

Xinyu Fu 付新宇

PH.D. CANDIDATE IN COMPUTER SCIENCE AND ENGINEERING

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Research Interests

My general research interests lie in Graph Neural Networks (GNNs) and Federated Learning (FL). I am particularly interested in the application and theory of **Heterogeneous Graph Representation Learning** (i.e., learning on graphs with multiple types of nodes/edges) and **Federated Graph Learning** (i.e., federated learning with graph-structured data). I have worked on developing GNN models and FL frameworks that can handle complex real-world heterogeneous graph data, with a wide range of applications, including recommendation systems, fraud detection, and drug discovery.

Highlights

- One highly cited publication reaching more than 700 citations
- One GitHub repository with more than 300 stars
- Three released datasets adopted by the PyTorch Geometric library

Education

The Chinese University of Hong Kong (CUHK)

DOCTOR OF PHILOSOPHY IN COMPUTER SCIENCE AND ENGINEERING

- Supervised by Prof. Irwin King (IEEE Fellow, INNS Fellow, AAIA Fellow, ACM Distinguished Member)

Hong Kong SAR, China

Aug. 2018 - Jul. 2024 (Expected)

The Chinese University of Hong Kong (CUHK)

BACHELOR OF SCIENCE IN COMPUTER SCIENCE

- Cumulative GPA: 3.71/4.00
- Major GPA: 3.86/4.00

Hong Kong SAR, China

Sep. 2016 - July 2018

Sun Yat-Sen University (SYSU)

CUHK-SYSU ENGINEERING UNDERGRADUATE PROGRAMME

- GPA: 3.9/4.0

Guangzhou, China

Sep. 2014 - July 2016

Industry Experience

Amazon AWS Shanghai AI Lab

APPLIED SCIENTIST INTERN

- Explored drug repurposing based on representations learnt from biomedical knowledge graphs
- Supervisor: Dr. Da Zheng, Prof. George Karypis (IEEE Fellow)

Shanghai, China

May 2020 - Nov. 2020

Tencent

BACK-END DEVELOPER INTERN

- Developed a low-quality comment filtering system based on machine learning techniques
- Supervisor: Junwei Qiu, Haijian Long

Shenzhen, China

May 2018 - July 2018

Publications

JOURNAL ARTICLES

[J1] MECCH: Metapath Context Convolution-based Heterogeneous Graph Neural Networks

Xinyu Fu, Irwin King

Neural Networks 170 (2024) pp. 266–275. 2024

[J2] A Survey of Trustworthy Federated Learning: Issues, Solutions, and Challenges

Yifei Zhang, Dun Zeng, Jinglong Luo, Xinyu Fu, Guanzhong Chen, Zenglin Xu, Irwin King

ACM Transactions on Intelligent Systems and Technology (2024). 2024

CONFERENCE ARTICLES

[C1] A Systematic Survey on Federated Semi-supervised Learning

Zixing Song, Xiangli Yang, Yifei Zhang, Xinyu Fu, Zenglin Xu, Irwin King

IJCAI, 2024

[C2] Geometric View of Soft Decorrelation in Self-Supervised Learning
Yifei Zhang, Hao Zhu, Zixing Song, Yankai Chen, **Xinyu Fu**, Piotr Koniusz, Irwin King
KDD, 2024

[C3] FedHGN: A Federated Framework for Heterogeneous Graph Neural Networks
Xinyu Fu, Irwin King
Acceptance Rate: 14.1%, IJCAI 2023, Macao SAR, China, August 19-25, 2023

[C4] MAGNN: Metapath Aggregated Graph Neural Network for Heterogeneous Graph Embedding
Xinyu Fu, Jiani Zhang, Ziqiao Meng, Irwin King
[Over 700 citations](#), Acceptance Rate: 19.2%, WWW 2020, Taipei, April 20-24, 2020

Presentations

AI for non-AI Researchers

CUHK LIBRARY RESEARCH COMPUTING CAFÉ

- Introduced AI-powered tools and domain researches for non-AI researchers

Hong Kong SAR, China

Sep. 2023

Trustworthy Federated Learning: Concepts, Methods, Applications, and Beyond

INTERNATIONAL JOINT CONFERENCE ON NEURAL NETWORKS 2023

- Introduced trustworthy federated learning techniques in terms of privacy, security, and robustness

Gold Coast, Australia

June 2023

Heterogeneous Graph Neural Networks Recent Research Progress

LEARNING ON GRAPHS SEMINAR

- Shared personal research progress on heterogeneous graph neural networks

Online

Jan. 2023

Deep Learning on Graphs

DEEPLearn 2022 SUMMER

- Introduced recent research progress on deep graph representation learning

Spain

July 2022

Deep Learning on Graphs: Methods and Applications

INTERNATIONAL CONFERENCE ON NEURAL INFORMATION PROCESSING 2020

- Introduced recent research progress on deep graph representation learning

Online

Nov. 2020

Services

JOURNAL REVIEWER

IEEE Transactions on Knowledge and Data Engineering (TKDE)

IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI)

IEEE Transactions on Software Engineering (TSE)

ACM Transactions on Knowledge Discovery from Data (TKDD)

IEEE Transactions on Neural Networks and Learning Systems (TNNLS)

IEEE Transactions on Services Computing (TSC)

Neural Networks (NEUNET)

Pattern Recognition (PR)

Future Generation Computer Systems (FGCS)

IEEE Transactions on Network Science and Engineering (TNSE)

CONFERENCE REVIEWER / PC MEMBER

Conference on Neural Information Processing Systems (NeurIPS)

2021

International Conference on Learning Representations (ICLR)

2024

The Web Conference (WWW)

2022, 2023, 2024

ACM Knowledge Discovery and Data Mining (KDD)

2024

ACM International Conference on Web Search and Data Mining (WSDM)

2023

AAAI Conference on Artificial Intelligence (AAAI)

2023, 2024

European Conference on Machine Learning and Principles and Practice of Knowledge Discovery in Databases (ECML/PKDD)

2023

Teaching

TEACHING ASSISTANT

2022 Spring	CSCI2100A/ESTR2102 Data Structures , Prof. Irwin King	CUHK, Hong Kong SAR
2021 Spring	CSCI2100A/ESTR2102 Data Structures , Prof. Irwin King	CUHK, Hong Kong SAR
2020 Fall	CSCI3230/ESTR3108 Fundamentals of Artificial Intelligence , Prof. Kwong-Sak Leung	CUHK, Hong Kong SAR
2020 Spring	CSCI2100A/ESTR2102 Data Structures , Prof. Irwin King	CUHK, Hong Kong SAR
2019 Fall	ENGG5108 Big Data Analytics , Prof. Irwin King	CUHK, Hong Kong SAR
2019 Spring	CSCI2100A/ESTR2102 Data Structures , Prof. Irwin King	CUHK, Hong Kong SAR
2018 Fall	CSCI3230/ESTR3108 Fundamentals of Artificial Intelligence , Prof. Kwong-Sak Leung	CUHK, Hong Kong SAR

Skills

Programming	Python, C/C++, Linux, LaTeX, Markdown
Framework	PyTorch, DGL, TensorFlow
Languages	Mandarin (Native), English (Fluent), Cantonese (Intermediate)

Honors & Awards

2019	Best TA Award , Department of Computer Science and Engineering, CUHK	Hong Kong SAR
2018	Dean's List , Faculty of Engineering, CUHK	Hong Kong SAR
2017	ELITE Stream Student Scholarship , Faculty of Engineering, CUHK	Hong Kong SAR
2017	Dean's List , Faculty of Engineering, CUHK	Hong Kong SAR
2016	Honorable Mention , The Mathematical Contest in Modeling (MCM)	U.S.A.
2015	Second Class Scholarship , SYSU	Guangzhou, China

Projects

Few-shot/Weak Label/No Label Learning

PHD STUDENT RESEARCHER

China

Dec. 2019 - Dec. 2023

- National Key Research and Development Program of China (No. 2018AAA0100204)
- Principal Investigator: Prof. Irwin King
- Studied neural network methodologies with few, weakly labeled, or unlabeled samples

Drug Repurposing via Graph Representation Learning on Biomedical KG

RESEARCH INTERN

AWS, Shanghai

May 2020 - Nov. 2020

- Drug repurposing: to find new therapeutic indications for existing drugs
- Developed a drug repurposing framework via learning from biomedical knowledge graphs
- Explored various backend graph embedding methods with extensive experiments

Low-quality Web Novel Comments Classification

SUMMER INTERN

Tencent, Shenzhen

May 2018 - July 2018

- Developed a machine learning based method to recognize low-quality comments of web novels
- Improved credibility of novel ratings by filtering out low-quality comments
- Optimized user experience on selecting target novels

Diagnosis of Skin Cancer using Convolutional Neural Networks

FINAL YEAR PROJECT/GRADUATION THESIS

CUHK, Hong Kong SAR

Aug. 2017 - May 2018

- Coworker: Jiamin Chen. Supervised by Prof. Pheng-Ann Heng
- Developed a deep learning based method to automatically analyze the skin lesions images
- Achieved comparable performance to top groups in ISBI2016 challenge
- Developed an Android app integrated with this model for handy self diagnosis

Immersive Video Stitching of Dual Fisheye Videos

UNDERGRADUATE SUMMER RESEARCH

CUHK, Hong Kong SAR

Jun. 2017 - Aug. 2017

- Supervised by Dr. Zhensong Zhang and Prof. Hanqiu Sun
- Designed and implemented an algorithm to seamlessly stitch dual-fisheye videos into 360-degree videos
- The result outperformed Samsung's official tool in terms of stitching quality

Patents

2024	隐私保护的图模型, Irwin King, Xinyu Fu (2024100016605)	China
2024	人工智能文本检测, Irwin King, Tommy Tam, Patrick Lau, Xinyu Fu , Yifei Zhang (2024100016592)	China