

ENYAN DAI

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RESEARCH INTERESTS

Trustworthy Graph Neural Networks, Trustworthy AI for Science, Graph Foundation Model

EMPLOYMENT

Hong Kong University of Science and Technology (Guangzhou) 2024 – Present
Assistant Professor in Artificial Intelligence Thrust

EDUCATION

The Pennsylvania State University (PSU), State college, USA 2019 – 2024
Ph.D. in Information Sciences and Technology
Advisor: Dr. Suhang Wang

Catholic University of Leuven (KU Leuven), Leuven, Belgium 2017 – 2018
M.S. in Artificial Intelligence (Cum Laude)
Advisor: Dr. Marie-Francine Moens

University of Science and Technology of China (USTC), Hefei, China 2012 – 2016
B.S. in Mechanical Engineering

PUBLICATIONS

Summary

Until 6/14/2024, my google citation is 1032. My publications can be generally categorized into the following areas, and each category is attached with representative works:

- Fair graph model learning on protected sensitive attributes [17],[9],[12],[13]
 - **Enyan Dai**, and Suhang Wang. “Say No to the Discrimination: Learning Fair Graph Neural Networks with Limited Sensitive Attribute Information.” In Proceedings of 14th ACM International Conference on Web Search and Data Mining (**WSDM 2021**)
- Robustness of graph neural networks under adversarial attacks [5],[4],[10],[6],[3] label noises [14], and graph heterophily [8],[11],[26]
 - **Enyan Dai**, Jie Wei, Hui Liu, and Suhang Wang. “Towards Robust Graph Neural Networks for Noisy Graphs with Sparse Labels.” **Oral paper** In Proceedings of 15th ACM International Conference on Web Search and Data Mining (**WSDM 2022**)
 - **Enyan Dai**, Charu Aggarwal, and Suhang Wang. “NRGNN: Learning a Label Noise-Resistant Graph Neural Network on Sparsely and Noisily Labeled Graphs.” In Proceedings of 27th ACM SIGKDD International Conference on Knowledge Discovery & Data Mining (**KDD 2021**)
 - **Enyan Dai***, Minhua Lin*, Xiang Zhang, Suhang Wang. “Unnoticeable Backdoor Attacks on Graph Neural Networks.” In Proceedings of The Web Conference 2023 (**WWW 2023**)
- Privacy-preserving on graph-structured data [4],[9],[25],[27]
 - **Enyan Dai**, Limeng Cui, Zhengyang Wang, Xianfeng Tang, Yinhan Wang, Monica Chen, Bing Yin, Suhang Wang. “A Unified Framework of Graph Information Bottleneck for Robustness and Membership Privacy.” Accepted by 29th ACM SIGKDD International Conference on Knowledge Discovery & Data Mining (**KDD 2023**)

- Self-explainable graph neural networks [16], [23], [28]
 - **Enyan Dai**, and Suhang Wang. “Towards Self-Explainable Graph Neural Network.” In Proceedings of 30th ACM International Conference on Information and Knowledge Management (**CIKM 2021**)
- AI for social good applications [7],[15],[18],[21],[22],[24],[2]
 - **Enyan Dai**, and Jie Chen. “Graph-Augmented Normalizing Flows for Anomaly Detection of Multiple Time Series.” **Spotlight paper** in Proceedings of International Conference on Learning Representations (**ICLR 2022**)
 - **Enyan Dai**, Yiwei Sun and Suhang Wang. “Ginger Cannot Cure Cancer: Battling Fake Health News with a Comprehensive Data Repository.” In Proceedings of International AAAI Conference on Web and Social Media (**ICWSM 2020**)

