

Zirui Wang

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RESEARCH INTERESTS

Computer Systems, Data Systems, Systems for ML

EDUCATION

Boston University

Master of Science in Computer Science

Boston, MA

Sept. 2022 – Present

Hangzhou Dianzi University

Bachelor of Engineering in Computer Science and Technology

Hangzhou, China

Sept. 2018 – Jun. 2022

PUBLICATION

- **VLDB'24** *Everything You Always Wanted to Know About Storage Compressibility of Pre-Trained ML Models but Were Afraid to Ask.*
50th International Conference on Very Large Data Bases (**VLDB'24**), (*Under review*).
Zhaoyuan Su, Ammar Ahmed, **Zirui Wang**, Ali Anwar, Yue Cheng.
- **ICCV'21** *Temporal Cue Guided Video Highlight Detection with Low-Rank Audio-Visual Fusion.*
International Conference on Computer Vision (**ICCV'21**).
Qinghao Ye*, Xiyue Shen*, Yuan Gao*, **Zirui Wang***, Qi Bi, Ping Li, Guang Yang.

RESEARCH PROJECTS

ELF Compression Algorithm Acceleration

Jul. 2023 – Oct. 2023

Remote work with Prof.Cheng

Boston, MA

- Optimized ELF compression algorithm to increase the compression rate of 32-bit float floating-point numbers from around 1.2x to 1.25x.
- Achieved parallel acceleration of ELF algorithm on SmartSSD, and used P2P transfer to significantly improve the I/O throughput, with the compression throughput reaching 1.3 GB/s in a single compute unit.
- The paper was submitted to **VLDB'24**.

Stream Processing System with State Disaggregation

Feb. 2023 – May 2023

Boston University

Boston, MA

- Designed and implemented a streaming data processing system capable of automated task allocation, loading balancing, and state storage disaggregation.
- Implemented operators that handle the computation of stream data, including **stateless** operators such as Filter, KeyBy, Map, Union, and **stateful** operators such as Reduce, Count, and Sliding Window.
- Developed Task Manager that achieves state storage management, data I/O, and distribution. Implemented Control Plane to achieve load balancing, state routing, and other functions.
- Wrote test scripts in Java to test the latency of the system using local storage as well as remote state storage. Used **Prometheus** for real-time status monitoring of system latency.

Video Highlight Detection Based on Deep Learning Method

Sept. 2020 – Jul. 2021

Hangzhou Dianzi University

Hangzhou, China

- Used a hierarchical temporal context coding structure and proposed a low-rank decomposition-based video and audio fusion method to improve the detecting accuracy and speed. Successfully **exceeding the SOTA level** and improving the mAP value from 0.584 to 0.629. Paper accepted by **ICCV2021**.

PROJECTS

Key-Value storage database engine

Mar. 2023 – Jun. 2023

- Based on **Bistcask**, developed a log-structure based KV storage database engine.
- Implemented basic CRUD operations and support transactions.
- Optimized memory index (support ART, B+ Tree, B Tree), optimized file I/O using MMap to speed up file reading, provided database state query to speed merge process.
- Completed support for HTTP, Redis data structures and the Redis protocol.

Sharded Key-Value storage system with fault-tolerant

May 2022 – Sept. 2022

- Based on the **Raft** algorithm, implemented leader election and log replication mechanisms.
- Developed **fault tolerance** mechanisms, including log compaction and snapshotting.
- Designed and implemented **sharding** mechanisms for distributing data across multiple servers.

Alibaba Tianchi Global Video Cloud Innovation Challenge

Mar. 2021 – Jul. 2021

- According to the competition problem, the Fast Instance Segmentation + Mask Refinement method is proposed to solve the problems of motion blur, frequent scene switching, and character edge refinement, making it possible to perform segmentation quickly and accurately.
- The competition ended up with a **bronze prize** 🏆 (ranking 5/2904).

TECHNICAL SKILLS

Programming Language: Java, Go, Python, C/C++

Framework: PyTorch, Flink

Tools&Platforms: Git, Docker, AMD Vitis, Redis, Linux, SQL, Github, GitLab

ENGLISH LEVEL

TOEFL iBT: 103 (S 23)