

# Hejie Cui

Postdoctoral  
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## Research Interests

**AI for Health:** Large language models and large vision-language models for biomedical informatics and healthcare applications.

**Multimodal Structured Knowledge Extraction:** knowledge extraction with large models from images, texts, tabular data, etc.

**Data Science and Data Mining:** data mining, health data science.

## Education

**Emory University**, Atlanta, GA, USA Sept 2019 – May 2024

Ph.D., Department of Computer Science

Advisor: [Prof. Carl J. Yang](#)

Laney-EDGE Graduate School Diverse Scholars in the Sciences, 2023 EECS Rising Star

Thesis Title: *AI-Assisted Healthcare with Multimodal Structured Knowledge Extraction and Augmented Reasoning*

Thesis Committee: Dr. Carl J. Yang (Emory), Dr. Joyce C Ho (Emory), Dr. Yana Bromberg (Emory), Dr. Fei Wang (Cornell)

**Emory University**, Atlanta, GA, USA Sept 2019 – Dec 2022

Master of Science in Computer Science, in the Middle of PhD Program

**Tongji University**, Shanghai, CHINA Sept 2015 – Jul 2019

B.E., School of Software Engineering

Advisor: [Prof. Lin Zhang](#)

Summa cum laude, Valedictorian

GPA: 4.96/5.0, Rank: 1/164

## Professional Experience

**Microsoft Research**, Redmond, WA, USA May 2023 – Aug 2023

Research Intern @ Augmented Learning and Reasoning Group

Worked on serendipity chat message recommendations for the Teams platform.

**Amazon**, Seattle, WA, USA May 2022 – Aug 2022

Applied Scientist Intern @ Product Knowledge Graph Team

Worked on attribute information extraction from texts and images on the Amazon shopping platform.

**Google**, Remote Jan 2022 – Apr 2022

Google's CS Research Mentorship Program

Research on graph neural networks for retrieval and recommendation on social networks.

**Emory University**, Atlanta, GA, USA Dec 2019 – May 2020

Rotation RA @ Information Retrieval Lab

Worked on COVID-19 literature document retrieval.

**Sensetime Research**, Beijing, CHINA Dec 2018 – Jul 2019

Research Intern @ Intelligent Health Team

Worked on pulmonary vessel segmentation for 3D chest CT images.

**Queens University**, Kingston, ON, CANADA Jul 2018 – Oct 2018

Research Intern @ Perk Lab (The Laboratory for Percutaneous Surgery)

Worked on real-time web-cam video images classification.

Advisor: [Prof. Gabor Fichtinger](#)

**Microsoft**, Beijing, CHINA Aug 2017 – Aug 2017

Visiting Student @ Microsoft Research Asia

Worked on HoloLens mixed reality applications.

Best work award for university summer camp Hackathon.

## Honors and Awards

2023 EECS Rising Star	2023
NSF Student Travel Support Award for ICDM	2023
KDD Student Travel Award	2023
CHIL Student Travel Award	2023
NeurIPS AI4Science Workshop Travel Award	2022
Emory University Laney Graduate Student Council Research Grant	2022
NSF Student Travel Grant Award for CIKM	2022
MICCAI Student Travel Grant Award	2022
Award for CRA-WP Grad Cohort for Women	2021
Mitacs Globalink Research Award	2018
Valedictorian of the School of Software Engineering Class 2019, Tongji University	2019
Outstanding Graduates Award, the City of Shanghai	2019
Outstanding Graduates Award, Tongji University	2019
Best Work Award for Microsoft Student Camp Hackathon	2017
MCM: American Mathematical Contest in Modeling (Meritorious Winner)	2017
Tongji University Programming Competition (Silver Prize)	2017
National Scholarship	2017,2018,2019

## Publications [Google Scholar]

### Tutorials

- [ISBI 2024]      **Brain Network Analysis with Graph Neural Network**  
Hejie Cui, Xuan Kan, Ying Guo, Xiaoxiao Li, Lifang He, Liang Zhan, Carl Yang  
*IEEE International Symposium on Biomedical Imaging (ISBI), Tutorials, 2024*
- [ICIBM 2023]      **Brain Network Analysis with Graph Neural Network**  
Hejie Cui, Xuan Kan, Xiaoxiao Li, Lifang He, Liang Zhan, Ying Guo, Carl Yang  
*International Conference on Intelligent Biology and Medicine (ICIBM), Tutorials, 2023*

