Jiale Liu

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Education

Huazhong Agricultural University , BS in Computer Science   Sep 2022 – present
- GPA: Overall: 3.84/4.0 (91.22/100), Major: 3.95/4.0 (93.71/100)
- **Coursework:** Calculus, Discrete Mathematics, Data Structures, Algorithm Analysis and Design, Linear Algebra, Machine Learning, Neural Networks and Deep Learning, Natural Language Processing and Knowledge Discovery

Research Experience

Undergraduate Researcher, National Key Laboratory of Crop Genetic Improvement, Hubei Hongshan Laboratory, Huazhong Agricultural University

Research on Explainable Graph Neural Networks   Apr 2024 – Aug 2024
- Participated in the design and development of a novel self-explainable graph transformer model (**SE-SGformer**) for link sign prediction in signed graphs.
- Proposed a position encoding method based on signed random walks to enhance model expressiveness .
- Conducted theoretical analysis demonstrating the superiority of SE-SGformer over traditional GCNs and shortest-path-based transformers.
- Led experiments on real-world datasets, achieving up to 2.2% improvement in prediction accuracy and 73.1% improvement in interpretability accuracy compared to state-of-the-art methods.
- Actively collaborated with a multidisciplinary team, contributing to model design, implementation, and analysis.

Research on Verbalized Graph Representation Learning   Jul 2024 – Jan 2025
- Developed a novel framework, **Verbalized Graph Representation Learning (VGRL)**, which integrates large language models (LLMs) throughout the entire pipeline to achieve fully interpretable graph representation learning.
- Designed a methodology to verbalize graph structures and node attributes into textual descriptions, effectively constraining the parameter space to ensure interpretability across input, training, and decision-making stages.
- Addressed challenges in text-attributed graphs (TAGs) by leveraging LLMs to capture rich semantic information and enable complex reasoning, while mitigating the influence of noisy neighbors through a label matching mechanism.
- Conducted empirical evaluations to validate VGRL's effectiveness in enhancing both interpretability and performance for graph representation tasks.
- Collaborated with a multidisciplinary team, contributing to model design, implementation, and experimental validation, as well as drafting the research paper and creating detailed framework diagrams.

Experimental Support for NeurIPS Rebuttal   Jul 2024
- Contributed to the rebuttal phase of the NeurIPS paper *DropEdge not Foolproof: Effective Augmentation Method for Signed Graph Neural Networks* by conducting additional experiments on link prediction tasks with data augmentation methods.

Publications

Self-Explainable Graph Transformer for Link Sign Prediction   Aug 2024

Lu Li, *Jiale Liu*, Xingyu Ji, Maojun Wang, Zeyu Zhang

AAAI 2025

Verbalized Graph Representation Learning: A Fully Interpretable Graph Model   Oct 2024
Based on Large Language Models Throughout the Entire Process

Xingyu Ji[*], *Jiale Liu*[*], Lu Li, Maojun Wang, Zeyu Zhang

Arxiv

Course Projects

House Price Prediction on Kaggle   Jun, 2023

- Spent 14 days in Yunshu Lab learning machine learning concepts from scratch.
- Implemented multiple models for house price prediction, including Linear Regression, Random Forest, Gradient Boosting (e.g., XGBoost), and Neural Networks.
- Tuned hyperparameters and optimized model performance, achieving a top 100 position on the Kaggle leaderboard.
- Gained hands-on experience in feature engineering, model evaluation, and using Python libraries such as Scikit-learn and XGBoost.

Intelligent Knowledge Graph Construction System   May, 2024

- Developed a large-scale knowledge graph model integrated with a database retrieval system.
- Implemented an intelligent keyword retrieval system to search literature within the database.
- Designed and deployed a knowledge graph visualization feature, enabling the display of relationships and structures within the database.

Multi-Omics Data Integration and Clustering Analysis   Jul, 2024

- Conducted clustering analysis by integrating multi-omics data, including gene expression, DNA methylation, and miRNA expression.
- Applied neural network models to process dimension-reduced data.
- Evaluated the biological significance of clustering results using survival analysis.

Scholarship

- Excellent Study Scholarship (ratio: 10%)   Dec, 2024
- Merit Student Scholarship (ratio: 20%)   Dec, 2024

Technologies

Languages: C++, C, Java, SQL, Python, Verilog HDL

Frameworks: Scikit-learn, PyTorch, PyG, DGL

Tools: Git, Jupyter Notebook, LATEX, Linux, Bash

Personal Statement

I am a third-year undergraduate student majoring in Computer Science, with a strong research interest in Graph Neural Networks (GNNs), particularly their interpretability and integration with large language models. I am passionate about leveraging advanced machine learning techniques to address complex challenges in graph-based data analysis and contributing to impactful research in this field. To learn more about me, please visit my personal website: liule66.github.io/.