Chang Liu

📞 (+1)412-954-8753 | ✉ changl8@andrew.cmu.edu | 🏠 changliu-drpatient.github.io

Education

School of Computer Science

Carnegie Mellon University, Ph.D. Student in Machine Learning 08/2023 - 05/2028(est.)

- Advisor: Prof. Artur Dubrawski.
- Research Interests: Agentic AI, LLM post-training, machine learning in healthcare, deep learning.
- Courses: Advanced Introduction to Machine Learning, Intermediate Statistics, Advanced Machine Learning: Theory and Methods, Advanced Deep Learning, Machine Learning for Large Datasets.

Yao Class, Institute for Interdisciplinary Information Sciences (IIIS) established by Prof. Andrew C. Yao

Tsinghua University, B.Eng. in Computer Science 08/2019 06/2023

- GPA: **3.91/4.00**.
- TOEFL: **120/120**. Reading: 30, Listening: 30, Speaking: 30, Writing: 30.
- GRE: **340/340**. Quant: 170, Verbal: 170, Writing: 5.
- Mathematics Courses: Calculus, Linear Algebra, Abstract Algebra, Mathematics for Computer Science, Mathematics for Artificial Intelligence, Probability and Statistics.
- Computer Science Courses: Machine Learning, Reinforcement Learning, Computational Biology, Computer Vision, Deep Learning, Natural Language Processing, Introduction to Databases, Data Mining, Quantum Computer Science, Introduction to Robotics, Algorithm Design, Theory of Computation.

Ongoing Research

LLM agents for time series machine learning engineering 07/2025 Now

Advised by Prof. Artur Dubrawski. Carnegie Mellon University

- Develop an agentic AI framework for machine learning engineering tasks on time series data.

Heterogeneous federated learning of foundation models 03/2025 Now

Advised by Prof. Artur Dubrawski. Carnegie Mellon University

- Develop a framework for fine-tuning foundation models with task heterogeneity in a federated learning setting using knowledge distillation.

Effieicnt Compression of LLMs 11/2024 Now

Advised by Prof. Artur Dubrawski. Carnegie Mellon University

- Explore and innovate depth-based pruning methodologies of LLMs.

Research Experience

WGS structure-preserving representation learning for MALDI-TOF mass spectrometry 10/2023 03/2025

Advised by Prof. Artur Dubrawski. Carnegie Mellon University

- Developed a novel method of learning MALDI-TOF representations that respect external whole genome sequencing (WGS) structure, effectively bridging the modality gap between WGS and MALDI-TOF for outbreak detection.

Identifying Disease Targets through a Probabilistic Knowledge Graph 09/2021 05/2023

Advised by Prof. Jianyang Zeng. Tsinghua University

- Developed a novel method of augmenting biological networks with literature evidence to construct a probabilistic knowledge graph.

- Developed a graph neural network to predict target candidates from the knowledge graph, achieving superior performance to state-of-the-art models in terms of accuracy (esp. on sparse data) and literature support for top novel predictions.
- Conducted bioinformatics analyses and cooperated with experimental validation of the identified colorectal cancer and melanoma targets.

Reconstructing the Allele-specific Genome Structure from Hi-C Contacts
Advised by Prof. Jian Ma.

03/2022 03/2023
Carnegie Mellon University

- Developed an improved particle dynamics framework (based on *hickit*) that iterates between inferring chromosome contact phases and 3D genomic coordinates to fully exploit their common information.
- Developed a new graph neural network to implicitly impute the phases of the Hi-C contacts and reconstruct the allele-specific 3D genome structure.

Discovering Competitive Binding of Transcription Factors
Advised by Prof. Jianyang Zeng.

05/2021 - 02/2023
Tsinghua University

- Developed a framework to infer in-vivo competitive TF binding (the binding of one TF removes that of the other), consisting of a deep neural network, several motif analyses, and statistical tests.
- Cooperated with experimental validation of the predicted competing TF pairs (in progress).

Predicting Antigen Binding Sites through Graph Neural Networks
Advised by Prof. Boxue Tian.

06/2021 - 08/2021
Tsinghua University

- Developed a graph neural network to predict antigen binding residues using antigen-antibody compound data in the SAbDAb database based on *GraphBind*, a DNA/RNA-Protein binding site prediction model.
- Utilized the model to validate lab-generated compounds.

Intelligent Diabetes Management
Advised by Prof. Yang Yuan.

12/2020 - 02/2021
Tsinghua University

- Cooperated with Shanghai Zhongshan Hospital to investigate the needs of the endocrinology department and its patients.
- Developed a deep learning framework for predicting future patient blood sugar levels from patient records for pre-emptive alerts.
- Developed a deep learning framework for predicting the proper dosage of insulin to be administered to alleviate the demand for expert consultation.

Publications

1. **Chang Liu**[†]; Arjun Choudhry[†]; Yifu Cai; Nina Żukowska; Mononito Goswami; Artur Dubrawski. "Depth as a Scaling Vector: Simple Pruning and Evaluation of Emergent Abilities in Pruned LLMs," *NeurIPS 2025 Workshop on Evaluating the Evolving LLM Lifecycle: Benchmarks, Emergent Abilities, and Scaling*, September 2025.

2. Arjun Choudhry[†]; **Chang Liu**[†]; Nina Żukowska; Yifu Cai; Mononito Goswami; Artur Dubrawski. "LayerMerge: Modality-Agnostic Depth Pruning for Efficient Foundation Model Deployment," *NeurIPS 2025 Workshop on Efficient Reasoning*, September 2025.

3. Mikołaj Piórczyński, Wojciech Łapacz, Xinyu Li, **Chang Liu**, Abby Turner, Artur Dubrawski. "From Aggregation to Guidance: Strategies for Personalized Federated Fine-Tuning of Foundation Models" *NeurIPS 2025 Workshop on Unifying Representations in Neural Models*, Sept 2025.

4. **Chang Liu**; Jieshi Chen; Lee H. Harrison; Artur Dubrawski[∗]. "Bridging the Utility Gap Between MALDI-TOF and WGS for Affordable Outbreak Cluster Detection," *The AHLI Conference on Health, Inference, and Learning (CHIL)*, April 2025.

5. **Chang Liu**; Jieshi Chen; Lee H. Harrison; Artur Dubrawski*. "Multimodal Structure Preservation Learning,"*arXiv preprint*, October 2024.

6. **Chang Liu**†; Kaimin Xiao†; Cuinan Yu†; Yipin Lei†;...; Dan Zhao*; Fengfeng Zhou*; Haidong Tang*; Jianyang Zeng*. "A Probabilistic Knowledge Graph Approach for Target Identification," *PLOS Computational Biology*, April 2024.

7. **Chang Liu**†; Cuinan Yu†; Yipin Lei†;...; Dan Zhao*; Fengfeng Zhou*; Jianyang Zeng*. "Improving Target-disease Association Prediction through a Graph Neural Network with Credibility Information," proceedings of the *Pacific Symposium on Biocomputing*, January 2023.

Honors & Awards

- **Comprehensive Merit Award (7/32)**, *Tsinghua University*   2022
- **Comprehensive Merit Award (6/32)**, *Tsinghua University*   2021
- **Excellence Award for Volunteering Services**, *Tsinghua University*   2020
- **Freshmen Scholarship**, *Tsinghua University*   2019
- **University Full Scholarship for Future Scholars**, *Tsinghua University*   2019