Gi-Luen (Allen) Huang

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Summary

4+ years of research experience in computer vision, deep learning, and machine learning, coupled with a year of automotive AI development in the industry. My work in the industry has encompassed data collection, model development and quantization, as well as deploying models on the Qualcomm 8295 platform, enabling on-vehicle testing.

Education

National Taiwan University *Feb. 2021 - Jan. 2023*
MS in Data Science Group of Communication Engineering, GPA: 4.30/4.30 *Taipei, Taiwan*
Transcript

- **Courses**: Machine Learning, Deep Learning for Computer Vision, Applied Deep Learning, Deep Learning for Human Language Processing, Computer Vision, Convex Optimization, Time-Frequency Analysis and Wavelet Transform
- **Thesis**: "CTGAN: Cloud Transformer Generative Adversarial Network"
- **Advisor**: *Prof. Pei-Yuan Wu*

National Taiwan University of Science and Technology *Jun. 2017 - Jan. 2021*
BS in Electrical Engineering, GPA: 4.09/4.30 *Taipei, Taiwan*
Transcript

- **Courses**: Data Structures, Algorithm design and analysis, Programming
- **Paper publication**: "Face Expression and Tone of Voice for Deception System"
- **Advisor**: *Prof. Jing-Ming Guo*

Work Experiences

MobileDrive Technology *Jun. 2023 - May 2024*
Machine Learning Engineer *New Taipei, Taiwan*

- Developed a method for projecting future vehicle trajectories on current front-view images as ground-truth for 3D Vehicle Future Trajectory Model. This approach utilizes data collected by vehicles equipped with RTK and front-view cameras, enabling model training **with minimal human intervention.**
- Developed and optimized 3D Vehicle Future Trajectory Model, significantly enhancing performance through empirical experiments focused on dataset improvement, warping method, and data augmentation. Conducted model quantization for deployment on embedded devices.
- Deployed the quantized model on the **Qualcomm 8295 platform** by converting the Python program to C++. Optimized model efficiency achieved **200 FPS**, and the quantization error (L1 error) was reduced from 4.0 to 0.15 **(266% ↓)**.
- Collaborated with team members to integrate the quantized model into the AR navigation algorithm, enabling **on-vehicle testing**. This enhancement significantly improved performance in challenging scenarios, such as navigating roundabouts and executing sharp turns.
- Developed intersection depth estimation **auto-labeling algorithm** using projected RTK trajectory.

Jubo Health *Jul. 2022 - Aug. 2022*
Machine Learning Engineer Intern *New Taipei, Taiwan*

- Implemented general frameworks to support various deep learning tasks including recognition, segmentation, and object detection.
- Enhanced the existing Wound Classification Model, improving accuracy by **approximately 3%.**
- Deployed models as a service using Docker on GCP.

Neurobit Technologies *Feb. 2022 - Jun. 2022*
Machine Learning Engineer Intern *Taipei, Taiwan*

- Developed Gaze Estimation Model using a self-supervised learning technique, successfully **reducing the error rate by 90%.**
- Developed a feature matching algorithm to accurately detect torsional eye rotation.

Taiwan Semiconductor Manufacturing Company (TSMC) *Jul. 2021 - Aug. 2021*
Information Technology (IT) Intern *Hsinchu, Taiwan*

- Full-stack system integration
- Implemented backend functionality for a webpage that changes color in response to user button clicks.

TA Experiences

NTU - Deep Learning for Computer Vision *2022 Fall*
MS student in Graduate Institute of Communication Engineering *Taipei, Taiwan*
Advisor: *Prof. Yu-Chiang Frank Wang*

- Designed and graded homework sets
  - Generative Adversarial Network (GAN)
  - Conditional Diffusion models (DDPM)
  - Domain Adaptation model (DANN)
  - Final project: 3D Indoor Scene Long Tail Segmentation
- Motivated students during TA office hours

ITRI - Machine Learning *Sep. 2022 - Oct. 2022*
MS student in Graduate Institute of Communication Engineering *Hsinchu, Taiwan*
Advisor: *Prof. Pei-Yuan Wu*

- Designed programming exercises
  - PM2.5 prediction (Regression model)
  - Income prediction (Classification model)
  - Facial Emotion Recognition
  - Text Sentiment Classification
  - Dimension Reduction
  - Image Event Anomaly Detection

NTU - Time-Frequency Analysis and Wavelet Transform *2021 Fall*
MS student in Graduate Institute of Communication Engineering *Taipei, Taiwan*
Advisor: *Prof. Jian-Jiun Ding*

- Graded the homework sets

NTU - Data Structure *2021 Spring*
MS student in Graduate Institute of Communication Engineering *Taipei, Taiwan*
Advisor: *Prof. Pei-Yuan Wu*

- Designed and graded the theoretical homework set
  - Big-O notation definition

- Red-black tree
- Disjoint sets
- AA tree

- Designed and graded the programming homework set
  - Dynamic Programming (DP)
  - Tree data structure implementation

AI Competitions

Orchid Species Identification and Classification *Apr. 2022 - Jun. 2022*
2022 T-Brain Competition Github Link