### Peer-Reviewed Publications

- [AMIA 2024]      **LLMs-based Few-Shot Disease Predictions using EHR: A Novel Approach Combining Predictive Agent Reasoning and Critical Agent Instruction**  
Hejie Cui, Zhuocheng Shen, Jieyu Zhang, Hui Shao, Lianhui Qin, Joyce C Ho, Carl Yang  
*American Medical Informatics Association Annual Symposium, (AMIA-Annual Symposium), 2024*
- [ACL 2024]      **Knowledge-Infused Prompting: Assessing and Advancing Clinical Text Data Generation with Large Language Models**  
Ran Xu, Hejie Cui, Yue Yu, Xuan Kan, Wenqi Shi, Yuchen Zhuang, Wei Jin, Joyce Ho, Carl Yang  
*Annual Meeting of the Association for Computational Linguistics (ACL-Findings), 2023*  
*NeurIPS Workshop on SyntheticData4ML, 2023*
- [KDD 2024]      **TACCO: Task-guided Co-clustering of Clinical Concepts and Patient Visits for Disease Subtyping based on EHR Data**  
Ziyang Zhang, Hejie Cui, Ran Xu, Yuzhang Xie, Joyce C Ho, Carl Yang  
*ACM SIGKDD International Conference on Knowledge Discovery and Data Mining (KDD), 2024*
- [ISBI 2024]      **Multi-task Learning for Brain Connectome Analysis in the ABCD study**  
Xuan Kan, Hejie Cui, Keqi Han, Ying Guo, Carl Yang  
*IEEE International Symposium on Biomedical Imaging (ISBI), 2024*
- [IC2S2 2024]      **Network Recall by Large Language Models**  
Yanbang Wang, Hejie Cui, Jon Kleinberg  
*International Conference on Computational Social Science, (IC2S2), Oral, 2024*

