Chunhui Zhang, Ph.D. student at Dartmouth

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Research interests

Large language models, Agent Reasoning (vision, language, and audio), Post-Training (instruction tuning, DPO), Mechanistic Interpretability and its Application

Education

Dartmouth College Hanover, NH, US
Ph.D. student in Computer Science Aug. 2023 – April. 2026 (expected)
Advisor: Professor Soroush Vosoughi

Brandeis University Waltham, MA, US
Master of Science, Computer Science Sep. 2021 – Jun. 2023
GSAS Fellowship, Research-Based

Northeastern University CN
Bachelor of Science, Computer Science Sep. 2017 – Jun. 2021
Outstanding Honor Thesis Award

Experience

Honda Research Institute USA San Jose, CA, USA
Research Intern Jun. 2024 – Sept. 2024
Project: Multimodal LLM Post-Training (8B - 70B) and Synthetic Data
Developed a **LLM-powered reasoner** capable of understanding human behaviors in **multimodal environments**, achieving a **4.6%** improvement over state-of-the-art solutions. The post-trained small agents facilitate inference-time decoding, scaling up to 405B params. The paper is under review at ICLR 2025, rated with 6665.
Host: Dr. Shao-Yuan Lo

Under review

Scaling Multimodal Theory-of-Mind with Weak-to-Strong Bayesian Reasoning
Preprint | Code | *A global-local structure uses Bayesian inverse planning for global planning, then allows LLMs to fully focus on local reasoning.*
Chunhui Zhang, Sean Dae Houlihan, Kwonjoon Lee, Nakul Agarwal, Zhongyu Ouyang, Soroush Vosoughi, Shao-Yuan Lo

Pretrained Image-Text Models are Secretly Video Captioners

Preprint | Code | *A general instruction tuning recipe trains a top-2 best captioner on PaperwithCode Leaderboarder*
Chunhui Zhang, Yiren Jian, Zhongyu Ouyang, Soroush Vosoughi

Working Memory Retains Essential Temporal Multimodal Sequences for Audio-Video-Language Modelling
Preprint | Code
Chunhui Zhang, Xingjian Diao, Weiyi Wu, Zhongyu Ouyang, Peijun Qing, Ming Cheng, Soroush Vosoughi, Jiang Gui

Is It Navajo? Accurate Language Detection in Endangered Athabaskan Languages
Preprint | Code
Ivory Yang, Weicheng Ma, **Chunhui Zhang**, Soroush Vosoughi

Publications

Working Memory Identifies Reasoning Limits in Language Models
Chunhui Zhang, Yiren Jian, Zhongyu Ouyang, Soroush Vosoughi
The Conference on Empirical Methods in Natural Language Processing (EMNLP), 2024.

Learning Musical Representations for Music Performance Question Answering
Xingjian Diao, **Chunhui Zhang**, Tingxuan Wu, Ming Cheng, Zhongyu Ouyang, Weiyi Wu, Soroush Vosoughi, Jiang Gui
Findings of the Association for Computational Linguistics: Empirical Methods in Natural Language Processing (Findings of EMNLP), 2024.

Expedited Training of Visual Conditioned Language Generation via Redundancy Reduction
Yiren Jian, Tingkai Liu, Yunzhe Tao, **Chunhui Zhang**, Soroush Vosoughi, Hongxia Yang
*Annual Meeting of the Association for Computational Linguistics (**ACL, Oral Presentation**), 2024.*

Aligning Relational Learning with Lipschitz Fairness
{Yaning Jia, **Chunhui Zhang**}, Soroush Vosoughi.
*International Conference on Learning Representations (**ICLR**), 2024.*
Note: Co-first author Jia was a master student who was mentored by me. Thanks Jia.

Mitigating Emergent Robustness Degradation on Graphs while Scaling-up
{Xiangchi Yuan, **Chunhui Zhang**}, Yijun Tian, Yanfang Ye, et al.
*International Conference on Learning Representations (**ICLR**), 2024.*
Note: Co-first author Yuan was a master student who was mentored by me. Thanks Yuan.

Graph Mixed Supervised Learning via Generalized Knowledge
Xiangchi Yuan, Yijun Tian, **Chunhui Zhang**, Yanfang Ye, Nitesh V Chawla, et al.
*ACM SIGKDD International Conference on Knowledge Discovery and Data Mining (**KDD**), 2024.*

GCVR: Reconstruction from Cross-View Enable Sufficient and Robust Graph Contrastive Learning
Qianlong Wen, Zhongyu Ouyang, **Chunhui Zhang**, Yiyue Qian, Chuxu Zhang, Yanfang Ye
*The Conference on Uncertainty in Artificial Intelligence (**UAI**), 2024.*

Symbolic Prompt Tuning Completes the App Promotion Graph
Zhongyu Ouyang, **Chunhui Zhang**, Shifu Hou, Shang Ma, Chaoran Chen, Toby Li, Xusheng Xiao, et al.
European Conference on Machine Learning and Principles and Practice of Knowledge Discovery in Databases (ECML PKDD), 2024

How to Improve Representation Alignment and Uniformity in Graph-based Collaborative Filtering?
Zhongyu Ouyang, **Chunhui Zhang**, Shifu Hou, Chuxu Zhang, Yanfang Ye
*International AAAI Conference on Web and Social Media (**ICWSM**), 2024.*

Breaking the Trilemma of Privacy, Utility, and Efficiency via Controllable Machine Unlearning
{Zheyuan Liu, Guangyao Dou}, Yijun Tian, **Chunhui Zhang**, Eli Chien, Ziwei Zhu
*ACM International World Wide Web Conference (**WWW**/**TheWebConf**), 2024.*

When Sparsity Meets Contrastive Models: Less Data Can Bring Better Class-Balanced Representations
Chunhui Zhang, Chao Huang, Yijun Tian, Qianlong Wen, et al.

