



Dr. Li Xue

Curriculum Vitae

Research Video



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DOCTORAL RESEARCH

“Explaining and Designing the Message Passing Mechanism in Graph Neural Networks”

Research Significance: This research investigates the following fundamental questions in graph neural networks:

1. Why does message passing produce group structures?
2. Why is the well-known attention theory ineffective on graphs?
3. What is over-smoothing?
4. How to build deep graph neural networks?
5. How to design message passing among unconnected nodes?

Research Progress: The progress of all my work is as follows (The contents of the doctoral dissertation are marked with an asterisk):

- **Explaining and designing graph neural networks.**
 - *Completion: 100% for explaining GNNs
 - *Completion: 100% for designing new GNN framework
 - Completion: 30% for distributed GNNs
- **Explaining and optimizing of attention mechanism.**
 - *Completion: 100% for graph attention
 - Completion: 20% for Transformer attention
- **Explaining and optimizing “X-Norm” (e.g., BatchNorm) (The theoretical part is verified and almost completed.)**
 - Completion: 60%
- **What is Transformer? A perspective from graph generation and alignment.**
 - Completion: 20%

PUBLICATIONS

1. Xue Li and Yuanzhi Cheng, “**Tired of Over-smoothing? Stress Graph Drawing Is All You Need!**”, IEEE TPAMI (In review, 11-17-2022—).
2. Xue Li and Yuanzhi Cheng, “**Understanding the Message Passing in Graph Neural Networks via Power Iteration Clustering**”, Neural Networks, 140, pp. 130-135, 2021.
3. Xue Li and Yuanzhi Cheng, “**Irregular Message Passing Networks**”, Knowledge-Based Systems, 257, 2022.
4. Xue Li, “**Directed LPA: Propagating Labels in Directed Networks**”, Physics Letters A, 8(383), 732-737, 2019.
5. Xue Li, “**Growth Curve based Label Propagation Algorithm for Community Detection**”, Physics Letters A, 21(383), 2481-2487, 2019.
6. Xue Li and Xindan Gao, “**A Collaborative Filtering Recommendation Algorithm Based on Theme Mining**”, Chinese Mini-Micro Computer Systems, 39(04):664-667, 2018.
7. Xue Li, “**Retelling the Story of X-Normalization**”, (In writing).

EDUCATION & WORK

- 2019 – 2023 **Doctor of Computer Science**
School of Computer Science and Technology
Harbin Institute of Technology
- 2017 – 2019 **Helicopter Pilot**
Aviation Industry Corporation of China
- 2015-2017 **Master of Computer Science**
School of Computer Science and Technology
Northeast Forestry University
- 2010 – 2015 **Bachelor of Computer Sciences**
Network Engineering
Qingdao Technological University

AWARDS

- 2022 **Ranked first on the Stanford OGB leaderboard**
Ogbn-Products (Amazon Product Identification)
- 2017 **Ranked second on the Stanford OGB leaderboard**
Ogbn-Arxiv(CS paper category prediction)
- 2021 **Youth Scientific Research Progress Award**
Harbin Institute of Technology
- 2017 **Outstanding Master’s Thesis Award**
Northeast Forestry University

ACTIVITIES & SOCIETIES

- PROJECT Business Plan at Hafei Aviation Group
AR Aviation Tourism Project Design – 2018
- CONFERENCE Oral Presentation at the Annual NEFU
Retelling the Story of GNN – 2020
- POSTER Poster at the Meeting of Swarm Agents Club
Attention is Not Quite All You Need – 2021
- WORKSHOP China Aerospace Science and Industry Group
Interpretable Artificial Intelligence – 2022

OUTLOOK FOR FUTURE RESEARCH

I am expected to complete my PhD before September 2023, and currently, I am actively following research on the fundamental theories of artificial intelligence. In terms of theory, I hope to engage in optimization work on cutting-edge technologies such as graph neural networks, spiking neural networks, and Transformers. As for applications, I intend to work on accelerated computing of large graphs, recommendation systems, physical simulation, drug discovery, and EDA design. I am passionate about all research related to graphs and hope to continue exploring, innovating, and deepening my knowledge in this field in the future.