- [SPIE 2024] **Federated Learning for Cross-Institution Brain Network Analysis**  
Han Xie, Yi Yang, **Hejie Cui**, Carl Yang  
*Proceedings of the SPIE Medical Imaging Conference (SPIE)*, **Oral**, 2024
- [NeurIPS 2023] **Open Visual Knowledge Extraction via Relation-Oriented Multimodality Model Prompting**  
**Hejie Cui**, Xinyu Fang, Zihan Zhang, Ran Xu, Xuan Kan, Xin Liu, Manling Li, Yangqiu Song, Carl Yang  
*Neural Information Processing Systems (NeurIPS)*, 2023  
*ICML Workshop of Knowledge and Logical Reasoning in the Era of Data-driven Learning*, 2023
- [PSB 2024] **BrainSTEAM: A Practical Pipeline for Connectome-based fMRI Analysis towards Subject Classification**  
Alexis Li (Mentored High-Schooler), Owen Yang, **Hejie Cui**, Carl Yang  
*Pacific Symposium on Biocomputing (PSB)*, **Oral**, 2024
- [PSB 2024] **FedBrain: Federated Training of GNNs for Connectome-based Brain Imaging Analysis**  
Yi Yang, Han Xie, **Hejie Cui**, Carl Yang  
*Pacific Symposium on Biocomputing (PSB)*, 2024
- [IEEE-BHI 2023] **Dynamic Brain Transformer with Multi-Level Attention for Functional Brain Network Analysis**  
Xuan Kan, Tony Gu, **Hejie Cui**, Ying Guo, Carl Yang  
*International Conference on Biomedical and Health Informatics (IEEE-BHI)*, 2023
- [KDD 2023] **R-Mixup: Riemannian Mixup for Biological Networks**  
Xuan Kan, Zimu Li, **Hejie Cui**, Yue Yu, Ran Xu, Shaojun Yu, Zilong Zhang, Ying Guo, Carl Yang  
*ACM SIGKDD International Conference on Knowledge Discovery and Data Mining (KDD)*, 2023
- [ACL 2023] **PV2TEA: Patching Visual Modality to Textual-Established Information Extraction**  
**Hejie Cui**, Rongmei Lin, Nasser Zalmout, Chenwei Zhang, Jingbo Shang, Carl Yang, Xian Li  
*Annual Meeting of the Association for Computational Linguistics (ACL-Findings)*, 2023  
*KDD Workshop on Knowledge Augmented Methods for NLP (KnowledgeNLP)*, **Oral**, 2023
- [CHIL 2023] **PTGB: Pre-Train Graph Neural Networks for Brain Network Analysis**  
Yi Yang, **Hejie Cui**, Carl Yang  
*The Conference on Health, Inference, and Learning (CHIL)*, **Oral**, 2023
- [ISBI 2023] **Deep DAG Learning of Effective Brain Connectivity for fMRI Analysis**  
Yue Yu, Xuan Kan, **Hejie Cui**, Ran Xu, Yujia Zheng, Xiangchen Song, Yanqiao Zhu, Kun Zhang, Razieh Nabi, Ying Guo, Chao Zhang, Carl Yang  
*IEEE International Symposium on Biomedical Imaging (ISBI)*, 2023  
Extended Abstract accepted to the IEEE International Conference on Big Data
- [ISBI 2023] **Transformer-based Hierarchical Clustering for Brain Network Analysis**  
Wei Dai, **Hejie Cui**, Xuan Kan, Ying Guo, Sanne van Rooij, Carl Yang  
*IEEE International Symposium on Biomedical Imaging (ISBI)*, 2023  
Extended Abstract accepted to the IEEE International Conference on Big Data
- [AAAI 2023] **Neighborhood-regularized Self-Training for Learning with Few Labels**  
Ran Xu, Yue Yu, **Hejie Cui**, Xuan Kan, Yanqiao Zhu, Joyce C. Ho, Chao Zhang, Carl Yang  
*International Conference on Artificial Intelligence (AAAI)*, **Oral**, 2023
- [IEEE TMI] **BrainGB: A Benchmark for Brain Network Analysis with Graph Neural Networks**  
**Hejie Cui**, Wei Dai, Yanqiao Zhu, Xuan Kan, Antonio Aodong Chen Gu, Joshua Lukemire, Liang Zhan, Lifang He, Ying Guo, Carl Yang  
*IEEE Transactions on Medical Imaging (TMI)*, **IF: 11.037, 167 GitHub Stars**, 2022
- [BIBM 2022] **Multi-View Brain Network Analysis with Cross-View Missing Network Generation**  
Gongxu Luo, Chenyang Li, **Hejie Cui**, Lichao Sun, Lifang He, Carl Yang  
*IEEE International Conference on Bioinformatics and Biomedicine (BIBM)*, 2022
- [NeurIPS 2022] **Brain Network Transformer**  
Xuan Kan, Wei Dai, **Hejie Cui**, Zilong Zhang, Ying Guo, Carl Yang

- [CIKM 2022] **On Positional and Structural Node Features for Graph Neural Networks on Non-attributed Graphs**  
Hejie Cui, Zijie Lu, Pan Li, Carl Yang  
*International Conference on Information and Knowledge Management (CIKM Short), **Spotlight**, 2022*  
**Most Influential CIKM Paper of 2022**
- [KDD 2022] **Data-Efficient Brain Connectome Analysis via Multi-Task Meta-Learning**  
Yi Yang\*, Yanqiao Zhu\*, Hejie Cui, Xuan Kan, Lifang He, Ying Guo, Carl Yang  
*ACM SIGKDD International Conference on Knowledge Discovery and Data Mining (KDD), 2022*
- [MICCAI 2022] **Interpretable GNNs for Connectome-Based Brain Disorder Analysis**  
Hejie Cui, Wei Dai, Yanqiao Zhu, Xiaoxiao Li, Lifang He, Carl Yang  
*International Conference on Medical Image Computing & Computer-Assisted Intervention (MICCAI), **Oral**, 2022*
- [EMBC 2022] **Joint Embedding of Structural and Functional Brain Networks with Graph Neural Networks for Mental Illness Diagnosis**  
Yanqiao Zhu, Hejie Cui, Lifang He, Lichao Sun, Carl Yang  
*International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC), 2022*
- [MIDL 2022] **FBNetGen: Task-aware GNN-based fMRI Analysis via Functional Brain Network Generation**  
Xuan Kan, Hejie Cui, Joshua Lukemire, Ying Guo, Carl Yang  
*International Conference on Medical Imaging with Deep Learning (MIDL), **Oral**, 2022*
- [SDM 2022] **Structure-Aware Hard Negative Mining for Heterogeneous Graph Contrastive Learning**  
Yanqiao Zhu, Yichen Xu, Hejie Cui, Carl Yang, Qiang Liu, Shu Wu  
*SIAM International Conference on Data Mining (SDM), 2022*
- [ECIR 2022] **How Can Graph Neural Networks Help Document Retrieval: A Case Study on COVID-19 with Concept Map Generation**  
Hejie Cui, Jiaying Lu, Yao Ge, Carl Yang  
*The European Conference on Information Retrieval (ECIR Short), 2022*
- [ECML 2021] **Zero-Shot Scene Graph Relation Prediction through Commonsense Knowledge Integration**  
Xuan Kan, Hejie Cui, Carl Yang  
*The European Conference on Machine Learning and Principles and Practice of Knowledge Discovery in Databases (ECML-PKDD), 2021*
- [MICCAI 2019] **Pulmonary Vessel Segmentation based on Orthogonal Fused U-Net++ of Chest CT Images**  
Hejie Cui, Xinglong Liu, Ning Huang  
*International Conference on Medical Image Computing and Computer-Assisted Intervention (MICCAI), 2019*
- [ICBC 2018] **A Method to Predict the Performance and Storage of Executing Contract for Ethereum Consortium-Blockchain**  
Huijuan Zhang, Chengxin Jin, Hejie Cui  
*IEEE International Conference on Blockchain (ICBC), 2018*

