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
MS in Data Science Group of Communication Engineering, GPA: 4.30/4.30
Transcript

Feb 2021 - Jan 2023
Taipei, Taiwan

- **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
BS in Electrical Engineering, GPA: 4.09/4.30
Transcript

Jun 2017 - Jan 2021
Taipei, Taiwan

- **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
Machine Learning Engineer

Jun 2023 - Present
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**.
- 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*

- Design and grade homework sets
  - Generative Adversarial Network (GAN)
  - Conditional Diffusion models (DDPM)
  - Domain Adaptation model (DANN)
  - Final project: 3D Indoor Scene Long Tail Segmentation
- Motivate 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*

- Design 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*

- Grade the homework sets

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

- Design and grade the theoretical homework set
  - Big-O notation definition
  - Red-black tree
  - Disjoint sets
  - AA tree

- Design and grade the programming homework set
  - Dynamic Programming (DP)
  - Tree data structure implementation

AI COMPETITIONS

Orchid Species Identification and Classification
2022 T-Brain Competition

Apr 2022 - Jun 2022
Github Link

- Apply ConvNext and Swin_transformer to conduct image recognition task
- Apply 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
2022 T-Brain Competition

Mar 2022 - Jun 2022
Github Link

- Develop Deeplab-v3-plus to segment the cells having STAS features
- Develop the post-processing method to fill in holes after model prediction
- Apply 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
2022 AIdea Competition

Mar 2022 - May 2022
Github Link

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

Human Voice Denoising
2022 AIdea Competition

Feb 2022 - May 2022
Github Link

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

Traditional Chinese Scene Text Recognition (Advanced)
2021 T-Brain Competition

Nov 2021 - Dec 2021
Github Link

- Apply Yolov5 for signboard detection
- Develop Resnet18 model to conduct ROI transformation
- Develop modified Vision Transformer to conduct text recognition

- Apply 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)
2021 T-Brain Competition

Aug 2021 - Oct 2021
[Github Link]

- Apply Yolov5 to capture the subword from a word
- Develop arcMargin loss function on Resnet18 model
- Apply 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
2021 AIdea Competition

Aug 2021 - Oct 2021

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

SELECTED PROJECTS

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

2022 Spring
[Github Link]

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

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

2021 Fall
[Github Link]

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

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

2021 Fall
[Github Link]

- Design experiments about the adversarial attack on deception detection

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

2021 Fall
[Github Link]

- Design a cosine sampling method to deal with the data imbalanced problem
- Implement 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	Pandas, Numpy, Scikit-learn, Matplotlib, Flask, XGBoost