- Applied ConvNext and Swin_transformer to conduct image recognition task
- Applied data augmentation methods to enhance models' generalization ability, including random crop, random rotation, Mixup, random erasing, etc.
- **Private Leaderboard: 14/743, Top 3%**

Lung Adenocarcinoma Pathological image segmentation *Mar. 2022 - Jun. 2022*
2022 T-Brain Competition Github Link

- Developed Deeplab-v3-plus to segment the cells having STAS features
- Developed the post-processing method to fill in holes after model prediction
- Applied data augmentation methods to enhance the models' robustness, including horizontal/vertical flip, random rotation, color jitter, etc.
- **Private Leaderboard: 2/307, Top 1%**

Crops Status Monitoring by Image Recognition *Mar. 2022 - May 2022*
2022 AIdea Competition Github Link

- Developed ConvNext and Resnet50 models to do ensemble prediction
- Applied data augmentation methods during training, including horizontal/vertical flip, affine transformation, etc.
- Applied Grad-cam to visualize the attention location of model prediction
- **Private Leaderboard: 3/428, Top 1%**

Human Voice Denoising *Feb. 2022 - May 2022*
2022 AIdea Competition Github Link

- Based on U-net, developed a 1d-convolutional neural network as an autoencoder
- Applied data augmentation methods during training, including reverb, remix, shift, etc.
- Combined time domain and frequency domain loss functions
- **Private Leaderboard: 6/282, Top 2%**

Traditional Chinese Scene Text Recognition (Advanced) *Nov. 2021 - Dec. 2021*
2021 T-Brain Competition Github Link

- Applied Yolov5 for signboard detection
- Developed Resnet18 model to conduct ROI transformation
- Developed modified Vision Transformer to conduct text recognition
- Applied data augmentation methods during training, including horizontal/vertical flip, affine transformation, resolution transformation, etc.
- **Private Leaderboard: 6/128, Top 5%**

Traditional Chinese Scene Text Recognition (Intermediate) *Aug. 2021 - Oct. 2021*
2021 T-Brain Competition Github Link

- Applied Yolov5 to capture the subword from a word
- Developed arcMargin loss function on Resnet18 model
- Applied data augmentation methods during training, including horizontal/vertical flip, affine transformation, resolution transformation, etc.
- **Private Leaderboard: 5/183, Top 3% and Innovation Award from T_brain**

Rice Plant Position Labeling in UAV full-color image *Aug. 2021 - Oct. 2021*
2021 AIdea Competition

- Applied Yolov5 to capture the rice plant location
- Applied rule-based post-processing to deal with the overlapping region after the sliding window method
- Applied data augmentation methods during training, including horizontal/vertical flip, affine transformation, resolution transformation, etc.
- **Private Leaderboard: 18/523, Top 3%**

Selected Projects

Pupil Tracking *2022 Spring*
NTU - Computer Vision (Final Project) Github Link
Instructor: *Prof. Shao-Yi Chien*

- Combined the deep learning model Deeplab-v3-plus with the traditional CV method to obtain pupil segmentation.
- **Private leaderboard: 3/21, Top3**

Intracranial Hemorrhage Prediction *2021 Fall*
NTU - Application of Deep Learning in Medical Imaging Github Link
Instructor: *Prof. Joe Yeh*

- Developed an ensemble model of Resnet50 and SEresnet50 to conduct multi-label classification problem

Adversarial Attack on Deception Detection *2021 Fall*
NTU - Security and Privacy of Machine Learning (Final Project) Github Link
Instructor: *Prof. Shang-Tse Chen*

- Designed experiments about the adversarial attack on deception detection

Fine-grained Food Classification *2021 Fall*
NTU - Deep Learning for Computer Vision (Final Project) Github Link
Instructor: *Prof. Yu-Chiang Frank Wang*

- Designed a cosine sampling method to deal with the data imbalanced problem
- Implemented ArcFace loss function so that the extracted features can be separated in high-dimensional space

Publications

Chen, P. W., Yang, T. S., Huang, **G. L., Huang** *et al.*(2023). Viewing Bias Matters in 360° Videos Visual Saliency Prediction. IEEE Access.

Huang, Gi-Luen and Pei-Yuan Wu (2022). "CTGAN : Cloud Transformer Generative Adversarial Network". In: *2022 IEEE International Conference on Image Processing (ICIP)*, pp. 511–515. DOI: 10.1109/ICIP46576.2022.9897229.

Li-Wei Hsiao, Jing-Ming Guo, **Gi-Luen Huang**, *et al.* "Face Expression and Tone of Voice for Deception System". 2020 International Conference on System Science and Engineering (ICSSE), 2020 (Best student paper award)

Award/Scholarships

Pan Wen Yuan Foundation Scholarship *2022*
MS student in Graduate Institute of Communication Engineering *Taipei, Taiwan*

Outstanding Student *2021*
Department of Electrical Engineering at NTUST *Taipei, Taiwan*

Skills

Programming	Python (main), C++
Frameworks	PyTorch
Developer Tools	Git, Vim, Docker
Libraries	NumPy, Scikit-learn, Matplotlib, Flask