NINGYI LIAO

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Education

Nanyang Technological University — *Singapore*
Ph.D. Candidate in Computer Science and Engineering, College of Computing and Data Science — *Aug. 2021 – 2025 (expected)*
- CGPA: 4.67/5 | Thesis: "Scaling up Graph Neural Networks"

Shanghai Jiao Tong University — *Shanghai, China*
B.Eng. in Information Security, School of Electronic Information and Electrical Engineering — *Sept. 2017 – Jun. 2021*
- CGPA: 88/100 | Thesis: "Network Compression in Federated Machine Learning"

Awards

2024 Certificate of Merit *(3 nationwide)*, PREMIA Best Student Paper Awards — *Singapore*
2021 – 2025 NTU Research Scholarship, NTU-WeBank Joint Research Centre — *Singapore*

Publication

- **Ningyi Liao**, Zihao Yu, Ruixiao Zeng, Siqiang Luo. "Unifews: You Need Fewer Operations for Efficient Graph Neural Networks". *42nd International Conference on Machine Learning (**ICML**)*, 2025.
- **Ningyi Liao**, Haoyu Liu, Zulun Zhu, Siqiang Luo, Laks V.S. Lakshmanan. "Benchmarking Spectral Graph Neural Networks: A Comprehensive Study on Effectiveness and Efficiency". *ACM International Conference on Management of Data (**SIGMOD**)*, 2026.
- **Ningyi Liao**, Siqiang Luo, Xiaokui Xiao, Reynold Cheng. "Advances in Designing Scalable Graph Neural Networks: The Perspective of Graph Data Management". *ACM International Conference on Management of Data (**SIGMOD** Tutorial)*, 2025.
- Zihao Yu*, **Ningyi Liao***, Siqiang Luo. "GENTI: GPU-powered Walk-based Subgraph Extraction for Scalable Representation Learning on Dynamic Graphs". *50th International Conference on Very Large Data Bases (**VLDB**)*, 2024.
- **Ningyi Liao**, Dingheng Mo, Siqiang Luo, Xiang Li, Pengcheng Yin. "Scalable Decoupling Graph Neural Network with Feature-Oriented Optimization". *The VLDB Journal (**VLDBJ**)*, Vol. 33, pp. 667–683, 2024.
- **Ningyi Liao**, Siqiang Luo, Xiang Li, Jieming Shi. "LD^2: Scalable Heterophilous Graph Neural Network with Decoupled Embeddings". *37th Conference on Neural Information Processing Systems (**NeurIPS**)*, 2023.
- **Ningyi Liao***, Dingheng Mo*, Siqiang Luo, Xiang Li, Pengcheng Yin. "SCARA: Scalable Graph Neural Networks with Feature-Oriented Optimization". *48th International Conference on Very Large Data Bases (**VLDB**)*, 2022.
- **Ningyi Liao**, Shufan Wang, Liyao Xiang, Nanyang Ye, Shuo Shao, Pengzhi Chu. "Achieving Adversarial Robustness via Sparsity". *Machine Learning (**MLJ**)*, Vol. 111, pp. 685–711, 2021.
- Haoyu Liu, **Ningyi Liao**, Siqiang Luo. "SIGMA: An Efficient Heterophilous Graph Neural Network with Similarity-based Efficient Global Aggregation". *41th International Conference on Data Engineering (**ICDE**)*, 2025.
- Kai Siong Yow, **Ningyi Liao**, Siqiang Luo, Reynold Cheng. "Machine Learning for Subgraph Extraction: Methods, Applications and Challenges". *49th International Conference on Very Large Data Bases (**VLDB** Tutorial)*, 2023.
- Jun Xuan Yew, **Ningyi Liao**, Dingheng Mo, Siqiang Luo. "Example Searcher: A Spatial Query System via Example". *IEEE 39th International Conference on Data Engineering (**ICDE** Demo)*, 2023.
- Yuxin Qi, Xi Lin, Jiani Zhu, **Ningyi Liao**, Jianhua Li. "Hiding in the Network: Attribute-Oriented Differential Privacy for Graph Neural Networks". Under revision of *IEEE Transactions on Information Forensics and Security (**TIFS**)*, 2025.
- **Ningyi Liao***, Zihao Yu*, Siqiang Luo, Gao Cong. "HubGT: Scalable Graph Transformer with Decoupled Hierarchy Labeling". *arXiv:2412.04738*, 2025.
- Weiping Yu*, **Ningyi Liao***, Siqiang Luo, Junfeng Liu. "RAGDoll: Efficient Offloading-based Online RAG System on a Single GPU". *arXiv:2504.15302*, 2025.
- Kai Siong Yow*, **Ningyi Liao***, Siqiang Luo, Reynold Cheng, Chenhao Ma, Xiaolin Han. "A Survey on Machine Learning Solutions for Graph Pattern Extraction". *arXiv:2204.01057*, 2023.

