Yicong (Bryce) Chen

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Education

University of Washington — Seattle, WA
Ph.D. in Electrical & Computer Engineering — *Sep. 2024 – Present*
- Advisor: Mari Ostendorf

University of Wisconsin-Madison — Madison, WI
B.S. in Computer Engineering: Machine Learning and Data Science — *Sep. 2020 – May 2024*
2nd Major in Computer Science
- Advisor: Kangwook Lee
- GPA: 3.98/4.00

Research Interest

My current research interests focus on building and assessing **multimodal foundation models** to address real-world problems involving speech, text, and image modalities. Prior to this, I have also worked on continual federated learning, prompt engineering, text-to-image generation, and multimodal in-context learning.

Experience

Research Assistant — Sep. 2024 – Present
Advisor: Mari Ostendorf — *Seattle, WA*
- Developed an evaluation pipeline for an automated sentence recall screener for child speech language disorders.
- Assessed pause-based screening features using multiple **speech LLMs**, ASR models, and alignment tools, showing correlations between pause typicality and clinical screening outcomes.
- (In progress) LLM-based typical pause pattern modeling: fine-tuning an LLM on pause labels derived from forced alignment to predict likely pause positions, derive pause atypicality scores from token-level perplexities, and benchmark them for automatic detection of atypical child speech patterns.

Undergraduate Researcher — May 2022 – May 2024
Advisor: Kangwook Lee — *Madison, WI*
- Established a benchmark to evaluate the **in-context learning** capabilities of **Multimodal** Large Language Models (MLLMs) for mapping text inputs to image outputs.
- Introduced **coded prompts**, inspired by coding theory, to process multiple inputs simultaneously in LLMs.
- Designed a novel algorithm that mitigates forgetting by leveraging aggregated buffer gradients, ensuring the retention of prior knowledge across clients in **Continual Federated Learning**.
- Developed a zero-shot technique to improve **CLIP's object counting** accuracy by extracting a counting-specific vector from its text embedding space, improving both counting tasks and **text-to-image generation**.
- Enhanced the efficacy of Mixed Sample Data Augmentation (MSDA) by introducing self-distillation for relabeling, providing more accurate labels for the mixed samples in MSDA.
- Enhanced low-resolution cosmic data into high-resolution images using diffusion to aid dark matter research.

Undergraduate Researcher — Jan. 2022 – May 2022
Advisor: Dane Morgan — *Madison, WI*
- Accelerated molecular machine learning by integrating nystroem into the kernel training process with Faber–Christensen–Huang–Lilienfeld (FCHL) representation and kernel ridge regression.

Publications

[1] Can MLLMs Perform Text-to-Image In-Context Learning?
Yuchen Zeng*, Wonjun Kang*, **Yicong Chen**, Hyung Il Koo, Kangwook Lee
Conference on Language Modeling (COLM) 2024

[2] Zero-shot Improvement of Object Counting with CLIP
Ruisu Zhang*, **Yicong Chen***, Kangwook Lee
Robustness of Few-shot and Zero-shot Learning in Foundation Models (R0-FoMo) Workshop @ NeurIPS 2023

[3] Coded Prompts for Large Language Models
Ziqian Lin, **Yicong Chen**, Yuchen Zeng, Kangwook Lee
Robustness of Few-shot and Zero-shot Learning in Foundation Models (R0-FoMo) Workshop @ NeurIPS 2023

[4] FedGP: Buffer-based Gradient Projection for Continual Federated Learning
Shenghong Dai, **Yicong Chen**, Jy-yong Sohn, S M Iftekharul Alam, Ravikumar Balakrishnan, Suman Banerjee, Nageen Himayat, Kangwook Lee
Federated Learning Systems (FLSys) Workshop @ MLSys 2023 • Oral Presentation • Best Paper Award

[5] AVMeme Exam: A Multimodal Multilingual Multicultural Benchmark for LLMs' Contextual and Cultural Knowledge and Thinking
Xilin Jiang, Qiaolin Wang, Junkai Wu, Xiaomin He, Zhongweiyang Xu, Yinghao Ma, Minshuo Piao, Kaiyi Yang, Xiuwen Zheng, Riki Shimizu, **Yicong Chen**, et al.
Submitted to the Annual Meeting of the Association for Computational Linguistics (ACL) 2026

Projects

Run Right: Mobile App Design for Personal Running Coach Spring 2024

- Developed a mobile app using TensorFlow MoveNet to analyze running form via smartphone video.
- Enabled users to capture video, receive detailed feedback, and improve running mechanics through an intuitive interface, helping reduce injury risk and enhance running efficiency.

WISC-SP23 architecture microprocessor design Spring 2023

- Designed and implemented a 16-bit, 5-stage pipelined processor (WISC-SP23) using Verilog.
- Developed a two-way set associative instruction cache, a multi-cycle main memory, and other optimizations.

Skills

Languages: Python, Java, C++, C, MATLAB, Verilog, HTML/CSS, JavaScript
Tools: Latex, Wandb, AWS, Git, Docker, Google Cloud
Libraries: PyTorch, TensorFlow, Hugging Face, Scikit-learn, Pandas, NumPy, Matplotlib