

Ziniu Hu |

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Education

University of California, Los Angeles

Ph.D. in Computer Science

Advisor: Prof. Yizhou Sun, Co-Advisor: Prof. Kai-Wei Chang

Los Angeles, USA

Sep. 2018 – Apr. 2023 (expected)

Peking University

B.Sc. in Computer Science

Beijing, China

Sep. 2014 – Jun. 2018

Research Interests

My ultimate research goal is to build **Differentiable Neural-Symbolic Reasoning Systems** that have the ability to conduct complex reasoning and could be trained in end-to-end manner. Specifically, I worked on:

- **Designing Reasoning Modules** of Knowledge Graph Reasoning [1, 4] and complex logical reasoning [3]
- **Learning via Self-Supervision** from Structural Knowledge (e.g., Graph and Knowledge Base) [5, 7, 12]
- **Improving Generalization** for Out-of-Distribution [2], Out-of-Vocabulary [9] and Cross-Lingual [10] tasks.

Selected Honors and Awards

2022: **Best Paper Award, SoCal NLP Symposium 2022**

2022: NeurIPS 2022 Top Reviewers (Top 8%)

2021: Baidu PhD Fellowship (10 Chinese PhD students worldwide, 200,000 ¥)

2021: Amazon PhD Fellowship (50,000 \$)

2021: Top 100 Chinese Rising Stars in AI field

2020: **Best Student Paper Award, KDD 2020 Workshop (Deep Learning on Graphs)**

2019: **Best Full Paper Award, WWW 2019**

2017: SenseTime Scholarship (30 Chinese Undergraduate students in AI field)

2016: May Forth Scholarship of Peking University

2014: First Prize of Chinese Physics Olympiad

Selected Representative Publications

1. **Empowering Language Models with Knowledge Graph Reasoning for Question Answering**
 - [Ziniu Hu](#), Yichong Xu, Shuohang Wang, Ziyi Yang, Chengguang Zhu, Kai-Wei Chang, Yizhou Sun
 - EMNLP 2022 (Conference on Empirical Methods in Natural Language Processing)
 - **Best Paper Award at SoCal NLP Symposium 2022**
2. **Improving Multi-Task Generalization via Regularizing Spurious Correlation**
 - [Ziniu Hu](#), Zhe Zhao, Xinyang Yi, Tiansheng Yao, Lichan Hong, Yizhou Sun, Ed H Chi
 - NeurIPS 2022 (Conference on Neural Information Processing Systems)
 - **Spotlight Presentation (537 out of 9634). Used in Google Product (Youtube Shorts Recommendation)**
3. **Fuzzy Logic based Logical Query Answering on Knowledge Graphs**
 - Xuelu Chen, [Ziniu Hu](#), Yizhou Sun
 - AAAI 2022 (AAAI Conference on Artificial Intelligence). Previously on ICML 2021 SSL Workshop.
4. **Heterogeneous Graph Transformer**
 - [Ziniu Hu](#), Yuxiao Dong, Kuansan Wang, Yizhou Sun
 - WWW 2020 (The Web Conference), **Most cited paper in WWW'20.**
 - **Used in Microsoft (Academic & Microsoft graph) and Meta products**, 500+ Stars on Github
5. **GPT-GNN: Generative Pre-Training of Graph Neural Networks**
 - [Ziniu Hu](#), Yuxiao Dong, Kuansan Wang, Kai-Wei Chang, Yizhou Sun
 - KDD 2020 (Conference on Knowledge Discovery and Data Mining)
 - **Oral Presentation, Used in Meta Product**, 300+ Stars on Github
6. **Layer-Dependent Importance Sampling for Training Deep and Large Graph Convolutional Networks**
 - Difan Zou*, [Ziniu Hu](#)* (equal contribution), Yewen Wang, Song Jiang, Yizhou Sun, Quanquan Gu
 - NeurIPS 2019 (Conference on Neural Information Processing Systems).