*International Conference on Machine Learning (**ICML**), 2023.* AAAI-DCAA 2023 Best Paper Runner-up Award

Chasing All-Round Graph Representation Robustness: Model, Training, and Optimization
Chunhui Zhang, Yijun Tian, Mingxuan Ju, Zheyuan Liu, et al.
*International Conference on Learning Representations (**ICLR**), 2023.*

Mind the Gap: Mitigating the Distribution Gap in Graph Few-shot Learning
Chunhui Zhang, Hongfu Liu, Jundong Li, Yanfang Ye, et al.
*Transactions on Machine Learning Research (**TMLR**), 2023.*

Fair Graph Representation Learning via Diverse Mixture-of-Experts
{Zheyuan Liu, **Chunhui Zhang**}, Yijun Tian, Erchi Zhang, et al.
*ACM International World Wide Web Conference (**WWW**/**TheWebConf**), 2023.*
Note: Co-first author Liu (in alphabetical order) was an undergraduate who was mentored by me. Thanks Liu.

Boosting Graph Neural Networks via Adaptive Knowledge Distillation
Zhichun Guo, **Chunhui Zhang**, Yujie Fan, Yijun Tian, et al.
*AAAI Conference on Artificial Intelligence (**AAAI**), 2023.*

Heterogeneous Graph Masked Autoencoders
Yijun Tian, Kaiwen Dong, **Chunhui Zhang**, et al.
*AAAI Conference on Artificial Intelligence (**AAAI**), 2023.*

Heterogeneous Temporal Graph Neural Network Explainer
Jiazheng Li, **Chunhui Zhang**, Chuxu Zhang.
*ACM International Conference on Information and Knowledge Management (**CIKM**), 2023.*

Label-invariant Augmentation for Semi-Supervised Graph Classification
Han Yue, **Chunhui Zhang**, Chuxu Zhang, and Hongfu Liu.
*Conference on Neural Information Processing Systems (**NeurIPS**), 2022.*

Co-Modality Imbalanced Graph Contrastive Learning
Yiyue Qian, **Chunhui Zhang**, Yiming Zhang, Qianlong Wen, Yanfang Ye, et al.

*Conference on Neural Information Processing Systems (**NeurIPS**), 2022.*

Look Twice as Much as You Say: Scene Graph Contrastive Learning for Self-Supervised Image Caption Generation
Chunhui Zhang, Chao Huang, Youhuan Li, Xiangliang Zhang, Yanfang Ye, et al.
*ACM International Conference on Information and Knowledge Management (**CIKM**), 2022.*

GraphBERT: Bridging Graph and Text for Malicious Behavior Detection on Social Media
Jiele Wu, **Chunhui Zhang**, Zheyuan Liu, Erchi Zhang, Steven Wilson, et al.
*IEEE International Conference on Data Mining (**ICDM**), 2022.*

Towards Tailored Models on Private AIoT Devices: Federated Direct Neural Architecture Search
Chunhui Zhang, Xiaoming Yuan, Qianyun Zhang, Guangxu Zhu, Lei Cheng, and Ning Zhang.
*IEEE Internet of Things Journal (**IEEE-IoTJ**)*, Feb. 2022.

Honors and scholarships

ACL Oral Presentation Award	2024
Graduate School of Arts and Sciences Fellowship	2021 – 2023
GSAS Ph.D. Student Conference Award	2023
Travel and Research Grant	2022
CIKM Travel Grant Award	2022
AAAI-DCAA Best Paper Runner-up Award	2023

Teaching experience

Teaching Assistant, Computer Science, Brandeis Fall 2021 & Spring 2023
CS 133A: Graph Mining
Graphs are capable of modeling complex social, technological, and biological systems. This course covers the core concepts, models, and algorithms of graph mining.

Teaching Assistant, Computer Science, Brandeis Spring & Fall 2022
CS 165B: Deep Learning
This course covers the core methods and algorithms of deep learning techniques.

Service and outreach

Program Committee/Conference Reviewer

NeurIPS 2023, NeurIPS Datasets and Benchmarks track 2023, AAAI 2023, Learning on Graphs 2023, NeurIPS 2022, CIKM 2022, ICDM 2022, IEEE HPCC 2020

Journal Reviewer

IEEE Transactions on Knowledge and Data Engineering, IEEE Transactions on Network Science and Engineering, ACM Transactions on Intelligent Systems and Technology, Neurocomputing, Big Data