XIANGYU ZHAO

London, United Kingdom
Personal Website: https://victorzxy.github.io/ ◇ GitHub: VictorZXY
Email: x.zhao22@imperial.ac.uk ◇ Telephone: +44 7387 595135

EDUCATION

PhD in Electrical and Electronic Engineering *January 2023 – January 2027 (Expected)*
Imperial College London, United Kingdom
Research topic: Learning Beyond Structured Data: Topological Deep Learning and Graphs in Foundation Models
Award: Electrical and Electronic Engineering PhD Scholarship

BA & MEng (Hons) in Computer Science *October 2018 – June 2022*
Trinity College, University of Cambridge, United Kingdom
MEng result: Distinction (Overall: 81.2%; Modules: 79.7%; Dissertation: 83%; Ranking: 7/25)
Awards: Trinity College Senior Scholarship; Trinity College Exam Prize 2022

WORK EXPERIENCE

Department of Computer Science and Technology, University of Cambridge *June – September 2022*
Undergraduate Research Opportunities Programme (UROP) – Research Intern *Cambridge, United Kingdom*

- Research Project: Long and Short-Range Attentions for Complex Hypergraph Data;
- Extension of this research project is published at the *27th European Conference on Artificial Intelligence (ECAI 2024)*.

ByteDance *June – September 2021*
Algorithm Engineer Intern *Beijing, China*

- Trained a model based on causal forest and double ML for TikTok Lite's user growth campaign;
- Increased per-user successful invitation count by 43.9% while decreasing its cost by 56.1%.

PUBLICATIONS

- Yutong Zheng, **Xiangyu Zhao**, and Danilo Mandic (2025). EC-Gate: Expansion Contribution-Aware Gating for Structure-Guided Message Passing in GNNs. In *Proceedings of the 4th Learning on Graphs Conference (LoG 2025)*, volume 269. PMLR.
- **Xiangyu Zhao**, Zehui Li, Mingzhu Shen, Guy-Bart Stan, Pietro Liò, and Yiren Zhao (2024). Enhancing Node Representations for Real-World Complex Networks with Topological Augmentation. In *The 27th European Conference on Artificial Intelligence (ECAI 2024)*, volume 392, pages 1487–1494. IOS Press.
- Xiandong Zou, **Xiangyu Zhao**, Pietro Liò, and Yiren Zhao (2023). Will More Expressive Graph Neural Networks do Better on Generative Tasks? In *Proceedings of the 2nd Learning on Graphs Conference (LoG 2023)*, volume 231, pages 21:1–21:26. PMLR.
- **Xiangyu Zhao**, Hannes Stärk, Dominique Beaini, Yiren Zhao, and Pietro Liò (2023). Task-Agnostic Graph Neural Network Evaluation via Adversarial Collaboration. *The 11th International Conference on Learning Representations (ICLR 2023) Machine Learning for Drug Discovery (MLDD) Workshop*.
- **Xiangyu Zhao** and Sean B. Holden (2022). Towards a Competitive 3-Player Mahjong AI using Deep Reinforcement Learning. In *2022 IEEE Conference on Games (CoG)*, pages 524–527. IEEE.

AWARDS AND PRIZES

Imperial College London EEE PhD Scholarship	*2023–2026*	Total amount >£150,000
Trinity College Senior Scholarship	*2022*	Awarded for Distinction result in MEng exam
Trinity College Exam Prize	*2022*	Awarded for Distinction result in MEng exam
Google Hash Code Competition	*2020*	Team ranked global top 10%
LeetCode Programming Contest (LCCUP)	*2020*	Team ranked global top 5%
UK & Ireland Programming Contest (UKIEPC)	*2019*	Team ranked UK top 25%
British Informatics Olympiad (BIO)	*2017*	National Finalist (UK top 15, raw mark 96%)
British Physics Olympiad (BPhO)	*2017*	Gold Medal (UK top 5%)
British Chemistry Olympiad (BChO)	*2017*	Gold Medal (UK top 5%)
British Mathematics Olympiad (BMO)	*2016, 2017*	Distinction (UK top 5%)

SKILLS

Languages	Chinese (Native), English (Fluent, IELTS Band 8.0)
Programming	Python, C, C++, C#, Java, OCaml, Standard ML, Prolog, SQL, LaTeX
ML Libraries	PyTorch, PyTorch Geometric, DGL, TensorFlow, Keras, Scikit-learn, EconML
ML Techniques	Graph Representation Learning, Multimodal Learning, Generative Models, LLM, RL, CV, NLP

PROJECT EXPERIENCE

Representation Engineering for Robust Spatial Reasoning in Vision-Language Models *2025*

- Introduce a novel representation engineering approach that enhances spatial reasoning capabilities in VLMs;
- Provide a novel dataset isolating directional reasoning capabilities without confounding factors in natural images;
- Significantly improve VLMs' spatial reasoning performance while maintaining model coherence.