7. **Relation-Guided Pre-Training for Open-Domain Question Answering**
 - [Ziniu Hu](#), Yizhou Sun, Kai-Wei Chang
 - **EMNLP-Finding 2021** (Conference on Empirical Methods in Natural Language Processing)
8. **Unbiased LambdaMART: An Unbiased Pairwise Learning-to-Rank Algorithm**
 - [Ziniu Hu](#), Yang Wang, Qu Peng, Hang Li
 - **WWW 2019** (The Web Conference).
 - **Used in ByteDance's search engine (Tiktok & Toutiao) with US Patent**, 200+ Stars on Github
9. **Few-Shot Representation Learning for Out-Of-Vocabulary Words**
 - [Ziniu Hu](#), Ting Chen, Kai-Wei Chang, Yizhou Sun
 - **ACL 2019** (Annual Conference of the Association for Computational Linguistics).
10. **Emoji-Powered Representation Learning for Cross-Lingual Sentiment Classification**
 - Zhenpeng Chen, Sheng Shen, [Ziniu Hu](#), Xuan Lu, Qiaozhu Mei, Xuanzhe Liu
 - **WWW 2019** (The Web Conference)
 - **Best Full Paper Award (2 out of 1247)**
11. **Listening to Chaotic Whispers: Deep Learning Framework for News-oriented Stock Trend Prediction**
 - [Ziniu Hu](#), Weiqing Liu, Jiang Bian, Xuanzhe Liu, Tie-Yan Liu
 - **WSDM 2018** (Conference on Web Search and Data Mining), **Transferred to a WIPO Patent.**
12. **ReVeaL: Retrieval-Augmented Visual Language Pre-Training with Multimodal Knowledge Memory**
 - [Ziniu Hu](#), Ahmet Iscen, Chen Sun, Zirui Wang, Kai-Wei Chang, Yizhou Sun, Cordelia Schmid, David A Ross, Alireza Fathi
 - Under Submission.

Other Publications

1. **Real-Time Continual Learning with Uncertainty-Aware Memory**
 - [Ziniu Hu](#), Jason Cong, Yizhou Sun
 - Under Submission.
2. **Survey on Graph Neural Network Acceleration: Algorithms, Systems, and Customized Hardware**
 - Shichang Zhang, [Ziniu Hu](#), Atefeh Sohrabizadeh, Yewen Wang, Linghao Song, Jason Cong, Yizhou Sun
 - Under Submission.
3. **Zero-shot Domain Adaptation of Heterogeneous Graphs via Knowledge Transfer Networks**
 - Minji Yoon, John Palowitch, Dustin Zelle, [Ziniu Hu](#), Ruslan Salakhutdinov, Bryan Perozzi
 - **NeurIPS 2022** (Conference on Neural Information Processing Systems)
4. **Broaden the Vision: Geo-Diverse Visual Commonsense Reasoning**
 - Da Yin, Liunian Harold Li, [Ziniu Hu](#), Nanyun Peng, and Kai-Wei Chang
 - **EMNLP 2021** (Conference on Empirical Methods in Natural Language Processing)
 - **Oral Presentation (249 out of 2540)**
5. **Motif-Driven Contrastive Learning of Graph Representations**
 - Shichang Zhang*, [Ziniu Hu](#)* (equal contribution), Arjun Subramonian, Yizhou Sun
 - **WWW 2021 Workshop** (Self-Supervised Learning for the Web)
6. **Heterogeneous Network Representation Learning**
 - Yuxiao Dong, [Ziniu Hu](#), Kuansan Wang, Yizhou Sun, Jie Tang
 - **IJCAI 2020** (International Joint Conference on Artificial Intelligence).
7. **Improving Neural Language Generation with Spectrum Control**
 - Lingxiao Wang, Jing Huang, [Ziniu Hu](#), Kevin Huang, Guangtao Wang, Quanquan Gu
 - **ICLR 2020** (International Conference on Learning Representations).
8. **Fast Adaptation for Cold-start Collaborative Filtering with Meta-learning**
 - Tianxin Wei, Ziwei Wu, Ruirui Li, [Ziniu Hu](#), Fuli Feng, Xiangnan He, Yizhou Sun, and Wei Wang
 - **ICDM 2020** (International Conference on Data Mining).
9. **Demystifying Graph Neural Networks with Graph Filter Assessment**
 - Yewen Wang, [Ziniu Hu](#), Yusong Ye, Yizhou Sun
 - **KDD 2020 workshop** (Deep Learning on Graphs (KDD-DLG)), **Best Student Paper Award**
10. **Unsupervised Pre-Training of Graph Convolutional Networks**
 - [Ziniu Hu](#), Changjun Fan, Ting Chen, Kai-Wei Chang, Yizhou Sun
 - **ICLR 2019 workshop** (Representation Learning on Graphs and Manifolds)
11. **Paladin: Automated Generation of Reproducible Test Cases for Android Apps.**
 - Yun Ma, Yangyang Huang, [Ziniu Hu](#), Xusheng Xiao, Xuanzhe Liu
 - **HotMobile 2019** (International Workshop on Mobile Computing Systems and Applications).
12. **FaceOff: Assisting the Manifestation Design of Web Graphical User Interface.**

