

# Gi-Luen (Allen) Huang

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## SUMMARY

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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

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### 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

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### 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

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### 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

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### 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 AIda 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 AIda 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 AIda 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

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### 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

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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](https://doi.org/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

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<b>Pan Wen Yuan Foundation Scholarship</b>	2022
<i>MS student in Graduate Institute of Communication Engineering</i>	<i>Taipei, Taiwan</i>

<b>Outstanding Student</b>	2021
<i>Department of Electrical Engineering at NTUST</i>	<i>Taipei, Taiwan</i>

SKILLS

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