Zhongming Yao

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EDUCATION

Aalborg University, Denmark | ***Guest PhD*** — Dec. 2023 – Present
Major: Computer Science — Aalborg, Denmark
- *Research Topic:* Blockchain-based Trajectory Data Management

Northeastern University, China | ***PhD Candidate*** — Sep. 2020 – Jan. 2026 (Expected)
Major: Computer Science and Technology — Shenyang, China
- *Supervisor:* Prof. Junchang Xin
- *Research Topic:* Blockchain Technology

Northeastern University, China | ***Master*** — Sep. 2018 – Jul. 2020
Major: Biomedical Engineering — Shenyang, China
- *Supervisor:* Prof. Junchang Xin
- *Research Topic:* Blockchain Technology

Northeastern University, China | ***Bachelor*** — Sep. 2013 – Jul. 2017
Major: Computer Science and Technology — Shenyang, China

PUBLICATIONS

Accepted:

* **Zhongming Yao**, Tianyi Li, Junchang Xin, Yushuai Li, Chenxu Wang, Zhiqiong Wang, Divesh Srivastava, Christian S Jensen. VGQ: Enabling Verifiable Graph Queries on Blockchain Systems. The IEEE International Conference on Data Engineering (**ICDE**), 2025.

* Ziming Liu, Cheng Zhang, **Zhongming Yao**, Tianyi Li, Qiuye Sun, Yushuai Li. Clustered Federated Learning for Energy-Harvesting Smart Meters in P2P Energy Trading. IEEE Transactions on Green Communications and Networking (**TGCN**), 2025.

* Tianyi Li, Yushuai Li, Yumeng Song, **Zhongming Yao**, Wei Gao, David Wenzhong Gao. Networked Digital Twins for Autonomous Vehicles: A New Perspective. IEEE Transactions on Intelligent Vehicles (**TIV**), 2024.

* **Zhongming Yao**, Zhiqiong Wang, Kun Hao, Liang Wen. Efficient Blockchain Data Provenance Based on the W3C PROV Model. The International Conference on Advanced Data Mining and Applications (**ADMA**), 2023.

* Liang Wen, Zhiqiong Wang, Tingyu Cui, Caiyun Shi, Baoting Li, **Zhongming Yao**. A Fine-Grained Verification Method for Blockchain Data Based on Merkle Path Sharding. The International Conference on Advanced Data Mining and Applications (**ADMA**), 2023.

* **Zhongming Yao**, Junchang Xin, Kun Hao, Zhiqiong Wang, Wancheng Zhu. Learned Index Based Semantic Keyword Query on Blockchain, Mathematics, 2023.

* Kun Hao, Junchang Xin, Zhiqiong Wang, **Zhongming Yao**, Guoren Wang. Efficient and Secure Data Sharing Scheme on Interoperable Blockchain Database. IEEE Transactions on Big Data (**TBD**), 2023.

* Kun Hao, Junchang Xin, Zhiqiong Wang, **Zhongming Yao**, Guoren Wang. On efficient top-k transaction path query processing in blockchain database. Data & Knowledge Engineering (**DKE**), 2022.

* Sihan Dong, Junchang Xin, Kun Hao, **Zhongming Yao**, Jinyi Chen. A join query optimization algorithm in multi-blockchain environment. Journal of Zhejiang University (Engineering Science), 2021. (In Chinese)

Under Review:

* **Zhongming Yao**, Junchang Xin, Yumeng Song, Yusen Mao, Kristian Torp, Divesh Srivastava, Yushuai Li, Christian S. Jensen, Tianyi Li. VTRQ: Enabling Verifiable Trajectory Range Queries in Hybrid-Storage Blockchains. Proceedings of the VLDB Endowment (**PVLDB**), 2026.

* Wentao Xu, **Zhongming Yao**, Weihao Li, Zhenghang Song, Tianyi Li, Yushuai Li. TCRL: Temporal-Coupled Adversarial Training for Robust Constrained Reinforcement Learning in Worst-Case Scenarios. The AAAI Conference on Artificial Intelligence (**AAAI**), 2026.

* Jiachen Xu, Torben Bach Pedersen, **Zhongming Yao**, Tianyi Li, Yushuai Li. FOgym: A Bottom-Up Home Energy Management Framework Based on FlexOffer and Multi-Agent Reinforcement Learning. The AAAI Conference on Artificial Intelligence (**AAAI**), 2026.

* Qi Shen, Junchang Xin, Bingtian Dai, **Zhongming Yao**, Zhengang Liu, Xinyao Liu, Shudi Zhang, Zhiqiong Wang. Towards Heterogeneous Multimodal Sentiment Analysis with ASR Errors via Multi-Granularity Contrastive Coordination. The AAAI Conference on Artificial Intelligence (**AAAI**), 2026.

