

Summary

– Research interests lie in Applied Machine Learning, especially Large Language Models (LLMs), Generative Models (GenAI), Reinforcement Learning (RL), and Graph Neural Networks (GNN) with applications to real-world scenarios (Finance, Computer Vision, Traffic, Material), such as Portfolio Management, Visual Understanding, Time Series Forecasting, and Molecular Representation Learning, aiming to leverage advanced AI techniques to solve complex real-world challenges.

Education

2020 – 2025: **PhD, Computer Science**, *New Jersey Institute of Technology*, Newark.

– Advisor: Guiling (Grace) Wang, Distinguished Professor

2017 – 2019: **Master, Data Science**, *Rutgers University*, New Brunswick.

2013 – 2017: **Bachelor, Economics & Statistics**, *Xiamen University*, China.

Working Experience

Sep 2024 – **Research Intern**, *NEC Labs America*, Princeton, NJ.

- Present:
- Developing a flowchart image understanding framework, finetuning open-sourced Large Visual Language Models (VLMs) with prompt engineering for entity extraction and text-based code generation.
 - Building an intelligent LLM-based assistant for question answering, designed to interpret flowchart structure, respond to user queries, and provide step-by-step guidance through complex flow in real time.
 - Designing a comprehensive quantitative evaluation pipeline to benchmark VLM/LLM capability, achieving 85% accuracy in entity extraction and 90% accuracy in interactive Q&A responses.

May 2024 – **PhD Intern, Clinical Informatics**, *Regeneron*, Tarrytown, NY.

- Aug 2024:
- Leveraged LLMs for entity resolution and disease phenotyping on electronic health records data, improved consistency of medical terms, and enabled accurate clinical insights for diagnosis.
 - Created a robust bioinformatics pipeline to deploy models on large-scale clinical data to gain insights in human biology and disease.

Jun 2023 – **AI/ML Research Intern, Display Lab**, *Samsung Semiconductor*, San Jose, CA.

- Sep 2023:
- Implemented self-supervised models to learn molecular representations from 2D topology and 3D spatial position, compared different pre-training tasks (e.g., position denoising, contrastive learning, masked structure prediction) on public and internal molecule data.
 - Fine-tuned molecular representations for downstream applications (e.g., property prediction).

Highlighted Research Experience

FinTech Lab, AI Center for Research, New Jersey Institute of Technology

Jun 2024 – ***Creativity of LLMs on Math Problem Solving (AAAI'25)***.

- Present:
- Explored an innovative task – evaluating creativity of LLMs in solving math problems, analyzing the LLMs' ability to generate novel solutions based on provided problem and existing solutions.
 - Proposed CreativeMath, a comprehensive dataset containing high-quality mathematical problems and solutions with diverse topics, problem types, and difficulty levels in US competitions.
 - Designed a detailed assessing framework to standardize the task, evaluated state-of-the-art LLMs performance based on correctness and novelty of generated solutions.

- Jan 2023 – **Adaptive and Explainable Margin Trading DRL and LLMs on Portfolio Management (ICAIF'24).**
 Sep 2024:
- Established Margin Trader, the first framework integrating margin account and constraints in a realistic trading environment in RL for portfolio management, with the balance between profit and risk.
 - Incorporated LLMs to learn market trends from external data sources, enabling dynamic long-short position adjustments with clear reasoning paths in response to varying market conditions.
 - Supported various DRL algorithms, diverse LLMs, multiple external data sources, allowing traders to customize critical settings based on individual preferences and risk tolerance.
 - Achieved over 3x return and a Sharpe Ratio 2x higher than market indices and benchmarks during volatile market periods, providing adaptive and explainable trading strategies for diverse market conditions.
- Dec 2023 – **Dynamic Graph Representation Learning on Asset Pricing (ICAIF'24).**
 May 2024:
- Proposed a novel end-to-end dynamic graph construction and representation learning framework for asset pricing, accommodating dynamic node composition and evolving edge connections.
 - Captured both topological and temporal patterns, integrating multi-head attention (transformer) with graph encodings (GNN) to reflect asset importance, uncover hidden connections between assets, and evolving impact within the financial network.
- Dec 2022 – **Risk-Aware Generative Adversarial Model for Stock Interval Construction (TKDE).**
 Aug 2023:
- Employed a novel framework for *interval prediction* to quantify uncertainty of stock price.
 - Adapted a Generative Adversarial Network (GAN) to simulate future price series with artificial noise from the market, utilized statistical inference to design a *risk-sensitive interval* to detect market volatility and potential needs for hedging.
 - Achieved 95% of coverage of true next-day price with precise ranges on multiple global indices, outperforming existing state-of-the-art benchmarks.

