



# ZHONGMING YAO

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## EDUCATION

**Aalborg University, Denmark** | *Guest PhD*

Dec. 2023 – Present

*Major:* Computer Science

Aalborg, Denmark

- *Host Supervisor:* Associate Professor Tianyi Li
- *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

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- \* **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

<b>Object-Oriented Programming</b>   <i>Teaching Assistant</i> Northeastern University	Spring 2020, 2021, 2022, 2023 Shenyang, China
<b>Programming Practice Course</b>   <i>Teaching Assistant</i> Northeastern University	Spring 2020, 2021, 2022 Shenyang, China
<b>Software Engineering</b>   <i>Teaching Assistant</i> Northeastern University	Spring 2020 Shenyang, China
<b>Introduction to Big Data</b>   <i>Guest lecture</i> Northeastern University	Spring 2021 Shenyang, China
<b>Computer Networks</b>   <i>Guest lecture</i> Northeastern University	Fall 2019 Shenyang, China

## ACADEMIC SERVICE

<b>Program Committee</b>   <i>The AAAI Conference on Artificial Intelligence (AAAI)</i>	2026
<b>Reviewer</b>   <i>IEEE Network</i>	2025
<b>Reviewer</b>   <i>IEEE International Conference on Data Mining (ICDM)</i>	2025
<b>Reviewer</b>   <i>The Journal of Supercomputing</i>	2025
<b>Reviewer</b>   <i>The APWeb-WAIM joint International Conference on Web and Big Data (APWeb-WAIM)</i>	2025
<b>Reviewer</b>   <i>IEEE Transactions on Industrial Informatics (TII)</i>	2025
<b>Reviewer</b>   <i>World Wide Web: Internet and Web Information Systems (WWW)</i>	2024

## HONORS AND AWARDS

<b>First class doctoral scholarship</b>   <i>Northeastern University, China</i>	2021-2023
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## SKILLS

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