Tang Qian

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Education

Zhejiang University Hangzhou, China
M.S., Computer Science and Technology *Sep. 2023 - Present*
- Research focus: Vector Search, Distributed Systems, Big Data Analysis

Southwest Jiaotong University Chengdu, China
B.S., Computer Science *Sep. 2019 - Jun. 2023*
- Research focus: Spatio-temporal data analysis and graph neural networks

Professional Experience

High-Dimensional Data Retrieval Systems 2025 - Present
Submitting to VLDB 2026 *Zhejiang University*
- Architected DGI, a novel framework integrating distributed graph and tree structures for billion-scale vector retrieval, achieving an exceptional balance between performance and memory utilization.
- Developed a boundary-aware node importance model that reduces cross-partition communication by 67% while maintaining optimal workload distribution across the system.
- Engineered a hierarchical sparse-dense index layer that achieves 85% recall with merely 3% of the memory footprint required by traditional graph approaches.
- Implemented a sophisticated multi-entry parallel search framework with dynamic termination mechanisms, resulting in a 4.3x throughput increase under high concurrency conditions.

Distributed Indexing for Metric Space 2023 - 2024
Accepted by TKDE 2025 *Zhejiang University*
- Developed DIMS, a pioneering distributed metric index framework that effectively bridges the efficiency-accuracy gap for similarity search across heterogeneous data types.
- Formulated a sophisticated three-tier partitioning algorithm that reduces workload imbalance by 72% while preserving global pruning effectiveness in distributed environments.
- Engineered an adaptive multi-layer indexing hierarchy that intelligently routes queries through global, intermediate, and local structures, eliminating redundant computations.
- Devised a theoretical cost optimization model that dynamically tunes system parameters based on data distribution characteristics and network conditions.
- Demonstrated 2x lower latency for range queries and 50x speedup for k-NN search compared to SOTA solutions.

Multi-Modal Data Similarity Search Framework 2024 - 2025
Submitting to VLDB 2026 *Zhejiang University*
- Pioneered OneDB, an advanced distributed multi-metric data similarity search system that processes diverse multi-modal data with superior accuracy and efficiency compared to leading solutions.
- Designed an innovative lightweight modality weight learning model that effectively captures inter-modality relationships, enabling precise personalized similarity queries with minimal training samples.
- Implemented a cutting-edge dual-layer indexing strategy that combines data and modality granularity partitioning to achieve optimal load balancing in distributed environments.
- Created a sophisticated end-to-end parameter auto-tuning module leveraging deep reinforcement learning to optimize system performance across dynamic computational environments.
- Demonstrated significant performance gains of 2.5-5.75x speedup over existing solutions and 12.63%-30.75% accuracy improvement compared to vector database systems through rigorous evaluations on real-world datasets.

Query-aware Vector Database System 2024 - 2025
Accepted by TKDE 2026 *Zhejiang University*
- Developed QBase, an innovative query-aware vector search system that strategically exploits query vector similarities to dramatically optimize search performance.
- Designed an enhanced A3V-tree indexing structure capable of efficiently processing multi-vector searches with significantly improved performance metrics.
- Implemented a sophisticated algorithm that intelligently determines vector similarity thresholds based on comprehensive dataset distribution characteristics.
- Engineered a versatile system supporting six distinct vector query types with an advanced cost-based query plan selection mechanism for optimal execution strategies.

Graph-based Traffic Analysis Platform 2021 - 2022

Accepted by IJCNN 2022 *Southwest Jiaotong University*

- Proposed a groundbreaking Spatio-Temporal Latent Graph Structure Learning (ST-LGSL) framework that significantly enhances traffic forecasting accuracy.
- Designed an innovative MLP-kNN graph generator that seamlessly integrates geographical information with node similarity metrics to capture complex traffic network relationships.
- Achieved state-of-the-art performance metrics on METR-LA and PEMS08 real-world datasets for both traffic speed and flow prediction, outperforming existing benchmarks.

Publications

Yifan Zhu, Chengyang Luo, **Tang Qian**, Lu Chen, Yunjun Gao, and Baihua Zheng. *DIMS: Distributed Index for Similarity Search in Metric Spaces. IEEE Trans. Knowledge Data Eng.* (TKDE), 2024.

Boyu Tan, **Tang Qian**, Ziquan Fang, Lu Chen, Mengzhao Wang, Qilong Wang, and Jingwen Zhao. *QBase: A Query Aware Vector Search System. IEEE Trans. Knowledge Data Eng.* (TKDE), to appear 2026.

Jiabin Tang, **Tang Qian**, Shijing Liu, Shengdong Du, Jie Hu, and Tianrui Li. *Spatio-Temporal Latent Graph Structure Learning for Traffic Forecasting. International Joint Conference on Neural Networks* (IJCNN), 2022.

Academic Experience

- Oral Presentation in IJCNN 2022, Padua, Italy, July 18-23, 2022
- Participant in the 22nd China Computer Federation (CCF) Summer School on Chinese Databases

Selected Awards And Honors

Graduate Awards - Zhejiang University

- Huawei Elite Scholarship (Top 2%), 2023
- First-class Student Scholarship in Zhejiang University (Top 3%), 2023
- First Prize in 2024 CCF China Database Summer Competition
- Outstanding Graduate Student, 2023
- Excellent Graduate Student Leader, 2023
- Outstanding Youth League Member, 2023

Undergraduate Awards - Southwest Jiaotong University

- Outstanding Graduate of Sichuan Province, 2023
- Sishi Yanghua Medal of Southwest Jiaotong University (Top 0.1%), 2022
- First-class Scholarship of Leeds School (2021-2022), 2022
- Outstanding Youth League Cadre of Southwest Jiaotong University, 2022
- Exemplary Outstanding Student of Southwest Jiaotong University, 2021
- First-class Scholarship of Leeds School (2020-2021), 2021
- University-level Model League Branch Honor, 2021
- National Scholarship, 2020
- Outstanding Student of Southwest Jiaotong University, 2020

Skills & Extracurricular Interests

- C++, Scala, Python, Spark, Hadoop, Distributed Computing
- President of Student Union of College of Computer Science and Technology, Zhejiang University, 2023-2024.
- Class Monitor for Software Engineering Class 6, Grade 2023, Zhejiang University, 2023-2025.
- Deputy Secretary of the College League Committee, Southwest Jiaotong University, 2021-2023
- President of the College Student Union, Southwest Jiaotong University, 2021-2022
- Class Monitor for Computer Science Class 1, Grade 2019, Southwest Jiaotong University, 2020-2023