Publications

14 Peer-reviewed Publications

- [1] **Jingyi Gu**, Wenlu Du, Guiling Wang. "RAGIC: Risk-Aware Generative Adversarial Model for Stock Interval Construction." *IEEE Transactions on Knowledge and Data Engineering (TKDE)*, 2025.
- [2] Junyi Ye, **Jingyi Gu**, Xinyun Zhao, Wenpeng Yin, Guiling Wang. "Assessing the Creativity of LLMs in Mathematical Problem Solving" *AAAI Conference on Artificial Intelligence (AAAI)*, 2025. (Accepted rate = 23.4%)
- [3] **Jingyi Gu**, Junyi Ye, Guiling Wang, Wenpeng Yin. "Adaptive and Explainable Margin Trading via Large Language Models in Portfolio Management." (Oral) *5th ACM International Conference on AI in Finance (ICAIF)*, 2024. (Accepted rate = 40%)
- [4] **Jingyi Gu**, Junyi Ye, Ajim Uddin, Guiling Wang. "DySTAGE: Dynamic Graph Representation Learning on Asset Pricing via Spatio-Temporal Attention and Graph Encodings." (Oral) *5th ACM International Conference on AI in Finance (ICAIF)*, 2024. (Accepted rate = 40%)
- [5] Ankan Dash, **Jingyi Gu**, Guiling Wang. "HierGAN: GAN-Based Hierarchical Model for Combined RGB and Depth Inpainting." *CVPR workshop on Computer Vision in the Wild (CVinW)*, 2024.
- [6] Wei Yao, Wenlu Du, **Jingyi Gu**, Junyi Ye, Fadi P. Deek, Guiling Wang. "Establishing a Baseline for Evaluating Blockchain-Based Self-Sovereign Identity Systems: A Systematic Approach to Assess Capability, Compatibility, and Interoperability." *6th Blockchain and Internet of Things Conference (BIOTC)* 2024.
- [7] Junyi Ye*, Bhaskar Goswami*, **Jingyi Gu***, Ajim Uddin, Guiling Wang. "From Factor Model to AI: Machine Learning Paradigm Reshaping Empirical Asset Pricing." *arXiv:2403.06779*, 2024
- [8] Ankan Dash, **Jingyi Gu**, Guiling Wang, Nirwan Ansari. "Self-Supervised Learning for User Localization." *International Conference on Computing, Networking and Communications*, 2024.
- [9] **Jingyi Gu**, Wenlu Du, A M Muntasir Rahman, Guiling Wang. "Margin Trader: A Reinforcement Learning Framework for Portfolio Management with Margin and Constraints." (Oral) *4th ACM International Conference on AI in Finance (ICAIF)*, 2023. (Accepted rate = 40%)

- [10] **Jingyi Gu**, Fadi P. Deek, Guiling Wang. "Stock Broad-Index Trend Patterns Learning via Domain Knowledge Informed Generative Network." *International Journal of Artificial Intelligence & Applications* 14(2):11-28, 2023.
- [11] **Jingyi Gu**, Sarvesh Shukla, Junyi Ye, Ajim Uddin, Guiling Wang. "Deep Learning Model with Sentiment Score and Weekend Effect in Stock Price Prediction." *SN Business & Economics* 3(7): 119, 2023.
- [12] Junyi Ye, **Jingyi Gu**, Ankan Dash, Fadi P. Deek, Guiling Wang. "Prediction with Time-Series Mixer for the S&P500 Index." *IEEE 39th International Conference on Data Engineering (ICDE) Workshops on Big Data Analytics in Finance and Commerce (BDAFC)*, 2023.
- [13] Wenlu Du, Junyi Ye, **Jingyi Gu**, Jing Li, Hua Wei, Guiling Wang. "SafeLight: A Reinforcement Learning Method toward Collision-free Traffic Signal Control." *The 37th AAAI Conference on Artificial Intelligence (AAAI)*, 2023. (Accepted rate = 19.6%)
- [14] Wei Yao*, **Jingyi Gu***, Wenlu Du*, Fadi P. Deek, Guiling Wang. "ADPP: A Novel Anomaly Detection and Privacy-Preserving Framework in Tokenomics." *International Journal of Artificial Intelligence & Applications* 13(6):17-32, November 2022.

Under Review

- [1] Ankan Dash, **Jingyi Gu**, Guiling Wang. "Reverse Pass-Through VR and Head Avatars." *Submitted to International Joint Conferences on Artificial Intelligence (IJCAI)*, 2025.
- [2] **Jingyi Gu**, Wenlu Du, Xinyun Zhao, A M Muntasir Rahman, Guiling Wang. "Incorporating Realistic Margin Constraints: A Deep Reinforcement Learning Framework for Advanced Portfolio Management." *Accepted with Revision by IEEE Transactions on Knowledge and Data Engineering (TKDE)*, 2025.

Skills

Programming	Python (PyTorch, HuggingFace, transformers, Langchain, openai, Tensorflow, Gym, Stable Baselines, streamlit), R, SQL, Java, LaTeX, Git
Language	English (Fluent), Chinese (Native), French (Basic proficiency)

Service

Web Chair	ICAIF 2024, ACM KDD Finance Day 2023
PC Member	ICAIF
Reviewer	KDD, PAKDD, TKDE, ACM Computing Surveys
Presenter	ICAIF 2024, ICDE Workshop 2023

Honors and Leadership

- 2023: **Excellence in Award, Teaching Assistant**, *New Jersey Institute of Technology*.
- 2021 – **Chair**, *ACM-W, NJIT*.
- Present: – Organized the event "Roundtable Conversation with Dr. Jeff Ullman, Turing Award Laureate 2020"
- 2021 – 2022: **President**, *Graduate Woman in Computer Society (GWiCS)*, *NJIT*.
- 2017: **Dean's List Award**, *The School of Economics, Xiamen University*.