasks with various convolutional neural network (MobileNetV2, MobileNetV3, ResNet, ResNeXt) architectures demonstrate the superiority of our proposed mechanism over the state-of-the-art pooling techniques. For example, we surpass the test accuracy of existing pooling techniques on different variants of MobileNet-V2 on ImageNet by an average of ∼1.2%. With the aggressive down-sampling of the activation maps in the initial layers (providing up to 22x reduction in memory consumption), our approach achieves 1.43% higher test accuracy compared to SOTA techniques with iso-memory footprints.

Research Assistant | Key Laboratory of Signal and Information Processing of Chongqing **07/2020-06/2021**

- ***Advisor name:*** Chenqiang Gao
- ***Project 1: Local Patch Network for Infrared Small Target Detection***
  - ***Achievement: Local Patch Network with Global Attention for Infrared Small Target Detection*** published in IEEE Transactions on Aerospace and Electronic Systems (IEEE TAES, the 1st author), 03/2022.
  - ***Project description:*** For detecting infrared small targets, proposed a local patch network with global attention as a paradigm of deep learning methods on utilizing global and local features. The method outperforms the state-of-the-art methods on two widely used public

datasets and one of our private datasets under Probability of Detection (approximately 3%), AUC (approximately 7%) and F1-measure (approximately 3%) metrics. **Paper Link: https://ieeexplore.ieee.org/document/9735292.**

- ***Project 2: Infrared Small-Dim Target Detection under Complex Backgrounds***
  - ***Achievement:*** Paper titled ***Infrared Small-Dim Target Detection with Transformer under Complex Backgrounds*** is currently under major revision by IEEE Transactions on Image Processing (IEEE TIP, the 3rd author).
  - ***Project description:*** For improving the ability to capture long-range dependencies of deep learning methods based on convolutional neural networks, proposed an infrared small target detection framework based on Transform and U-Net-like skipped connection. The method outperforms the state-of-the-art methods on two widely used public datasets under Probability of Detection (approximately 3%), AUC (approximately 8%) and F1-measure (approximately 2%) metrics, especially on cross-scene generalization and anti-noise performance. **The pre-printed paper has been uploaded to Arxiv: https://arxiv.org/abs/2109.14379.**

Face Anti-spoofing Based on Multi-layer Domain Adaptation 03/2019-08/2019

- ***Advisor name:*** Chenqiang Gao
- ***Achievement: Face Anti-spoofing based on Multi-layer Domain Adaptation*** published in IEEE International Conference on Multimedia & Exp (IEEE ICME), 08/2019 (the 3rd author).
- ***Description:*** A face anti-spoofing detection algorithm based on domain adaptation is proposed to address the issue that the state-of-the-art methods might perform poorly in cross scenes. The fusion between low-level and high-level features of CNN is adapted to improve the model performance. The method has the lowest EER (reduced from 40.0% to 30.0%) and HTER (reduced from 80.0% to 60.0%) compared to the current methods on the Replay-Attack dataset. Under cross scenes, our model trained on the Replay-Attack dataset and validated on the CASIA Face Anti-Spoofing dataset has the best EER (reduced from 34.5% to 34.3%). **Paper Link: https://ieeexplore.ieee.org/document/8795006.**

Design for Correction Algorithm of Ring Artifact Based on High Energy Detector 11/2018-08/2019

- ***Advisor name:*** Miao Li
- ***Achievement:*** A patent granted by China Patent (No. 201910356591.9, the 3rd patentee) in April 2020.
- ***Description:*** A multi-region segmentation algorithm of CT image reconstruction is proposed with the aim of fixing the ring artifacts caused by fan-beam of back-projection filtration. As a result, the reconstructed image has an image uniformity of ±0.584~±0.741 (Chinese National Standard: ≤ ±3) and a local noise of ±0.0006%~±0.0056% (Chinese National Standard: ≤ ±0.35%).

Honors & Awards

USC

10/2021 **Best Masters Poster Award** of the 11th Annual Research Festival by USC Ming Hsieh Institute

CQUPT

06/2020 **Outstanding Graduate** of Chongqing (Provincial Level, in top **0.1%**)

11/2019 **Annual Progress Scholarship** in 2018-2019 Academic Year (in top **0.1%**)

07/2019 **Silver Award** and **Best Report** in IEEE ISI World Cup 2019 (IWC 2019)