- Shuyu Zheng, [Ziniu Hu](#), Yun Ma
- **WSDM 2019 Demo** (Conference on Web Search and Data Mining).
- 13. **Aladdin: Automating Release of Deep-Link APIs on Android**
 - Yun Ma, [Ziniu Hu](#), Yunxin Liu, Tao Xie, Xuanzhe Liu
 - **WWW 2018** (The Web Conference).
- 14. **Through the Castle Tunnels: Empirical Analysis of Inter-App Navigation of Android Apps**
 - Xuanzhe Liu, [Ziniu Hu](#), Yun Ma, Qiaozhu Mei
 - **TWEB** (ACM Transactions on the Web).

Teaching Experience

- **Lead Teaching Assistant for UCLA CS 249: Graph Neural Networks, 2021 Winter.**
 - Set up collaborative Github Repository and templates for students to write paper blog and project codes.
 - Summarize paper reading list and project topics. Lead the project discussion and evaluation.
- **Guest lecturer for UCLA EE 168: Computational Methods for Medical Imaging, 2020 Spring.**
 - Give two guest lectures about Deep Learning to EE audiences (without background knowledge about neural networks). Receive high feedback from audiences.
- **Teaching Assistant for UCLA CS 247: Advanced Data Mining, 2020 Spring.**
 - Design the whole set of homework (per week) using interactive Jupyter Notebook, implement all classical algorithms in a unified framework and ask students to re-implement some key components.
 - Design final project that solves real-world problems. Organize and lead the online discussion and explain knowledge taught in class. During TA office hour, explain many details to many attended students.
- **Teaching Assistant for UCLA CS 146: Introduction to Machine Learning, 2019 Fall.**
 - Hold a 40-student on-campus discussion course (2 hours per week), go over the knowledge taught in class with interactive demos and give students exercise. Receive high feedback scores (8 / 10) from my students for my teaching knowledge, concern, organization, scope and interaction.
 - One of my students commented: *"This TA was helpful and one of the only TAs that slowly went over again the concepts the instructor taught instead of simply going through the homework. He was very patient with students who did not understand the concepts and did well to reiterate difficult algorithms."*

Academic Services

- **Workflow Co-Chair for KDD 2023**
 - Helping PC Chair to set up conference website and submission portal. Recruit SPC and PC for reviewing. Set up and test paper-reviewer matching system.
 - Prepare reviewer recruiting form (with demographic survey) for each KDD paper author.
- **Program Committee / Reviewer:** ICML, Neurips, ICLR, KDD, ACL, EMNLP, AAAI, IJCAI, WWW, CIKM
 - Annual reviewer since 2019, reviewed for 100+ conference papers
 - Awarded NeurIPS 2022 Top Reviewers (Top 8%)
- **Journal Reviewer:** TKDE, TKDD, TOIS, TPAMI, TCS, TBD, JAIR
 - Reviewed for 20+ Journal papers
- **Reading Group Organizer @ UCLA-DM** from 2018 to 2022.
 - Organize paper reading group, determine the order for labmates to present interesting research papers.
 - Organize course reading group covering cutting-edge topics (e.g. Diffusion Model, LLM, Differential Geometry, Spectral Graph Theory, Graphical Model). I help find the topics, course materials and set up syllabus.
- **Server Administrator @ UCLA Scalable Analytics Institute (ScAi)** from 2021 to 2022.

