Xinyu Fu 付新宇

Research Engineer

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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 900 citations**
- **One GitHub repository with more than 400 stars**
- **Three released datasets adopted by the PyTorch Geometric library**

Education

The Chinese University of Hong Kong (CUHK) — *Hong Kong SAR, China*

Doctor of Philosophy in Computer Science and Engineering — *Aug. 2018 - July 2024*

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

The Chinese University of Hong Kong (CUHK) — *Hong Kong SAR, China*

Bachelor of Science in Computer Science — *Aug. 2016 - July 2018*

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

Sun Yat-Sen University (SYSU) — *Guangzhou, China*

CUHK-SYSU Engineering Undergraduate Programme — *Aug. 2014 - July 2016*

- GPA: 3.9/4.0

Industry Experience

Huawei Noah's Ark Lab — *Hong Kong SAR, China*

Research Engineer — *Oct. 2024 - Now*

- Research and development for Huawei's Xiaoyi AI virtual assistant

Amazon AWS Shanghai AI Lab — *Shanghai, China*

Applied Scientist Intern — *May 2020 - Nov. 2020*

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

Tencent — *Shenzhen, China*

Back-end Developer Intern — *May 2018 - July 2018*

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

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, Jeju, South Korea, August 3-9, 2024

[C2] Geometric View of Soft Decorrelation in Self-Supervised Learning
Yifei Zhang, Hao Zhu, Zixing Song, Yankai Chen, **Xinyu Fu**, Ziqiao Meng, Piotr Koniusz, Irwin King
KDD 2024, Barcelona, Spain, August 25-29, 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 900 citations**, Acceptance Rate: 19.2%, WWW 2020, Taipei, April 20-24*, 2020

Workshop Articles

[W1] Client-Specific Hyperbolic Federated Learning
Jiahong Liu, **Xinyu Fu**, Menglin Yang, Weixi Zhang, Rex Ying, Irwin King
FedKDD 2024, Barcelona, Spain, August 26, 2024

Presentations

AI for non-AI Researchers — *Hong Kong SAR, China*
CUHK Library Research Computing Café — *Sep. 2023*
- Introduced AI-powered tools and domain researches for non-AI researchers

Trustworthy Federated Learning: Concepts, Methods, Applications, and Beyond — *Gold Coast, Australia*
International Joint Conference on Neural Networks 2023 — *June 2023*
- Introduced trustworthy federated learning techniques in terms of privacy, security, and robustness

Heterogeneous Graph Neural Networks Recent Research Progress — *Online*
Learning on Graphs Seminar — *Jan. 2023*
- Shared personal research progress on heterogeneous graph neural networks

Deep Learning on Graphs — *Spain*
DeepLearn 2022 Summer — *July 2022*
- Introduced recent research progress on deep graph representation learning

Deep Learning on Graphs: Methods and Applications — *Online*
International Conference on Neural Information Processing 2020 — *Nov. 2020*
- Introduced recent research progress on deep graph representation learning

Services

Journal Reviewer

IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI)
IEEE Transactions on Neural Networks and Learning Systems (TNNLS)
IEEE Transactions on Knowledge and Data Engineering (TKDE)
IEEE Transactions on Software Engineering (TSE)
ACM Transactions on Knowledge Discovery from Data (TKDD)
IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems (TCAD)
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, 2025
The Web Conference (WWW)	2022, 2023, 2024, 2025
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, 2025
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, Linux, LaTeX, Markdown
Frameworks	PyTorch, DGL
Languages	Mandarine (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

China

PhD Student Researcher — *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

AWS, Shanghai

Research Intern — *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

Tencent, Shenzhen

Summer Intern — *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

CUHK, Hong Kong SAR

Final Year Project/Graduation Thesis — *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 *CUHK, Hong Kong SAR*

Undergraduate Summer Research *June 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*