Huancheng Chen

PhD Candidate

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Education

2020–2025 **Ph.D. in Electrical and Computer Engineering**, *University of Texas at Austin*
GPA: 3.97/4.0 Advisor: Haris Vikalo

2015–2019 **B.Eng. in Electrical Engineering**, *South China University of Technology*
GPA: 3.90/4.0

Research Overview

My research concentrates on developing **Scalable, Trustworthy, Efficient** learning system and their applications on **Foundation Models,** including:

- Employing model compression (pruning, quantization) in distributed learning.
- Promoting differential privacy and adversarial robustness in distributed learning.
- Improving fine-tuning strategies to continuously adapt large foundation models to downstream tasks using forgetting-resilient low-rank adaptation (LoRA).
- Enhancing spatial accuracy and fidelity of content control for generative models.

Industry Experience

May – Aug. 2024 **Research Intern**, *SonyAI*, Tokyo, Japan
Project: Enhancing Layout Guidance in Text-To-Image Generation

- Proposed a novel sampling scheme that optimizes backward noises aided by cross-attention maps of input text and enables controlling spatial semantics of images.
- Generation with layout guidance enables to synthesize an arbitrary number of images with bounding boxes for improving object detection capability of the foundation model.

Feb – May. 2024 **Research Intern**, *SonyAI*, Austin, Texas
Project: Forgetting-Resilient Low-Rank Adaptation on Large Pretrained Models

- Proposed a novel continual learning scheme based on low-rank adaptation (LoRA) that enables the foundation model fine-tuning on a sequence of downstream tasks.
- The proposed fine-tuning strategy prevents cataphoric forgetting problem and preserves performance of old tasks when adapting the foundation model to the new task.

May – Aug. 2022 **Research Intern**, *Toyota InfoTech Lab*, Mountain View, California
Project: Data-Free Knowledge Distillation in Non-IID Federated Learning (FL)

- Applying knowledge distillation technique to securely extract class-wise representations from clients' private datasets which are not allowed to be shared to the server.
- The server utilizes the extracted representations for regularization to mitigate performance degradation caused by data-heterogeneity cross clients in the server-clients FL system.

Jan. – May. 2022 **Research Intern**, *Nokia Bell Lab*, Murray Hill, New Jersey

Project: Robust Flaw Detection on Low-Quality Images

- Developed an end-to-end framework for background removal of equipment's images based on **U-2-Net** that enables removing irrelevant contents might mislead flaw detection.
- Constructed a highly accurate (90%+) and robust deep network based on **Inception-ResNet** for detecting flaws on images of devices in low quality (such as blur, shadow).

Publications

[1] **Huancheng Chen**, Jingtao Li, Nidham Gazagnadou, Weiming Zhuang, Chen Chen, Lingjuan Lyu. Dual Low-Rank Adaptation for Continual Learning with Pre-Trained Models. Under Review

[2] **Huancheng Chen**, Haris Vikalo. Heterogeneity-Guided Client Sampling: Towards Fast and Efficient Non-IID Federated Learning. Conference on Neural Information Processing Systems (NeurIPS), 2024

[3] **Huancheng Chen**, Haris Vikalo. Recovering Labels from Local Updates in Federated Learning. The International Conference on Machine Learning (ICML), 2024

[4] **Huancheng Chen**, Haris Vikalo. Mixed-Precision Quantization for Federated Learning on Resource-Constrained Heterogeneous Devices. The IEEE/CVF Computer Vision and Pattern Recognition Conference (CVPR), 2024

[5] **Huancheng Chen**, Haris Vikalo. Federated Learning in Non-IID Settings Aided by Differentially Private Synthetic Data. Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR) Workshops **Oral**, 2023

[6] **Huancheng Chen**, Johnny Wang, Haris Vikalo. The Best of Both Worlds Accurate Global and Personalized Models through Federated Learning with Data-Free Hyper-Knowledge Distillation. The International Conference on Learning Representations (ICLR), 2023

[7] Abduallah Mohamed*, **Huancheng Chen***, Zhangyang Wang, Christian Claudel. Skeleton-Graph: Long-Term 3D Motion Prediction From 2D Observations Using Deep Spatio-Temporal Graph CNNs. The International Conference on Computer Vision (ICCV), 2021

Honors

Sept. 2015 **National Encouragement scholarship**, *South China University of Technology*

Sept. 2016 **The First Prize scholarship**, *South China University of Technology*

Skills

Languages English (fluent), Mandarin (native), Cantonese (native)

Programming Python, Java, C/C++, Bash, SQL, Matlab, LaTeX

Tools Tensorflow, Pytorch, Hugging Face, Git, Pandas