Referred Peer-Reviewed Papers

- [1] **Enyan Dai**, Tianxiang Zhao, Huaisheng Zhu, Junjie Xu, Zhimeng Guo, Hui Liu, Jiliang Tang, and Suhang Wang. “A Comprehensive Survey on Trustworthy Graph Neural Networks: Privacy, Robustness, Fairness, and Explainability.” Published in Machine Intelligence Research
- [2] Shuotong Bai, Huaxiao Liu, **Enyan Dai**, Liu Lei. “Improving Issue-PR Link Prediction via Knowledge-aware Heterogeneous Graph Learning.” Published in IEEE Transactions on Software Engineering
- [3] Zhiwei Zhang, Minhua Lin, **Enyan Dai**, Suhang Wang. “Rethinking Graph Backdoor Attacks: A Distribution-Preserving Perspective.” Accepted by 30th ACM SIGKDD International Conference on Knowledge Discovery & Data Mining (**KDD 2024**)
- [4] **Enyan Dai**, Limeng Cui, Zhengyang Wang, Xianfeng Tang, Yinhan Wang, Monica Chen, Bing Yin, Suhang Wang. “A Unified Framework of Graph Information Bottleneck for Robustness and Membership Privacy.” In Proceedings of 29th ACM SIGKDD International Conference on Knowledge Discovery & Data Mining (**KDD 2023**)
- [5] **Enyan Dai***, Minhua Lin*, Xiang Zhang, Suhang Wang. “Unnoticeable Backdoor Attacks on Graph Neural Networks.” In Proceedings of The Web Conference 2023 (**WWW 2023**)
- [6] Minhua Lin, Teng Xiao, **Enyan Dai**, Suhang Wang. “Certifiably Robust Graph Contrastive Learning.” Accepted by 37th Conference on Neural Information Processing Systems (**NeurIPS 2023**)
- [7] **Enyan Dai**, and Jie Chen. “Graph-Augmented Normalizing Flows for Anomaly Detection of Multiple Time Series.” **Spotlight paper** in Proceedings of International Conference on Learning Representations (**ICLR 2022**)
- [8] **Enyan Dai**, Shijie Zhou, Zhimeng Guo, and Suhang Wang. “Label-Wise Graph Convolutional Network for Heterophilic Graphs.” In Proceedings of Learning On Graphs (**LOG 2022**)
- [9] **Enyan Dai**, Suhang Wang. “Learning Fair Graph Neural Networks with Limited and Private Sensitive Attribute Information.” Accepted by IEEE Transactions on Knowledge and Data Engineering (**TKDE**)
- [10] **Enyan Dai**, Jie Wei, Hui Liu, and Suhang Wang. “Towards Robust Graph Neural Networks for Noisy Graphs with Sparse Labels.” **Oral paper** In Proceedings of 15th ACM International Conference on Web Search and Data Mining (**WSDM 2022**)
- [11] Junjie Xu, **Enyan Dai**, Xiang Zhang, Suhang Wang. “HP-GMN: Graph Memory Networks for Heterophilous Graphs” In Proceedings of The IEEE International Conference on Data Mining (**ICDM 2022**)
- [12] Tianxiang Zhao, **Enyan Dai**, Kai Shu, and Suhang Wang. “Towards Fair Classifiers Without Sensitive Attributes: Exploring Biases in Related Features. ” In Proceedings of 15th ACM International Conference on Web Search and Data Mining (**WSDM 2022**)

- [13] Huaisheng Zhu, **Enyan Dai**, Hui Liu, Suhang Wang. “Learning Fair Models without Sensitive Attributes: A Generative Approach.” Accepted by Neurocomputing
- [14] **Enyan Dai**, Charu Aggarwal, and Suhang Wang. “NRGNN: Learning a Label Noise-Resistant Graph Neural Network on Sparsely and Noisily Labeled Graphs.” In Proceedings of 27th ACM SIGKDD International Conference on Knowledge Discovery & Data Mining (**KDD 2021**)
- [15] **Enyan Dai**, Kai Shu, Yiwei Sun, and Suhang Wang. “Labeled Data Generation with Inexact Supervision.” In Proceedings of 27th ACM SIGKDD International Conference on Knowledge Discovery & Data Mining (**KDD 2021**)
- [16] **Enyan Dai**, and Suhang Wang. “Towards Self-Explainable Graph Neural Network.” In Proceedings of International Conference on Information and Knowledge Management (**CIKM 2021**)
- [17] **Enyan Dai**, and Suhang Wang. “Say No to the Discrimination: Learning Fair Graph Neural Networks with Limited Sensitive Attribute Information.” In Proceedings of 14th ACM International Conference on Web Search and Data Mining (**WSDM 2021**)
- [18] **Enyan Dai**, Yiwei Sun and Suhang Wang. “Ginger Cannot Cure Cancer: Battling Fake Health News with a Comprehensive Data Repository.” In Proceedings of International AAAI Conference on Web and Social Media (**ICWSM 2020**)
- [19] Chacha, Chen, Chieh-Yang Huang, Yaqi Hou, Yang Shi, **Enyan Dai**, and Jiaqi Wang. “TEST POSITIVE at W-NUT 2020 Shared Task-3: Cross-task modeling.” In Proceedings of the Sixth Workshop on Noisy User-generated Text (**WNUT 2020**)
- [20] **Enyan Dai**, Shuaijun Chen, Zhen Han, Xu Jia, Ziluan Liu, Liu Xing, Xueyi Zou, Chunjing Xu, Jianzhuang Liu, and Qi Tian. “Unsupervised image super-resolution with an indirect supervised path.” In Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition Workshops (**CVPR Workshops**)
- [21] Yuqing Hu, Xiaoyuan Cheng, Suhang Wang, Jianli Chen, Tianxiang Zhao, and **Enyan Dai**. “Times series forecasting for urban building energy consumption based on graph convolutional network.” In **Applied Energy**
- [22] Xiaoyuan Cheng, Yuqing Hu, Jianxiang Huang, Suhang Wang, Tianxiang Zhao, and **Enyan Dai**. “Urban Building Energy Modeling: A Time-Series Building Energy Consumption Use Simulation Prediction Tool Based on Graph Neural Network.” In **Computing in Civil Engineering**

