Jiahao Xie

302-476-1097 | jiahaox@udel.edu | www.linkedin.com/in/jh-xie | jiahao-xie-86.github.io

EDUCATION

University of Delaware | Newark, DE — Expected July 2028
Ph.D. in Computer Science | *GPA*: 3.97/4

- **Relevant Courses:** Machine Learning, Artificial Intelligence, Algorithms, Computer Vision, Data Mining, etc.
- **Research Interests:** Generative AI, Combinatorial Optimization, Graph Learning, Computer Vision, Data Mining, etc.

Central South University | China — September 2018 – June 2022
B.Sc. in Electrical Engineering | *GPA*: 92.45/100
Honors: Dean's List and First-Class Scholarship (all semesters).

SKILLS

- **Programming Languages:** Python, R, SQL, MATLAB, JavaScript.
- **ML & DL:** Transformers (e.g., BERT, Graphormer, ViTs), flow matching, diffusion models, GANs, VAEs, GNNs, CNNs, RNNs, classical ML (e.g., SVM, Decision Trees), reinforcement learning (e.g., PPO).
- **Algorithms & Data:** Graph algorithms, combinatorial optimization, dynamic programming, statistical modeling, causal inference, feature engineering, and data visualization.
- **Tools:** PyTorch, TensorFlow, scikit-learn, NumPy, Pandas, Matplotlib, CUDA, Docker, Git, AWS, LaTeX.

RESEARCH EXPERIENCE

Graduate Research Assistant – Computational Data Science Lab (Advisor: Prof. Guangmo Tong)
University of Delaware — February 2024 – Present

- **Learning reductions for graph decision problems** (Submit to ***WWW 2027***)
  - Developed LR4GDP, a new framework that learns reductions between different NP-complete graph decision problems, such as Clique, Vertex Cover, and Dominating Set, to construct target instances better suited to downstream neural solver.
  - Coupled flow-matching graph generation with parameter prediction to encourage semantic preservation.
  - Outperformed all compared baselines on multiple source-target pairs.
- **Learning graphs from node-link images** (Published in ***CIKM 2026***)
  - Developed an end-to-end framework for recovering node locations and adjacency matrices from diverse node-link images, including synthetic graph visualizations, satellite road imagery, and retinal vessel scans.
  - Introduced an attention-sparse neighbor sampler that replaces fixed KNN heuristics with learned, topology-aware candidate selection, improving the coverage of long-range and visually ambiguous connections while maintaining sparse computation.
  - Designed a line-graph transformer that represents candidate edges as tokens and explicitly models dependencies among incident edges, integrating path-level visual evidence, geometric constraints, and image-level topology context to capture connectivity patterns and produce structurally consistent adjacency matrices.
  - Outperformed leading baselines across four datasets on both graph-level and subgraph-level metrics, while delivering 1.40–4.27× faster inference; improved TOPO-F1 and APLS when integrated into SAM-Road++ as a plug-in reasoning module.
- **Vision-based framework for graph property detection** (Published in ***WWW 2026***)
  - Reformulated graph property detection tasks (e.g., Hamiltonian cycle, planarity, claw-freeness, and tree detection) as image classification problems, proposing a new vision-based framework for this problem over traditional matrix-based methods.
  - Introduced a graph-conditioned stochastic layout generator trained with both adversarial supervision from principled reference layouts and downstream classification feedback, enabling each graph to receive a task-specific visualization.
  - Designed a differentiable graph-rendering module that connects layout generation to image classification, allowing the model to reduce visual clutter and expose discriminative structures such as isolated and 1-degree nodes via end-to-end optimization.
  - Achieved state-of-the-art performance and outperformed leading matrix-based methods (e.g., Graphormer, EquiformerV2, and GraphsGPT) in accuracy, runtime efficiency, and memory utilization; for example, improving Hamiltonian detection F1 score from 0.76 to 0.92 and reducing GPU memory usage from 39.79 GB to 2.97 GB compared with Graphormer.

- **Set function learning (**Published in ***ACM Computing Surveys*****)**
  - Conducted the first survey of set function learning, covering core theories, methods, applications, and relevant datasets.
  - Categorized key deep learning approaches (e.g., DeepSets and Set Transformer), and compared non-deep learning methods.
  - Explored various applications in point cloud processing, recommender systems, time series prediction, amortized inference, and multi-label classification, with the manuscript published in *ACM Computing Surveys*.

PUBLICATIONS

- **Jiahao Xie**, Guangmo Tong. VisAdj: Learning Adjacency Matrices from Node-Link Images. *In Proceedings of the 35th ACM International Conference on Information and Knowledge Management* (***CIKM***) 2026.
- **Jiahao Xie**, Guangmo Tong. VSAL: A Vision Solver with Adaptive Layouts for Graph Property Detection. *In Proceedings of the ACM Web Conference* (***WWW***) 2026.
- **Jiahao Xie**, Guangmo Tong. Advances in Set Function Learning: A Survey of Techniques and Applications. *ACM Computing Surveys (CSUR)*. 2025. (**Impact Factor: 30.4**).
- Siqi Wang, **Jiahao Xie**, Yifan Wang, Guangmo Tong. Data-driven Decision Making for Social Influence Risk Management. *Risk Sciences.* 2025.
- Siqi Wang, **Jiahao Xie**, Yifan Wang, Guangmo Tong. Query-Decision Regression for Misinformation Prevention in Social Networks. *The 13th International Conference on Computational Data and Social Networks.* 2024. (**Best Paper Award**).
- Mengmei Zhong[#], **Jiahao Xie**[#], Yao Feng, Shao-Hui Zhang, Jiangnan Xia, Li Tan, Ningxin Chen, Xiaolin Su, Qian Zhang, Yunzhi Feng*, Yue Guo*, Causal effects of the gut microbiome on COVID-19 susceptibility and severity: A two-sample Mendelian randomization study. *Frontiers in Immunology.* 2023. (co-first authors).
- Shaohui Zhang, Yao Feng, Mengmei Zhong, **Jiahao Xie***, Wei Xu*. Association between oxidative stress and chronic orofacial pain and potential druggable targets: Evidence from a Mendelian randomization study. *Journal of Oral Rehabilitation*. 2024.
- Xirui Chen, Hui Liu, Yamin Fang, Mengshuai Su, **Jiahao Xie**. Rotor Fault Feature Extraction Based on Low-frequency Sampling Vibration Signal. *In 7th CAA International Conference on Vehicular Control and Intelligence (CVCI). IEEE.* 2023.
- Hui Liu, Yanfei Li, **Jiahao Xie**, Jie Zhang, Xirui Chen. Train compartment air adjustment and control method and apparatus, storage medium, and program product. *U.S. Patent Application No. 18/267,450.* (**Gold Medal Award** in the 9th Macau International Innovation and Invention Exhibition.)

# Equal contribution. * Corresponding author.

SERVICE

- Undergraduate research program, CDS Lab @ UD — Supervisor, 2024 – 2025
- CISC621 (Algorithm Design and Analysis), CISC320 (Introduction to Algorithms) — Teaching Assistant, 2024 – present
- IEEE Transactions on Neural Networks and Learning Systems (TNNLS) — Reviewer, 2025 – present
- CIKM 2026, IJCAI 2025, IJCNN 2025, AAIM 2024–2025, CSoNet 2024, COCOON 2024 — Reviewer, 2024 – present
- ACM, IEEE, AAAS — Member, 2025 – present