Cheng-Yao **Hong**

Software Engineer | Computer Vision Researcher

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Education

National Taiwan University — *Taipei, Taiwan*

M.S. in Electrical and Computer Engineering — *Sep. 2014 - Aug. 2017*

- **GPA:** 4.01/4.3(scale)
- **Thesis:** Design of Timing-Error Detection and Correction System for Wide-Range Variation-Tolerant Microprocessors

National Chiao-Tung University — *Hsinchu, Taiwan*

B.S. in Electronics Engineering — *Sep. 2008 - Jun. 2012*

- **GPA:** 3.1/4.0(scale)
- **Senior Project:** Implementing Telematics for Enhanced Security and Real-Time Traffic Navigation

Selected Publications

Peer-Reviewed Conference Papers

[1] **Cheng-Yao Hong**, Yu-Ying Chou, and Tyng-Luh Liu. Attention discriminant sampling for point clouds. In *IEEE/CVF International Conference on Computer Vision, (ICCV)*, 2023.

[2] Wan-Cyuan Fan*, **Cheng-Yao Hong***, Yen-Chi Hsu, and Tyng-Luh Liu. IoU-aware multi-expert cascade network via dynamic ensemble for long-tailed object detection. In *IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, 2023.

[3] Chun-Hsiao Yeh, **Cheng-Yao Hong**, Yen-Chi Hsu, Tyng-Luh Liu, Yubei Chen, and Yann LeCun. Decoupled contrastive learning. In *17th European Conference on Computer Vision (ECCV)*, 2022.

[4] Yen-Chi Hsu, **Cheng-Yao Hong**, Ming-Sui Lee, and Tyng-Luh Liu. Query-driven multi-instance learning. In *The Thirty-Fourth AAAI Conference on Artificial Intelligence (AAAI) (**Spotlight**)*, 2020.

Journal Article

[1] Yen-Chi Hsu*, **Cheng-Yao Hong*** , Ming-Sui Lee, Davi Geiger, Tyng-Luh Liu. ABC-Norm Regularization for Fine-Grained and Long-Tailed Image Classification. IEEE Transactions on Image Processing (TIP) 2023.

Research Experience

Academia Sinica, Institute of Information Science, Computer Vision Lab — *Taipei, Taiwan*

Software Engineer | Research Assistant — *Jun. 2018 - Present*

- Proposed a token merging mechanism for the multimodal diffusion model, enhancing throughput by **2.9-fold**.
- Enhanced face detection in sequential face manipulation by **5.22%** through the application of MIL concepts.
- Proposed an attention-based sampling method for 3-D feature learning, enhancing performance by approximately **2%** in several 3-D downstream tasks. (ICCV)
- Implemented a regularization-based method, achieving a **2.1%** improvement in FGVC and long-tailed datasets. (TIP)
- Improved self-supervised learning accuracy in ImageNet by **5.1%** with a modified contrastive loss term.(ECCV)
- Formulated a multi-head-based approach for long-tailed object recognition, increasing mAP by increases **7%** mAP in LVIS dataset.(ICASSP)
- Enhanced contrastive learning accuracy in ImageNet-100 by **2%** via self-training and attention mechanisms. (ICASSP)
- Pioneered a neural architecture search algorithm, reducing computation time by **6%**.(ICIP)
- Developed an anchor-based approach for video summarization, competitive with leading methods. (ICIP)
- Innovated a weakly-supervised method, enhancing action recognition in video clips and MIML datasets (MNIST, CIFAR10, Scene) by **(7.5%)**.(AAAI)

University of California, Berkeley, Redwood Center for Theoretical Neuroscience — *Online*

Research intern — *June. 2021 - Aug. 2021*

- Implemented the unsupervised learning algorithm for the audio framework.

National Taiwan University, Energy Efficient Circuit, and System Lab — *Taipei, Taiwan*

IC Design Engineer · Research Assistant — *Jan. 2017 - Apr. 2018*

- Implemented an energy-efficient system using a deep learning algorithm and hardware co-optimization. (JSCC)

Honors & Awards

International

2020 **Silver, Top 2% (51/2265),** Deepfake Detection Challenge *Kaggle*
2020 **7th Place,** Large Vocabulary Instance Segmentation Challenge *Online*
2019 **5th Place,** Large Vocabulary Instance Segmentation Challenge *Seoul, Korea*

Domestic

2020 **Scholarship,** Academia Sinica Scholarship for Young Scholars to Attend International Conferences. *Taipei, Taiwan*
2020 **Scholarship,** Appier Award for Top Research in Artificial Intelligence and Information Technology. *Taipei, Taiwan*

