

Guoming Li

■ Research Interests

- Deep Learning on Graph and its application on real-world
- Graph Signal Processing and Denoising
- Graph Topology Inference

■ Education Background

B.Eng in Information Engineering, South China University of Technology, China *Sep 2017 – Jun 2021*

- Thesis: Deep learning method in Super-Resolution
- CGPA: 3.66 / 4.0 (20%)
- Selected Courses: Data Structure(88), Basic Theory of Information(88), Electromagnetic Fields and Waves(91), Signal and System, Digital Signal Processing, Digital Image Processing

(Quit) Master Degree Study, Institute of Automation, Chinese Academy of Sciences, China *Sep 2021 - Jul 2022*

- Major: Social Computing (AI + Network Science)
- CGPA: 3.97 / 4.0
- Selected Courses: Multivariate Statistical Analysis(93), Functional Analysis(95), Machine Learning, Deep Learning, Pattern Recognition

(Ongoing) Master Degree Study, MBZUAI, UAE *Sep 2023 – present*

- Major: Graph Neural Network
- CGPA: 4.0 / 4.0

■ Project(new to old)

Spectral GNN via Two-dimensional (2-D) Graph Convolution *Jul 2023 – present*

- (In submission) We jump out of recent trend of spectral GNNs, i.e., designing different types of graph filters with fruitful methods. Instead, we consider spectral GNN in a higher level: the convolution paradigm itself. We group current spectral GNNs into three convolution paradigms and point out their drawbacks in target construction. Motivated by this, we develop new convolution paradigm called 2-D graph convolution, and prove its theoretical advantages. We further propose a practical implementation of 2-D graph convolution, ChebNet2D, with chebyshev interpolation. Leading performance of ChebNet2D verify the correctness of our theoretical analysis.

Elevating Spectral GNNs through Enhanced Band-pass Filter Approximation *Feb 2023 – present*

- (In submission) We analyze what types of spectral graph filters are crucial for spectral GNNs. With rigorous theoretical analysis, we prove GNN with better approximation to band-pass filters have better performance. Based on this, we design TrigoNet, a spectral GNN whose filter is constructed with trigonometric polynomials. Results verify the correctness of our theoretical analysis.

Revisiting Graph Wavelet Neural Network *Nov 2022 – May 2023*

- We revisit a famous GNN architecture named GWNN (Xu et al, ICLR-19). We study the mistake in their paper and propose the correct form of graph wavelet convolution of signals. Based on the correct form, we further propose a universal framework that significantly boosts most GNNs performance.

Neural Parametric Modeling of Human Hand *Sep 2022 – present*

Update in Dec 1st, 2022

- (In submission) A cooperative research project. I am co-first author to the paper. We focused on a problem about point cloud inference (interpolation and extrapolation). I helped to write half of the paper and implement one of the Projection-Net with python.

Network Topology Inference with Graph Learning

Jun 2022 – July 2023

- This topic is just one of the sub-problems of my big idea about Graph Signal Processing. I proposed the main idea and designed the model. I am now cooperating with Prof. Luo and concentrated on solve this sub-problem.

Network epidemic dynamic model of COVID-19 in China

Dec 2020 – Jul 2021

- Modeling the network epidemic processes of COVID-19 in China. Using Matlab to implement SEIR、SIR、SEIRD models which fitted the epidemic data in China and building mobility dataset with Python-Spider.

■ **Research Publications**

- ***(Under review, ICML2024) Spectral GNN via Two-dimensional (2-D) Graph Convolution.*** Guo-ming Li, Jian Yang, Shangsong Liang, Dongsheng Luo.
- ***(Under review, ICML2024) Elevating Spectral GNNs through Enhanced Band-pass Filter Approximation.*** Guo-ming Li, Jian Yang, Shangsong Liang, Dongsheng Luo.
- ***(Rejected by ICML2023, on hold) Revisiting Graph Wavelet Neural Network: Mis-claim and Universal Enhancement Framework.*** Guo-ming Li, Jian Yang, Shangsong Liang, Dongsheng Luo.
- ***(Submitted to IEEE journal) Neural Parametric Modeling of Human Hand.*** Jian Yang*, Guo-ming Li*, Weize Quan, Qihang Fang, Keqiang Li, Dong-ming Yan, Zhen Shen, Xiong Gang, Huai-Yu Wu, Fei-Yue Wang.

■ **Coding Skills**

- **Python**, *(Proficient in using Pytorch and other packages about AI.*
- **Matlab**, *(Proficient)*