

HAO LIU

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RESEARCH INTEREST

I'm a **fifth-year Ph.D. candidate** at Washington University in St. Louis advised by Prof. Yixin Chen. My research primarily focuses on **Graph Neural Networks (GNNs)**, **Few-shot Learning**, **Contrastive Learning**, and **Multimodal Learning**. I am also exploring tabular representation learning, particularly its application in addressing real-world clinical problems. Most recently, I have been working on developing a **graph foundation model** by leveraging the power of **Large Language Models (LLMs)**.

EDUCATION

Washington University in St. Louis

Saint Louis, MO

Ph.D. Candidate in Computer Science & Engineering

Sep. 2019 – (Expected) June 2025

Beijing Normal University

Beijing, China

B.S. in Mathematics

Sep. 2015 – June 2019

SELECTED RESEARCH PROJECTS

One for All: Training One Graph Model for All Classification Tasks

Mar. 2023 – Present

- Developed the first graph foundation model capable of handling multiple classification tasks across various datasets and domains in supervised, few-shot, and zero-shot scenarios.
- Employed Large Language Models to standardize and unify graph data representation, transforming features of diverse graphs into consistent natural language formats, enabling multi-dataset training in the graph domain.
- Innovated a graph prompting paradigm, advancing the model's in-context learning capabilities.

Unsupervised Meta-Learning for Transductive Few-shot Node Tasks

Jan. 2023 – Oct. 2023

- Designed the first unsupervised meta-learning method for transductive few-shot node classification.
- Innovated an unsupervised meta-task construction method by leveraging the strengths of contrastive learning, enabling comprehensive use of graph nodes in the learning process.
- Achieved state-of-the-art performance on seven datasets, with at least 11.18% and up to 20.56% absolute accuracy improvement over existing meta-learning baselines.

Time Associated Meta-Learning for Clinical Prediction

May 2021 – Jan. 2022

- Developed a meta-learning method for predicting clinical outcomes associated with multiple time horizons, significantly enhancing patient event forecasting using Electronic Health Records (EHR).
- Validated superior performance across various clinical datasets and introduced a tool-set for few-shot tabular predictions in healthcare.

PUBLICATIONS

Conference:

- One for All: Towards Training One Graph Model for All Classification Tasks
Hao Liu*, J. Feng*, L. Kong*, N. Liang, D. Tao, Y. Chen, M. Zhang
The Twelfth International Conference on Learning Representations (**ICLR 2024 Spotlight**)
- Graph Contrastive Learning Meets Graph Meta Learning: A Unified Method for Few-shot Node Tasks
Hao Liu, J. Feng, L. Kong, D. Tao, Y. Chen, M. Zhang
The Web Conference 2024 (**WWW 2024**)
- TabContrast: A Local-Global Level Method for Tabular Contrastive Learning
Hao Liu, Y. Chen, B. Fritz, C. King
NeurIPS 2023 Second Table Representation Learning Workshop (**NeurIPS 2023 TRL**)

- MAG-GNN: Reinforcement Learning Boosted Graph Neural Network
L. Kong, J. Feng, **Hao Liu**, D. Tao, Y. Chen, M. Zhang
Thirty-seventh Conference on Neural Information Processing Systems (**NeurIPS 2023**)
- Extending the Design Space of Graph Neural Networks by Rethinking Folklore Weisfeiler-Lehman
J. Feng, L. Kong, **Hao Liu**, D. Tao, F. Li, M. Zhang, Y. Chen
Thirty-seventh Conference on Neural Information Processing Systems (**NeurIPS 2023**)

Preprint:

- Time Associated Meta Learning for Clinical Prediction
Hao Liu, M. Zhang, Z. Dong, L. Kong, Y. Chen, B. Fritz, D. Tao, C. King

TECHNICAL SKILLS

Programming Languages: Python, Matlab, C

Machine Learning Frameworks: PyTorch, Lightning, PyG (Graph Neural Networks), Scikit-learn

Data Science Tools: Pandas, NumPy, Matplotlib, Seaborn

Developer Tools: PyCharm, Jupyter Notebooks, Git, Docker, Google Cloud Platform, VS Code

TEACHING SERVICES

Washington University in St. Louis

CSE 543T: Nonlinear Optimization

Lecturer/Grader— Spring 2023/Spring 2024