Academic Service

Conference Reviewer *2020 - Present*

- CVPR'21, ICCV'21, CVPR'22, ECCV'22, CVPR'23, ICCV'23, CVPR'24

Teaching Experience

Advanced Integrated Circuit Design, National Taiwan University *Taipei, Taiwan*

Teaching Assistant, Instructed by Prof. Tsung-Te, Liu *Jan. 2017 - Apr. 2018*

Selected Projects

Deepfake Detection Challenge *Taipei, Taiwan*

Pytorch, python *Mar. 2020*

- Deepfake techniques present realistic AI-generated videos of people doing and saying fictional things. The goal of the challenge is to build technologies that can help detect deepfakes and manipulated media.
- The proposed model, on the public dataset, gets the **Top 2%** in Deepfake Detection Challenge (DFDC) on Kaggle.

LVIS Challenge *Taipei, Taiwan*

Pytorch, mmdect and python *Oct. 2019*

- Addressed challenges in large-scale object detection with thousands of categories due to long-tail data distributions.
- Utilized non-local and semantic concepts; the proposed model achieved **30.2** mAP accuracy and secured $5th$ place in the International Conference on Computer Vision (ICCV) 2019.

Low Power Accelerator for Handwriting Number Recognition *Taipei, Taiwan*

Verilog, Design Compiler, IC Compiler *Jul. 2018*

- Implemented the hardware of the trained model, employing techniques like memory hierarchy pruning and quantization to reduce power consumption.

Technical Strengths

Deep learning and Computer vision:

- Proficient in Python, C/C++, and Verilog
- Experienced in developing algorithms using PyTorch, TensorFlow, MMDetection, Detetron2, OpenSelfSup, Pytorch3D, Diffuser

IC design and Signal processing:

- Skilled in embedded system implementation and signal analysis using ARM DS-5 and Matlab
- Proficient in cell-based circuit design using Verilog Design Compiler and IC Compiler
- Experienced in circuit design using Liberate, Spectre, and HSPICE

Full Publications

Peer-Reviewed Conference Papers

[1] First Author. Promptable Token Merging. (Submitted), 2023.

[2] First Author. Contrastive Learning for DeepFake Classification and Localization via Multi-Label Ranking. (Submitted), 2023.

[3] **Cheng-Yao Hong**, Yu-Ying Chou and Tyng-Luh Liu. Attention Discriminant Sampling for Point Clouds. IEEE/CVF International Conference on Computer Vision, (ICCV), 2023.

[4] Wan-Cyuan Fan*, **Cheng-Yao Hong***, Yen-Chi Hsu and Tyng-Luh Liu. IoU-Aware Multi-Expert Cascade Network via Dynamic Ensemble for Long-tailed Object Detection. IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), 2023.

[5] Chun-Hsiao Yeh, **Cheng-Yao Hong**, Yen-Chi Hsu, Tyng-Luh Liu, Yubei Chen and Yann LeCun. Decoupled Contrastive Learning. 17th European Conference on Computer Vision (ECCV), 2022.

[6] Chun-Hsiao Yeh*, **Cheng-Yao Hong***, Yen-Chi Hsu* and Tyng-Luh Liu. SAGA: Self-Augmentation with Guided Attentions for Representation Learning. IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), 2022.

[7] Jun-Liang* Lin, Yi-Lin* Sung, **Cheng-Yao Hong***, Han-Hung Lee and Tyng-Luh Liu. The Maximum a Posterior Estimation of Darts. IEEE International Conference on Image Processing, (ICIP), 2021.

[8] Yi-Lin Sung, **Cheng-Yao Hong**, Yen-Chi Hsu and Tyng-Luh Liu. Video Summarization with Anchors and Multi-Head Attention. IEEE International Conference on Image Processing, (ICIP), 2020.

[9] Yen-Chi Hsu, **Cheng-Yao Hong**, Ming-Sui Lee and Tyng-Luh Liu. The Thirty-Fourth AAAI Conference on Artificial Intelligence (AAAI) (**Spotlight**), 2020.

Journal Article

[1] Yen-Chi Hsu*, **Cheng-Yao Hong*** , Ming-Sui Lee, Davi Geiger and Tyng-Luh Liu. ABC-Norm Regularization for Fine-Grained and Long-Tailed Image Classification. IEEE Transactions on Image Processing (TIP), 2023.

[2] **Cheng-Yao Hong** and Tsung-Te Liu. A Variation-Resilient Microprocessor With a Two-Level Timing Error Detection and Correction System in 28-nm CMOS. IEEE Journal of Solid-State Circuits 55.8 (JSSC), 2019.