Patents

- **Ningyi Liao**, Dingheng Mo, Siqiang Luo. "SCARA: Scalable Graph Neural Networks with Feature-Oriented Optimization". *Singapore Provisional* No. 10202203849U, 2022.

Talks

"Advances in Designing Scalable Graph Neural Networks: The Perspective of Graph Data Management – Specific Algorithms" — *Berlin, German*
ACM International Conference on Management of Data (SIGMOD 2025) — *Jun. 2025*

"Scalable Heterophilous Graph Neural Network with Decoupled Embeddings" — *Singapore*
Singapore ACM SIGKDD Symposium 2024 — *Jul. 2024*

"Machine Learning for Subgraph Extraction: Methods, Applications and Challenges – Community Detection & Maximum Common Subgraph" — *Vancouver, Canada*
49th International Conference on Very Large Databases (VLDB 2023) — *Sept. 2023*

Academia Services

PC Member NeurIPS 2024 – 2025, AISTATS 2025, CIKM (Full & Short) 2022 – 2025, BigData 2025
Reviewer TJSC 2025
Volunteer WWW 2024

Teaching Experience

Teaching Assistant CZ3002 Advanced Software Engineering | 2022 Fall & 2023 Spring — *CCDS, NTU*
CZ4123 Big Data Management | 2022 Spring & 2023 Spring — *CCDS, NTU*

Research Experience

John Hopcroft Center for Computer Science, Shanghai Jiao Tong University — *Shanghai, China*
Participation in Research Program. Advisor: Prof. Liyao Xiang — *Feb. 2019 – Jun. 2021*

- Project Topic: "Security Issues in Artificial Intelligence and Its Optimization";
- Designed algorithms for communication efficiency and differential privacy in federated learning by factorization;
- Designed algorithms for adversarial learning robustness by various network pruning techniques;
- Studied and implemented neural network models optimization algorithms for computer vision and neural language processing in a wide range of security-related topics including robustness, privacy, fairness, and data balance;
- Developed frameworks for neural network distributed training and architecture sparsification.

Department of Astronomy, University of California, Berkeley — *Berkeley, CA, U.S.*
Full-time Exchange. Advisor: Dr. Benjamin Horowitz — *Jul. – Aug. 2019*

- Project Topic: "Application of Machine Learning Approaches in Realistic Astronomical Problems";
- Studied applying advance algorithms to the star/galaxy separation problem, built a dataset from sky survey raw data;
- Implemented multiple mainstream machine learning classification algorithms, explored and optimized parameters;
- Studied impacts of variables including magnitude variable and inference results on performance of different models.

Working Experience

JD Intelligent Cities Research, JD Digits — *Beijing, China*
Technical Intern. Advisor: Dr. Ting Li, Prof. Junbo Zhang, & Prof. Yu Zheng — *Jul. – Sept. 2020*

- Job Responsibilities: Spatio-temporal Neural Network Structural Optimization;
- Implemented general network pruning APIs on various common model architectures and modules to search for optimal structure and runtime performance;
- Studied spatio-temporal model structures and data formats to specifically apply sparsification strategies, achieved effective performance improvement on realistic models in use;
- Studied pruning utility and interpretability on improving practical spatio-temporal task performance, including model size reduction, training convergence, and data generality.