I-Chun (Ethan) Chern

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Education

Carnegie Mellon University (CMU) *Pittsburgh, PA*

School of Computer Science, Language Technologies Institute *Aug. 2021 - May 2023*

MS in Artificial Intelligence and Innovation

- Courses: Advanced DL (10-707) (A+), Advanced NLP (11-711) (A+), Theoretical and Empirical Foundations of Modern ML (15-884) (A+), ML with Large Datasets (10-605) (A+), Convex Optimization (10-725) (A+), ML Production (11-695) (A+), AI Innovation (11-654) (A+), Advanced ML (10-716) (A), Intro. to ML (10-601) (A), AI & Future Markets (11-651) (A), Intro. to Computer Systems (15-513) (A)

National Yang Ming Chiao Tung University (NYCU) *Hsinchu, Taiwan*

BS in Electrical and Computer Engineering *Sept. 2017 - June 2021*

- Academic Excellence Award (top 5%), 2020

Publication

- **Ethan Chern***, Haoyang Zhou*, Xuefeng Li*, Jiewen Hu*, Junlong Li, Pengfei Liu "**Generative AI for Math: Abel**." *preprint.* (*= Core contributors)**.**
- Shiqi Chen, Yiran Zhao, Jinghan Zhang, **I-Chun Chern**, Siyang Gao, Pengfei Liu, Junxian He "**FELM: Benchmarking Factuality Evaluation of Large Language Models**." *NeurIPS 2023.* **.**
- **I-Chun Chern**, Steffi Chern, Shiqi Chen, Weizhe Yuan, Kehua Feng, Chunting Zhou, Junxian He, Graham Neubig, Pengfei Liu. "**Factool: Factuality Detection in Generative AI – A Tool Augmented Framework for Multi-Task and Multi-Domain Scenarios**." *arXiv preprint.* **.**
- **I-Chun Chern**, Zhiruo Wang, Sanjan Das, Bhavuk Sharma, Pengfei Liu, Graham Neubig. "**Improving Factuality of Abstractive Summarization via Contrastive Reward Learning**." *Third Workshop on Trustworthy Natural Language Processing at ACL 2023.*
- **I-Chun Chern**, Kuo-Hsuan Hung, Yi-Ting Chen, Tassadaq Hussain, Mandar Gogate, Amir Hussain, Yu Tsao, Jen-Cheng Hou. "**Audio-Visual Speech Enhancement and Separation by Leveraging Multi-Modal Self-Supervised Embeddings**." *Advances in Multi-modal Hearing Assistive Technologies (AMHAT) at IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP)* 2023.
- **I-Chun Chern**, Steffi Chern, Heng-Cheng Kuo, Huan-Hsin Tseng, Kuo-Hsuan Hung, Yu Tsao. "**Voice Direction-of-Arrival Conversion**." *IEEE International Workshop on Machine Learning for Signal Processing (MLSP)* 2023.
- Kao-Yueh Kuo, **I-Chun Chern**, and Ching-Yi Lai. "**Decoding of Quantum Data-Syndrome Codes via Belief Propagation**." *IEEE International Symposium on Information Theory (ISIT)* 2021.

Research Experience

Generative AI Lab, Shanghai AI Lab *Shanghai, China*

Research Assistant (Advisor: Prof. Pengfei Liu) *May. 2023 - Present*

- **Factool: Factuality Detection in Generative AI**
  - Pioneered the development of a sophisticated tool-augmented factuality detection framework designed to identify factual inaccuracies within generative AI outputs across various tasks and diverse domains.
  - Delivered a fine-grained factuality detection system for precise identification and rectification of factual inaccuracies.
- **Building Alignment Approaches for Safer LLMs**
  - Developing alignment approaches to ensure coherence between LLMs and existing human norms and criteria.
  - Building retrieval-based systems to enhance the alignment between LLM and existing laws.
- **Scalable Evaluation for Generative Chatbots**
  - Formulating a robust evaluation framework to critically assess the performance of generative chatbots under diverse scenarios.
  - Building AI-assisted meta evaluation framework to facilitate alignment between LLM-based evaluation metrics and human.
- **Unleashing Math Capabilities of LLM**
  - Building empirical approaches to unleash the capabilities of LLMs in mathematical and scientific domains.
  - Establishing distributed training framework to fine-tune and continuous pretrain open-sourced LLMs.

