

YAO XIAO

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This is the verbose version. You may want to check out the [short version](#) with a selected subset of information instead.

EDUCATION

Harvard University | Master of Science | Computational Science and Engineering 2024.09 – present

New York University Shanghai | Bachelor of Science | Honors Mathematics | Computer Science 2020.09 – 2024.05

- Honors Mathematics GPA: 4.00/4.00, including: Linear Algebra, Math Modeling, Probability Theory, Numerical Analysis, etc.
- Computer Science GPA: 3.97/4.00, including: Algorithms, Operating Systems, Computer Networking, Software Engineering, etc.

PUBLICATIONS

AUTHORS WITH † ARE SORTED BY α - β ORDER, OTHERS ARE SORTED BY CONTRIBUTION

- [1] Yuejie Wang, Qitong Men, **Yao Xiao**, Yongting Chen, and Guyue Liu. 2024. ConfMask: Enabling Privacy-Preserving Configuration Sharing via Anonymization. In *Proceedings of the ACM SIGCOMM 2024 Conference (ACM SIGCOMM'24)*. Association for Computing Machinery, New York, NY, USA, 465–483. doi:10.1145/3651890.3672217
- [2] Shengbin Yue, Shujun Liu, Yuxuan Zhou, Chenchen Shen, Siyuan Wang, **Yao Xiao**, Bingxuan Li, Yun Song, Xiaoyu Shen, Wei Chen, Xuanjing Huang, and Zhongyu Wei. 2024. LawLLM: Intelligent Legal System with Legal Reasoning and Verifiable Retrieval. In *29th International Conference on Database Systems for Advanced Applications (DASFAA'24)*. doi:10.48550/arXiv.2309.11325
- [3] Xinyu Li†, **Yao Xiao**†, and Yuchen Zhou†. 2023. Efficiently Visualizing Large Graphs. doi:10.48550/arXiv.2310.11186

RESEARCH EXPERIENCE

Privacy-Preserving Network Configuration Sharing via Anonymization | SIGCOMM'24 | GitHub 2022.10 – 2024.08

ADVISOR: Professor Guyue Liu, guyue.liu@gmail.com

- Proposed the ConfMask framework to systematically anonymize topology and routing information in network configurations.
- Designed the anonymization algorithm for different protocols that mitigated deanonymization risks yet preserved important utilities.
- Managed to rigorously prove the route equivalence and routing utility preservation properties of the anonymization framework.
- Led the implementation of the end-to-end network configuration anonymization system and the artifact evaluation.

Analyzing the Critical Behavior of Bernoulli Percolation in \mathbb{Z}^3 via Invasion Percolation | Capstone 2023.09 – 2024.01

ADVISOR: Professor Wei Wu, ww44@nyu.edu

- Proved that in \mathbb{Z}^d , infinite cluster density at critical point $\mathbf{P}_\infty(p_c) = 0$ if and only if invasion probability $G_{\mathbb{Z}^d}(0, x) \rightarrow 0$ as $|x| \rightarrow \infty$.
- Verified via simulation that $G_{\mathbb{Z}^3}(0, x) \leq G_{\mathbb{Z}^2}(0, x)$ for each $|x|$, thus proving that $\mathbf{P}_\infty(p_c) = 0$ in \mathbb{Z}^3 given the fact that it holds in \mathbb{Z}^2 .
- Estimated the fractal dimension of the invasion percolation cluster in \mathbb{Z}^3 numerically which was approximately 2.627.

Efficient Distributed Serving System for Large Language Model Inference | Capstone 2023.09 – 2024.01

ADVISOR: Professor Guyue Liu, guyue.liu@gmail.com

- Enabled larger batch sizes beyond KV cache limit for layers except self-attention, observing that only self-attention relies on KV cache.
- Batched prefills and decodes dynamically in self-attention to mitigate pipeline bubbles caused by varying transformer input lengths.
- Packed multiple short attention computations with the longest one, while concurrently swapping KV cache to minimize overhead.

Efficiently Visualizing Large Graphs | Dean's Undergraduate Research Fund | ArXiv 2022.05 – 2022.08

ADVISOR: Professor Jie Xue, jiexue@nyu.edu

- Designed t-SGNE specialized for graphs, leveraging the neighboring relations between nodes and achieving 6.7x computation efficiency.
- Proposed SPLEE, a graph embedding method based on Laplacian eigenmaps and shortest paths, intended to suit t-SGNE.
- Combined SPLEE and t-SGNE for visualization of graphs with 300K nodes and 1M edges, achieving 10% improvement in visual effect.