* Chenchen Yan, **Zhongming Yao**, Zhiqiong Wang, Kun Hao, Yusen Mao, Junchang Xin. FlexBC: A Flexible Blockchain Storage Mechanism Based on Data Hotness Features through Off-Chain Offloading. The International Conference on Database Systems for Advanced Applications (**DASFAA**), 2026.

* Chenchen Yan, **Zhongming Yao**, Yumeng Song, Zhiqiong Wang, Junchang Xin. Verifiable kNN Queries on Multimodal Medical Data in Hybrid-Storage Blockchain Systems. The International Conference on Bioinformatics and Biomedicine (**BIBM**), 2025.

* Jiaqi Tian, Bonan Huang, Tianyi Li, David Wenzhong Gao, **Zhongming Yao**, and Yushuai Li. FedMDN: Multi-Timescale Collaborative Energy Management for Smart Buildings. IEEE Transactions on Smart Grid (**TSG**), 2025.

* Xiaoyu Zhang, Qiuye Sun, Tianyi Li, Yumeng Song, **Zhongming Yao**, Yushuai Li. Large Language Models-Enhanced Reinforcement Learning for Smart Grid: A Survey. Journal of Modern Power Systems and Clean Energy (**MPCE**), 2025.

* Xiujie Yu, Junchang Xin, Kun Hao, **Zhongming Yao**, Zhiqiong Wang. Blockchain-Based Efficient Multi-Keyword Semantic Similarity Search with Searchable Encryption. Peer-to-Peer Networking and Applications (**PPNA**), 2025.

RESEARCH EXPERIENCE

* **Research on Provenance Data Management.** This research aims to develop a trustworthy framework for provenance data management, leveraging a blockchain system to record and maintain data version histories, thereby ensuring verifiability while enhancing query performance.

* **Research on Verifiable Graph Queries.** The research aims to improve the execution efficiency of graph queries by integrating blockchain systems with external graph databases, and to enable verifiable graph queries by designing a result verification method, thereby balancing performance and trustworthiness.

* **Research on Trajectory Range Queries.** The research aims to support efficient and trustworthy verifiable range queries over outsourced trajectory data by designing a novel and optimized authenticated data structure for managing trajectory data in hybrid blockchain systems.

PROJECT EXPERIENCE

* **Research on Large-Scale Medical Data Management.** The research focuses on the management of large-scale medical data and proposes three main technical contributions: (i) constructing a hierarchical blockchain model to improve data access and sharing efficiency across heterogeneous sources; (ii) designing a dynamic cross-chain consensus mechanism to ensure secure data exchange; and (iii) developing a modular verification method to guarantee data integrity and support real-time verification.

* **Research on Provenance Data Management and Analysis in Large-Scale Manufacturing Systems.** The research focuses on achieving trustworthy traceability in large-scale manufacturing systems, and proposes three approaches: (i) constructing a blockchain-based collaborative sharing mechanism to improve data sharing; (ii) enhancing a sharding-based consensus mechanism to support cross-domain data exchange; and (iii) developing privacy-preserving methods for data supervision throughout the product life cycle.

* **Research on Inter-Cloud Element Data Management and Analysis.** The research focuses on achieving cloud supervision and governance through the management and analysis of inter-cloud element data, making three main contributions: (i) proposing mechanisms for multi-party negotiation and dynamic inter-cloud resource reconfiguration; (ii) developing methods for inter-cloud workflow scheduling; and (iii) designing a federated governance framework to enable large-scale cross-domain collaboration.

TEACHING EXPERIENCE

Object-Oriented Programming | ***Teaching Assistant*** — Spring 2020, 2021, 2022, 2023
Northeastern University — Shenyang, China

Programming Practice Course | ***Teaching Assistant*** — Spring 2020, 2021, 2022
Northeastern University — Shenyang, China

Software Engineering | ***Teaching Assistant*** — Spring 2020
Northeastern University — Shenyang, China

Introduction to Big Data | ***Guest lecture*** — Spring 2021
Northeastern University — Shenyang, China

Computer Networks | ***Guest lecture*** — Fall 2019
Northeastern University — Shenyang, China

ACADEMIC SERVICE

Program Committee | ***The AAAI Conference on Artificial Intelligence (AAAI)*** — 2026

Reviewer | ***IEEE Network*** — 2025

Reviewer | ***IEEE International Conference on Data Mining (ICDM)*** — 2025

Reviewer | ***The Journal of Supercomputing*** — 2025

Reviewer | ***The APWeb-WAIM joint International Conference on Web and Big Data (APWeb-WAIM)*** — 2025

Reviewer | ***IEEE Transactions on Industrial Informatics (TII)*** — 2025

Reviewer | ***World Wide Web: Internet and Web Information Systems (WWWJ)*** — 2024

HONORS AND AWARDS

First class doctoral scholarship | ***Northeastern University, China*** — 2021-2023

SKILLS

Programming: Python, C/C++, Golang, SQL
Blockchain Platform: Ethereum, Hyperledger Fabric, Tendermint