Research Projects in Carnegie Mellon University *Pittsburgh, PA*

Independent Research (Advisors: Prof. Graham Neubig, Dr. Pengfei Liu) *Aug. 2021 - May 2023*

- **Factool: Factuality Detection in Generative AI**
  - Advisors: Prof. Graham Neubig, Dr. Pengfei Liu
  - Established robust factual error detection workflow designed to identify inaccuracies within the generated text of LLMs.
- **Improving Factuality of Abstractive Summarization via Contrastive Reward Learning**
  - Advisors: Prof. Graham Neubig, Dr. Pengfei Liu
  - Developed contrastive reward learning paradigm aiming at providing factual consistent abstractive summarization.

Biomedical Acoustic Signal Processing Lab, Academia Sinica, Taiwan *Taipei, Taiwan*

Student Research Assistant (Advisor: Prof. Yu Tsao) *Mar. 2022 - May 2023*

- **Audio-Visual Speech Enhancement based on Efficient Multimodal Neural Networks**
  - Built end-to-end SSL-based audio-visual multimodal speech enhancement and speech separation models.
- **Voice Direction-of-Arrival (DOA) Conversion**
  - Proposed voice DOA conversion; devised generative models to perform voice DOA conversion.

Quantum Computing Lab, NYCU *Hsinchu, Taiwan*

Research Assistant (Advisor: Prof. Ching-Yi Lai) *Feb. 2020 - Aug. 2021*

- **DS-BP: A Novel Fault-Tolerant Quantum Computation Scenario**
  - Devised a low complexity decoding algorithm (refined GF(4)-based belief propagation) for quantum data-syndrome (DS) codes to correct both data qubits and syndrome bit-flip errors concurrently.
  - Outperformed the classical decoding strategy (repeated syndrome measurements) under realistically defined physical realization condition.

Perception Signal Processing Lab, NYCU *Hsinchu, Taiwan*

Research Assistant (Advisor: Prof. Tai-Shih Chi) *Feb. 2019 - Jan. 2020*

- **A Hybrid DSP/Deep Learning Approach to Real-Time Speech Enhancement**
  - Implemented a hybrid DSP/deep learning algorithm targeting at "keeping the computing consumption as low as possible (compared to typical NN algorithm), while maintaining high-quality speech enhancement (compared to conventional algorithm)."
  - Outperformed the conventional MMSE-based approach at an average of 0.3 under PESQ MOS-LQO quality evaluation.
- **A CNN-based Auditory Model for Feature Extraction in Speaker Identification**
  - Revamped a traditional two-stage auditory model, replacing the original framework with a layered 1-D and 2-D CNN structure to simulate 1-D cochlear and 2-D spectro-temporal modulation filtering.
  - Achieved a higher accuracy in speaker identification (14% improvement) compared to the original structure.

Work Experience

Luca.ai *Pittsburgh, PA*

Machine Learning Engineer *Oct. 2022 - May 2023*

- **Reading Fluency Learning Platform for Children with Dyslexia**
  - Designed innovative story generation systems utilizing advanced large language models technology.
  - Developed phoneme-level ASR systems for real-time disfluencies detection.
  - Integrated systems workflows to provide real-time analytical reports and facilitate effective instructional approaches.

Amazon (AWS), Amazon Go *Seattle, WA*

Software Development Engineer Intern *May 2022 - Aug. 2022*

- **In-Store Devices Provisioning and ML Deployment Systems Improvements**
  - Enhanced the visibility of in-store devices (cameras and edge computing devices) to facilitate the device provisioning and ML software deployment.
  - Initiated and executed the automation of device provisioning (cameras, edge computing devices) debugging workflow and ticketing process, resulting in significantly reduced response time and improved efficiency in addressing technical issues.
  - Generated cross-team impacts to the vision algorithm deployment team, tech installation team, hardware device team, and device provisioning and management team.

Realtek Semiconductor Corp., Multimedia Department *Hsinchu, Taiwan*

Digital IC Consultant *June 2019 - July 2021*

- **Chip Design for AI-Driven Keyword Wake-Up Function**
  - Optimized AI-based voice keyword algorithm, developed optimized IC hardware architecture, and implemented RTL coding to deliver voice-wake-up function for TV in standby mode, with compact die size and low power consumption.
  - Designed a highly efficient digital circuit scheduling and control flow for the speech recognition module, optimized for reduced computational complexity while striking a balance between computation and memory usage; only 1/16 of the original computing capacity is required.
  - The end product of this project won the 2022 Computex Best Choice of the Year Award & Golden Award.

Skills

Software Python (TensorFlow, PyTorch), Large Language Models, Distributed Training, C/C++, MATLAB, Java, JavaScript, HTML, Assembly language (x86-64, 8051)