WORKING EXPERIENCE

Scikit-learn | Open Source | Core Developer | 120 Merged Pull Requests 2023.04 – present

SKILLS: Python, Cython, JavaScript, Sphinx, scikit-learn, numpy, scipy, pandas, polars, CI/CD

- Managed maintenance tasks e.g., test suite coverage, code refactoring, developer API improvement, automated GitHub workflows, etc.
- Enhanced sparse array and polars dataframe support, estimator representation, metrics visualization, multilabel data cross-validator, etc.
- Optimized IncrementalPCA on sparse data (>10x faster, >30x less memory), SPD matrix generator (>10x less memory), etc.
- Led the redesign the entire scikit-learn main website and coordinated efforts in documentation improvements and UI / UX enhancements.

SKILLS: Python, PyTorch, HuggingFace, LLM, instruction tuning

- Led the construction of 403K legal knowledge instruction data, curated with legal syllogism prompting for higher expertise.
- Fine-tuned DISC-LawLLM, an LLM specialized for legal services based on Baichuan 13B Chat, outperforming GPT-3.5 Turbo.
- Participated in designing a verifiable knowledge retrieval module to inject external knowledge and enhance output actuality.
- Drove the implementation of a comprehensive benchmark for legal systems evaluation in both objective and subjective dimensions.

TEACHING EXPERIENCE

- **Linear Algebra**, MATH-SHU.0140, NYU Shanghai, Learning Assistant, Spring 2024
- **Calculus II**, MATH-SHU.0131, NYU Shanghai, Learning Assistant, Fall 2021, Fall 2023
- **Operating Systems**, CSCI-UA.0202, New York University, Teaching Assistant, Spring 2023

PROJECTS

Deskulpt: A Cross-Platform Desktop Customization Tool | GitHub

2024.03 – present

SKILLS: Rust, TypeScript, Tauri, React, Vite, SWC

- Led the development of a cross-platform system for highly customizable desktop widgets that can be written in React / TypeScript.
- Integrated rich development tools in Deskulpt, enabling streamlined widget creation and debugging, editor and type hints, etc.
- Built Deskulpt using Tauri to ensure system security and compatibility across Windows, macOS, and Linux environments.
- Utilized Rust's async capabilities in the backend to ensure responsive interactions between the UI and system resources.
- Implemented security measures, e.g., CSP protection, constraints on file system access, limiting frontend capabilities, etc.

CampusHelper: WeChat / Alipay Miniprogram

2023.12 – present

SKILLS: TypeScript, MongoDB, WeChat / Alipay cloud, miniprogram frameworks

- Utilized miniprogram cloud, including cloud functions, database, and storage to enhance data management and service reliability.
- Optimized miniprogram performance through cloud-based technologies, lazy loading, list virtualization, etc.
- Built a clean, consistent, accessible, and user-friendly interface, enhancing the overall user experience.
- Won the 2nd Prize (4th Place) in the [2023 Alipay Miniprogram Developers' Competition](#).

YouTube Interface Customizer | Course Project | GitHub

2023.02

- Built a Firefox extension that supports changing color themes, rearranging, and customizing elements of the YouTube interface.
- Created the documentations of features and contribution guides, and released (self-distributed) v1.0 at Mozilla Add-ons.

Inequality Process Simulation | Course Project | Paper | GitHub

2022.12

- Simulated inequality process in economic systems via nuanced random transactions functions, reflecting on real-world economy.
- Discovered that the final distribution of wealth in a real-world economic system fits the shape of a gamma or beta prime distribution.

Gyro-Tower Simulation | Course Project | Paper | GitHub

2022.10

- Modeled gyroscopes as networks of springs, formulated the system with differential equations, and solved it via Euler's method.
- Simulated vertical stacks of gyroscopes, and found that they obeyed gyroscopic precession assuming a flexible middle axle.

HONORS AND AWARDS

- [1] **Magna cum laude**, NYU Shanghai, 2024
- [2] **Level I Certification**, CRLA's [International Tutor Training Program](#), 2024
- [3] **2nd Prize, 4th Place**, [Alipay Miniprogram Developers' Competition](#), 2023
- [4] **Meritorious Winner**, [Mathematical Contest in Modeling](#), 2023
- [5] **Dean's List of Academic Year**, NYU Shanghai, 2020 – 2021, 2021 – 2022, 2022 – 2023

SKILLS

- [1] **Programming**: Proficient in Python, Rust, C, TypeScript; Intermediate in Java, C++, Julia, MATLAB
- [2] **Frameworks and packages**: Tauri; React; Numpy, Scipy, Pandas, Polars, Scikit-learn, Matplotlib, Seaborn, PyTorch
- [3] **DevOps**: CircleCI, Github Actions; Docker; Git / GitHub; AWS, WeChat / Alipay Cloud; Computer networks; Linux
- [4] **Languages**: English (fluent); Mandarin Chinese (native)