Referred Preprints

- [23] **Enyan Dai** and Suhang Wang. “Towards Prototype-Based Self-Explainable Graph Neural Network.” Submitted to TKDD (Minor Revision)
- [24] **Enyan Dai**, Yinghan Wang, Xianfeng Tang, Zhengyang Wang, Zheng Li, Limeng Cui, Yifan Gao, Monica Cheng, Bing Yin and Suhang Wang. “Localized Temporal Purchase Event Mining in E-Commerce.”
- [25] **Enyan Dai**, Minhua Lin, Suhang Wang. “PreGIP: Watermarking the Pretraining of Graph Neural Networks for Deep Intellectual Property Protection.”
- [26] Junjie Xu, **Enyan Dai**, Dongsheng Luo, Xiang Zhang, Suhang Wang. “Shape-aware Graph Spectral Learning.”
- [27] Minhua Lin, **Enyan Dai**, Junjie Xu, Suhang Wang. “Stealing Training Graphs from Graph Neural Networks.”
- [28] Junfeng Fang, **Enyan Dai**, Xiang Wang, Xiangnan He. “LIG: Harnessing the Power of Large Language Models to Enhance Interpretable Graph Neural Networks.”

INVITED TALKS

- Trustworthy GNNs in Fairness, Robustness, and Privacy** Jul. 2023
Invited by University of Science and Technology of China
- GNNs for Robustness and Membership Privacy** Jul. 2023
Invited by Peking University
- Graph Structure Learning for Robustness** Aug. 2022
Invited by Amazon MARS Lab
- Fairness and Explainability in Graph Neural Networks** Jun. 2022
Invited by DataFun Summit 2022

EXPERIENCE

- Research Intern in Amazon, USA** May. 2022 – Dec. 2022
Localized Temporal Purchase Event Mining on Query Product Graphs
Manager: Dr. Xianfeng Tang
- Research Intern in MIT-IBM Watson AI Lab, USA** May 2021 – August 2021
Power grid time series data modeling with graph neural network for Anomaly Detection
Manager: Dr. Jie Chen
- Research Intern in Cloudwalk, China** May 2017 – August 2017
Computation acceleration of the Deep CNN face detection
Manager: Mr. Jiwei Li

TEACHING EXPERIENCE

- Teaching Assistant** in PSU Fall 2023
DS 402: Explainable AI and Reinforcement Learning
Instructor: Prof. Jonathan E. Dodge
- Instructor** in Deepshare Spring 2023
Online Course: Adversarial Attacks and Defenses on Graph Learning
- Teaching Assistant** in PSU Spring 2023
IST 452: Legal Environment of Privacy and Security
Instructor: Prof. Marc Friedenberg
- Teaching Assistant** in PSU Spring 2022
IST 510: Computational Foundations of Informatics
Instructor: Prof. Wilson Shomir
- Teaching Assistant** in PSU Spring 2022
DS 310: Machine Learning and Data Analytics
Instructor: Prof. Suhang Wang
- Teaching Assistant** in PSU Fall 2021
DS 402: Introduction to Social Network Mining
Instructor: Prof. Suhang Wang

STUDENTS & MENTEES

Minhua Liu, Ph.D. student in PSU Jun. 2022 - Present

Referred papers [6],[5]

Research Co-advising with Prof. Suhang Wang, and Prof. Xiang Zhang

Junjie Xu, Ph.D. student in PSU Sep. 2021 - Present

Referred papers [26],[11]

Research Co-advising with Prof. Suhang Wang, and Prof. Xiang Zhang

Fali Wang, Ph.D. student in PSU Sep. 2022 - Present

Project of model ownership verification on large language models

Research Co-advising with Prof. Suhang Wang

Zhiwei Zhang, Ph.D. student in PSU Sep. 2022 - Present

Project of adversarial attacks on graph model pre-training

Research Co-advising with Prof. Suhang Wang

Shijie Zhou, Master Student in PSU Sep. 2021 - Dec. 2022

Referred paper [8]

Research Co-advising with Prof. Suhang Wang

SERVICE

- **Program Committee Member:** AAAI (2023, 2024), KDD (2022, 2023), ASONAM (2022, 2021), WSDM (2024, 2023, 2022), SDM (2024)
- **Reviewer & External Reviewer:** NeurIPS (2022, 2023), ICML (2023), ICLR (2024), KDD (2021, 2020), The Web (2021, 2022), SIGIR (2021, 2022), WebSci (2020), CIKM (2022, 2022, 2023), LOG (2022), ICIG (2021, 2023), BigData (2021), TPAMI, Neurocomputing, TKDD, TNNLS, Neural Networks
- **Judge:** Mathematical Contest in Modeling (2020, 2022, 2023)

SELECTED HONORS

Awards

- Ph.D. Student Award for Research Excellence in College of IST (Highest award in IST)
- Outstanding Graduate Award in Qinghe City of 2018, 2020, 2021, and 2022
- Scholarship for Outstanding Students in USTC of 2012, 2014 and 2015
- KDD Student Travel Award of 2023
- CIKM Student Travel Award of 2021
- WSDM Student Travel Award of 2021 and 2022

Media Coverage

- Our work about anomaly detection on power grids with graph neural networks has been reported by The Register, MIT Press, and SciTechDaily
- Our work of FairGNN is reported in New machine learning model could remove bias from social network connections by PSU News and republished by ACM news.
- Our survey about trustworthy graph neural networks is reported by PaperWeekly and KDnuggets