Expansion Contribution-Aware Gating for Structure-Guided Message Passing in GNNs *2025*

- Develop a lightweight GNN component that leverages edge contributions in expanding the receptive field, concentrating capacity on structurally critical edges;
- Enhance the sensitivity bound in large hidden dimensions while limiting overfitting, and deliver significant improvements across synthetic and molecular benchmarks.

Learnable and Dynamic Neighbourhood Aggregation for Expressive and Flexible GNNs *2025*

- Develop a novel, dynamic and generalised GNN aggregation method, while preserving permutation invariance;
- Outperform GNN and Graph Transformer baselines in various prediction tasks;
- Enable seamless integration with other GNN techniques for enhanced performance.

Enhancing Real-World Complex Network Representations with Topological Augmentation *2024*

- Develop a novel graph augmentation method incorporating higher-order information for complex networks;
- Build 23 novel real-world higher-order graph datasets across various domains;
- Outperform GNN baselines and other graph augmentation methods in node prediction tasks.
- Paper published at the *27th European Conference on Artificial Intelligence (ECAI 2024)*.

Neural Weather Forecasting using Higher-Order Graphs *2024*

- Develop novel GNN and attention-based neural weather prediction methods by aggregating global and local space and time information on hierarchical graphs;
- Improve weather forecasting accuracy on local areas with significantly lower computational costs.

Investigating GNN Expressiveness in Graph Generation Tasks *2023*

- Improve GNN-based graph generative models with more advanced GNNs;
- Discover key factors in the correlation between GNN expressiveness and performance of graph generative models.
- Paper published at the *2nd Learning on Graphs Conference (LoG 2023)*.

Task-Agnostic Graph Neural Network Evaluation via Adversarial Collaboration *2022*
MEng Dissertation

- Develop a novel, reliable and stable framework for evaluating GNNs through contrastive self-supervised learning, without needing manual augmentations;
- Develop a novel and task-agnostic metric of evaluating GNN expressiveness by enabling more expressive GNNs to produce more informative graph embeddings on unlabelled graphs.
- Paper published at the *ICLR 2023 Machine Learning for Drug Discovery (MLDD) Workshop*.

Deep Reinforcement Learning for Mahjong *2021*
BA Dissertation

- Design an informative and compact data structure for encoding observable Mahjong states;
- Develop a Mahjong AI by pre-training CNN models for each action, and improve the major action's model with self-play reinforcement learning, achieving near state-of-the-art level.
- Paper published at the *2022 IEEE Conference on Games (CoG 2022)*.

Trading Assistant for IMC *2020*

- Develop a web service that automate trader actions in a human-like manner using speech recognition and NLP, while holding market data with real-time updates;
- Build accurate and efficient speech-to-text and text-to-speech libraries that improve the system's performance, with clear interfaces for the convenience of NLP and back-end teammates.

TEACHING EXPERIENCE

Department of Electrical and Electronic Engineering, Imperial College London *January 2023 – Present*
Teaching Assistant & Project Supervisor *London, United Kingdom*

- Course: ELEC70109 Advanced Deep Learning Systems (2023–2024);
- Projects: Investigating GNN Expressiveness in Graph Generative Tasks (UROP Project 2023), Neural Weather Forecasting using High-Order Graphs (MEng Final-Year Project 2023–2024), Representation Engineering for Robust Spatial Reasoning in VLMs (MEng Final-Year Project 2024–2025).

Department of Computer Science and Technology, University of Cambridge *January 2023 – Present*
Teaching Assistant & Course Supervisor *Cambridge, United Kingdom*

- Courses: Algorithms (2022–2026), Probability (2022–2026), OCaml Programming (2023–2024).

OTHER EXPERIENCE

Reviewer ACM SIGKDD Conference on Knowledge Discovery and Data Mining (KDD) *2024*