CHIAO-WEI HSU

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🏛 EDUCATION

Stanford University (Auditing Courses) <div align="right">Palo Alto, CA</div>
Digital Nomad at Startup House 🔗 <div align="right">*Since Sep. 2024*</div>
- ♟ AI Agents and Simulations, Conversational Virtual Assistants with Deep Learning.
- ♟ Parallel Computing, Big Data Systems, Computer Graphics and Vision.

Northwestern University   *GPA: 3.88/4.0* <div align="right">Evanston, IL</div>
Master of Science in Computer Science <div align="right">*Since Sep. 2023*</div>
- ♟ **Thesis**: *"Scaling Law for Deep Learning"* supervised by Han Liu 🔗.
- ♟ **Seminar Project**: *"Financial LLMs and FinGPT"* supervised by Han Liu 🔗.
- ♟ ML: Minimax, Bayesian Learning, Causal Inference, Decision Tree, Logistic Regression, EM Algorithm, Naive Bayes, Knowledge Representation and Reasoning, Deep Reinforcement Learning: A2C, PPO.
- ♟ DL: Quantization, LoRA, Retrieval-Augmented Generation, Diffusion Model, Linear RNN (Mamba), Transformer with RLHF, Mixture of Experts.
- ♟ CV/Graphics: Color Constancy, In-Pixel/On-Sensor Computation, Coded Aperture, Lensless Imaging.

💼 EXPERIENCE

Machine Learning Intern <div align="right">Irvine, CA</div>
Himax Imaging Corp. <div align="right">*Jun. 2024 – Sep. 2024*</div>
- Engineered a unified model for **Emotion, Attention, Body Detection, Face Expression** model based on **YOLO** with **TFLite** and **Vela**.
- Utilized **Model Pruning**, **Quantization**, and **Quantization-aware Training** to obtain a compression ratio of 46% on an **endpoint AI device** (milliwatts).
- Implemented Task Automation with Natural Language Commands by a fine-tuned **LLM** and **Text-to-Speech** and **Speech-to-Text** for AIPC.
- Integrated **Websocket**, **Shared Memory**, and **Named Pipe** for **Inter-Process Communication** among the **microcontroller**, the **host PC**, and the application.
- Developed a library to communicate with the **microcontroller** FT4222 driver.

Machine Learning Engineer (Research) <div align="right">Taiwan</div>
Academia Sinica <div align="right">*Oct. 2018 – Dec. 2022*</div>
- nlds 🔗: Developed a python library of natural language data structure with **Design Patterns**—Composite, Factory, Template, Command, Facade, Adapter, Delegate, Builder, Strategy, Iterator, Dependency Injection, and Meta Class.
- Engineered a **Knowledge**-driven **Multi-Modal QA System** integrating **vision, speech, and text** data, advancing capabilities in cross-modal information processing [3].
- Enhanced **state-of-the-art** performance by 4% on the **Named Entity Recognition (NER)** task through strategic **fine-tuning of Transformers**, applying **Multi-Task** and **Incremental Learning** techniques, and leveraging **Data Augmentation [1][2]**.
- Designed a **Hierarchical Multi-Head Multi-Layer Attention** mechanism from the ground up, enhancing model interpretability and performance.
- Implemented **Adaptive Boosting** for Ensemble Learning.

Software Developer <div align="right">Aug. 2017 – May. 2018</div>
Luye Gaotai <div align="right">*Taiwan*</div>
- Developed **3D vision graphics** (autostereogram) program by **JavaScript**.
- Developed a portal website using **HTML5/CSS3**, **BootStrap**, **PHP**, and **JavaScript**.

🖥 PROJECTS

Stock Trading using Deep Reinforcement Learning 🔗 VIDEO <div align="right">Mar. 2024 – Jun. 2024</div>
- Trained a **Stock Trading Agent** by **A2C** and **PPO** to obtain an annual return of 29%.

Information Retrieval and Multi-Document Analysis 🔗 <div align="right">Jan. 2019 – Jan. 2021</div>
- Implemented **Entity Linking** and **Relation Extraction** for **Wikidata Knowledge Graph**.
- Incorporated **K-Mean** and **Hierarchical Clustering** algorithms to group similar documents.
- Improved the **Re-ranking** model of an Information Retrieval System by 0.24 f1-score.

- Implemented a BERT-based **Query Generation** model and threshold-tuning P-R curve.
- Extracted syntactic patterns based on **Dependency Parsing** and **Part-of-Speech Tagging** based on LSTM.

Decentralization and Blockhcains System 🔗 VIDEO   Mar. 2024 – Jun. 2024
- Developed a **P2P Network** for the blockchain system using **Rust**.
- Implemented the data structures (e.g., Transaction, Block, Blockchain, Mempool) and algorithms for **Gossiping Protocol** and the **Proof of Work** consensus for the mining process.

Interpreter by Racket/Lisp 🔗 CODE   Jan. 2024 – Mar. 2024
- Built a **parser**, a **compiler**, and a **garbage collector** using **Mark & Sweep** and **Two-Space Collection**.
- Implemented features of deferred substitution, higher order functions, state, error handling, and recursions.

📘 PUBLICATIONS

[1] Hsu et al., *"A Redundancy-Enhanced Framework For Error Correction in Named Entity Recognition"*, pre-print '24.

[2] Hsu et al., *"GlobalNER: Incorporating Non-local Information into Named Entity Recognition"*, pre-print '23.

[3] Liang et al., *"A Flexible and Extensible Framework for Multiple Answer Modes Question Answering"*, ROCLING '21.

🏆 HONORS

- 🏅 **First Place** at the 2020 Formosa **Artificial Intelligence Grand Challenge**; developed a Multi-Round Dialogue System and Question Answering System.
- 🏅 Led the team of 4 students to **top 11%** in 2024 eBay Machine Learning Competition.

💻 OTHER PROJECTS

AI-Driven Grocery Logging and Recipe Suggestions App 🔗 DEMO   Sep. 2023 – Apr. 2024
- Adopted **ReactJS**, **Vite**, and **Firebase**; conducted tests using **Cypress**.
- Developed a **Serverless RESTful API** with **ExpressJS** as back-end deployed with **AWS ElasticBean**.
- Incorporated **API Gateway** with **AWS Lambda Functions**.
- **Engineered prompts for GPT-4 Vision**, deployed **OCR** to scan receipts, and implemented features to send expiry notifications and receipt suggestions.

AI-Powered Driver Companion Mobile App 🔗 DEMO   Mar. 2024 – Apr. 2024
- Incorporated AI models, **YOLOv4**, **GPT-4**, **Text-To-Speech**, **Speech-To-Text**, to streamline from image recognition to natural language processing.
- Adopted **Django** as back-end, and **React Native**, **Expo** for mobile development.