### **Preprints and Workshop**

- [Preprint] **Biomedical Visual Instruction Tuning with Clinician Preference Alignment**  
Hejie Cui, Lingjun Mao, Xin Liang, Jiayu Zhang, Hui Ren, Quanzheng Li, Xiang Li, Carl Yang  
*Under Review*
- [Preprint] **Microstructures and Accuracy of Graph Recall by Large Language Models**  
Yanbang Wang, Hejie Cui, Jon Kleinberg  
*Under Review*
- [Preprint] **A Survey on Knowledge Graphs for Healthcare: Resources, Applications, and Promises**

**Hejie Cui**, Jiaying Lu, Shiyu Wang, Ran Xu, Wenjing Ma, Shaojun Yu, Yue Yu, Xuan Kan, Chen Ling, Joyce Ho, Fei Wang, Carl Yang  
*ICML Workshop on Interpretable Machine Learning in Healthcare, 2023*  
*Under Review*

**[Preprint]** **Domain Specialization as Key to Make Large Language Models Disruptive: A Comprehensive Survey**  
Chen Ling, Xujiang Zhao, Jiaying Lu, Chengyuan Deng, Can Zheng, Junxiang Wang, Tanmoy Chowdhury, Yun Li, **Hejie Cui**, Xuchao Zhang, Tianjiao Zhao, Amit Panalkar, Wei Cheng, Haoyu Wang, Yanchi Liu, Zhengzhang Chen, Haifeng Chen, Chris White, Quanquan Gu, Jian Pei, Liang Zhao  
**Honorably mentioned by the 2024 Economic Report of the President from the White House**  
*Under Review*

**[Preprint]** **Multimodal Fusion of EHR in Structures and Semantics: Integrating Clinical Records and Notes with Hypergraph and LLM**  
**Hejie Cui**, Xinyu Fang, Ran Xu, Xuan Kan, Joyce C Ho, Carl Yang  
*On arXiv*

## Talks & Presentations

### *Invited Talks*

Rising Star Spotlight Speaker [Title TBD]	University of Michigan AI Symposium 2024
Advancing Healthcare with Multimodal Structural Knowledge	Stanford/UCLA/Harvard 2023
Serendipitous Recommendation over Communication Graph via Group Fairness	Microsoft Research 2023
Introduction to Multimodal Learning and Knowledge Acquisition	Amazon Inc. 2022
GNNs for Brain Network	University of Rochester 2022
Effective GNNs for Multimodality Graph Mining	Microsoft AI 2022

### *Conference & Workshop Oral Presentations*

PV2TEA: Patching Visual Modality to Textual-Established Information Extraction	KnowledgeNLP-KDD'23
PTGB: Pre-Train Graph Neural Networks for Brain Network Analysis	CHIL'23
Interpretable GNNs for Connectome-Based Brain Disorder Analysis	MICCAI'22
BrainNNExplainer	Interpretable Machine Learning in Healthcare ICML'21
Node Feature Choice for GNNs on Non-attributed Graphs	Deep Learning on Graphs KDD'21

## Open-Source Projects

### **BrainGB** [\[Link\]](#)

The first benchmark for brain network analysis with graph neural networks.  
With a Python pip package, tutorials, and [benchmark website](#).  
Received 167 GitHub stars.