Workshop Organization Experience

- **Program Committee Co-Chair : SSL @ WWW 2021** (Workshop on Self-Supervised Learning for the Web)
 - Recruit reviewers from different backgrounds with equal chances. Invite keynote speakers.
 - Arrange presentation time to make all speakers from different countries comfortable. Host the spotlight talks and discussion. The workshop attracts 20+ submissions and 500+ audiences.
- **Meta-Reviewer:** KnowledgeNLP @ AAAI 2023 (Workshop on Knowledge Augmented Methods for NLP)

Contributing Grants

- (NSF 1937599, Large): RTML: Acceleration to Graph-Based Machine Learning
- (NSF 1705169, Medium): StructNet: Constructing and Mining Structure-Rich Information Networks for Scientific Research

Industrial Experience

Google Research, Perception Team

Research Intern

Jun. 2022 – Sep. 2022

- Host: Alireza Fathi, Manager: Cordelia Schmid, David Ross
- Working on 'Knowledge/Memory Augmented Vision-Language Model Pre-Training'.
- Propose an end-to-end Retrieval-Augmented Visual Language Model (REVEAL) that learns to encode world knowledge into a large-scale memory, and to retrieve from it to answer knowledge-intensive queries. Achieves state-of-the-art results on visual question answering and image captioning. **The work is transferring to a US Patent.**

Google Research, Brain Team

Research Intern

Jun. 2021 – Sep. 2021

- Host: Zhe Zhao, Xinyang Yi and Tiansheng Yao, Manager: Ed H. Chi
- Working on 'Improving Multi-task Generalization via Causal Graph Regularization over Spurious Correlation'.
- We point out the unique challenges of spurious correlation problem in multi-task learning and propose a causal learning model to solve it. **Published one NeurIPS'22 Spotlight paper, and used in Google Youtube Shorts Recommendation.**

Microsoft Azure, Cognitive Service Research

Part-Time Researcher

Feb. 2022 – Jun. 2022

- Host: Yichong Xu, Manager: Chenguang Zhu
- Working on 'Empowering Large Language Model with Knowledge Graph Reasoning'.
- Add knowledge interaction layer amid Language Model blocks to conduct differentiable Knowledge Graph Reasoning. Achieve SOTA results on Open-Domain QA. **Published on EMNLP'22 and won best paper award at SoCal-NLP.**

Microsoft Research Redmond

Research Intern

Jun. 2019 – Sep. 2019

- Host: Yuxiao Dong, Manager: Kuansan Wang
- Worked on 'Pre-training Relational GNNs on Billion Scale Heterogeneous Network'.
- Design Heterogeneous Graph Transformer (HGT) for modelling dynamic and heterogeneous graphs. Pre-train it on billion-scale graph via self-supervised graph generation task. Published papers on KDD'20 and WWW'20 (most cited).
- HGT and GPT-GNN is deployed on Microsoft Graph and Facebook product, achieving significant improvement.

Bytedance AI Lab

Research Intern

Feb. 2018 – Aug. 2018

- Host: Hang Li
- Worked on 'Unbiased Pairwise Learning-to-rank'.
- Proposed a general framework of unbiased learning-to-rank in the pairwise setting, *Unbiased LambdaMart*. **Published a WWW'19 paper and a US Patent. Achieved 2.64% enhancement of Toutiao's first position click ratio.**

Microsoft Research Asia

Research Intern

Feb. 2017 – Aug. 2017

- Host: Jiang Bian and Weiqing Liu, Manager: Tie-Yan Liu
- Worked on 'News-based Deep Learning for Stock Trend Prediction'.
- Use online financial news to predict Chinese stock trend. Proposed a hybrid attention RNN architecture, and self-paced learning mechanism to deal with various noise. **Published a WSDM'18 paper and a WIPO Patent.**

References

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