## Teaching Experience

CS 253 Data Structures and Algorithms, Exercise Lesson Instructor and Head TA	Spring 2021
CS 584 Natural Language Processing for Biomedical Applications, Head TA	Fall 2020
CS 584 Deep Learning, Head TA	Spring 2020

## Mentoring

Alexis Li (Female), Senior High School Student in Hamilton High School at Chandler Co-authored paper: PSB'24	08/2022 – 03/2023
David Dai, Undergraduate in Emory, Master in Stanford Co-authored paper: MICCAI'22, ISBI'23	05/2021 – 11/2022
Owen Yang, Undergraduate in Emory, PhD in Duke Co-authored paper: KDD'22, CHIL'23, PSB'24	02/2022 – Present

Tony Gu, Undergraduate at Georgia Institute of Technology  
Co-authored paper: TMI, IEEE-BHI'23

01/2022 – 08/2023

Xinyu Fang, Undergraduate at Tongji University  
Co-authored paper: NeurIPS'23, ICML-KLR'23

05/2022 – Present

## **Services**

### **Program Committee Member | Reviewer**

International Conference on Machine Learning ( <b>ICML</b> )	Since 2024
Annual Meeting of the Association for Computational Linguistics ( <b>ACL</b> )	Since 2024
The International Conference on Learning Representations ( <b>ICLR</b> )	Since 2024
Conference on Health, Inference, and Learning ( <b>CHIL</b> )	Since 2023
International Conference on Learning Representations ( <b>ICLR</b> )	Since 2023
Machine Learning for Health ( <b>ML4H</b> )	Since 2023
Conference on Neural Information Processing Systems ( <b>NeurIPS</b> )	Since 2023
ACM SIGKDD Conference on Knowledge Discovery and Data Mining ( <b>SIGKDD</b> )	Since 2022
International Conference on Data Mining ( <b>ICDM</b> )	Since 2022
The Web Conference ( <b>WWW</b> )	2022
Conference on Artificial Intelligence, Main Track and Social Impact Track ( <b>AAAI</b> )	2022
International Conference on Medical Image Computing and Computer Assisted Intervention ( <b>MICCAI</b> )	Since 2020
SIAM International Conference on Data Mining ( <b>SDM</b> )	2022
Learning on Graphs Conference ( <b>LOG</b> )	2022
Medical Image Analysis ( <b>MIA</b> )	Since 2023
IEEE Transactions on Medical Imaging ( <b>TMI</b> )	Since 2022
IEEE Transactions on Knowledge and Data Engineering ( <b>TKDE</b> )	Since 2022
IEEE Transactions on Big Data ( <b>Big Data</b> )	Since 2021
NeurIPS Workshop on Generative AI & Biology	2023
ICML Workshop on Knowledge and Logical Reasoning in the Era of Data-driven Learning	2023
NeurIPS Workshop on AI for Science: Progress and Promises	2022
NeurIPS Workshop on Temporal Graph Learning	2022
CIKM Workshop on Federated Learning with Graph Data	2022
ICML Workshop on Interpretable Machine Learning in Healthcare	Since 2021
ICCV Workshop on Computer Vision for Automated Medical Diagnosis	2021

### **Workshop Organizer**

IEEE BigData Workshop on Neural Networks for Brain Connectome Analysis: Theories, Methods, and Applications	2022
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### **Volunteer**

Conference on Health, Inference, and Learning ( <b>CHIL</b> )	2023
Conference on Information and Knowledge Management ( <b>CIKM</b> )	2022
International Conference on Machine Learning ( <b>ICML</b> )	2021, 2020

### **Diversity, Equity, and Inclusion (DEI)**

Emory Laney-EDGE Graduate School Diverse Scholars in the Sciences  
Member of Emory OpenBMI  
Member of Emory ACM-W Women in Computing Chapter