DAOCE WANG

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EDUCATION

Washington State University, Pullman, WA

2020 PH.D. CANDIDATE in Computer Science PH.D. ADVISOR: Dr. Dingwen Tao

laboratory High Performance Data Analytics & Computing Lab (HiPDAC)

University of Florida, Gainesville, FL

2018-2020 Master of Science in Computer Sciences

University of Electronic Science and Technology of China, Chengdu, China

2013-2018 Bachelor of Science in Computer Science and Engineering

RESEARCH

Skills C/C++, Python, elixir, MPI, Java, MATLAB

Interests Lossy Compression, Adaptive Mesh Refinement, Tensor Decomposition, Scientific Data Management, HPC, Internet of Things (IoT), Big Data Analytics

PUBLICATION

HPDC '22 **Daoce Wang**, Jesus Pulido, Pascal Grosset, Jiannan Tian, James Ahrens, and Dingwen Tao. "TAC: Optimizing Error-Bounded Lossy Compression for Three Dimensional Adaptive Mesh Refinement Simulations."

CLUSTER '21 Bo Fang, **Daoce Wang**, Sian Jin, Quincey Koziol, Zhao Zhang, Qiang Guan, Suren Byna, Sriram Krishnamoorthy and Dingwen Tao (1st and 2nd authors contributed equally). "Characterizing Impacts of Storage Faults on HPC Applications: A Methodology and Insights."

CHINACOM '17 Baihua Ji, Xiao Liu, Tenghui Ke, Rongjie Kuang, Zibin Gao and **Daoce Wang**. "Research on the Monitoring Method of the Road Communication Network Quality Based on Vehicle Borne Internet of Things."

ACADEMIC & WORK EXPERIENCE

Graduate Research Assistant

HiPDAC Lab, Washington State University, 2020 August–present

- Research in designing an efficient high-efficiency hybrid lossy compressor based on SZ compressor and HOSVD to improve the ability of SZ compressor to compress high-dimensional data.
- Research on how real HPC application reacts to the data corruptions, and provide application-specific insights towards building fault-tolerant applications.

Summer Internship

Los Alamos National Laboratory, 2021 June–2021 August

- Working on evaluate and implement the best lossy compression algorithms and parameters for use in an in-situ cosmology application.
- Investigated how to effectively use error bounded lossy compression in adaptive mesh refinement (AMR) based HPC applications and integrated the SZ lossy compressor into the well-known AMR-based cosmology simulation code Nyx.

Development Internship

Chengyi Technology Co., Ltd., Chengdu, China, 2018 June–2018 August

- Complete the Android bookkeeping app, support different consumption types and quarterly summaries, and log in to the cloud to synchronize data.
- Complete the Android calculator app, which supports multi step calculations, bracket recognition, and historical result recording.

- Responsible for Android inter face development, algorithm implementation, database table design, interactive api design.

Development Internship

Huadi Technology Co., Ltd., Chengdu, China, 2015 June–2015 August

- Participated in the development of the Android shopping platform and realized basic consumer functions, including browsing, collection, shopping cart, search, etc. Owner management functions, including release of goods, delisting, order management, etc.
- Mainly responsible for the role of product manager, responsible for requirements analysis, Android UI development, layout, black and white box testing, and product reporting and won the company outstanding internship project award.

RESEARCH PROJECT

TAC: An Error-Bounded Lossy compressor for 3D Adaptive Mesh Refinement Data *Jun. 2021–present*

- Improve error-bounded lossy compression for Adaptive Mesh Refinement (AMR) simulation data.
- Leverage high-dimensional (e.g., 3D) compression for each refinement level of AMR data. Propose three pre-process strategies and adaptively use them based on the data characteristics.
- Can improve the compression ratio by up to 3.3x under the same data distortion, compared to the state-of-the-art method.
- Has the flexibility of to tune the error bound for each level based on the needed of application.

HYLOC: Objective-Driven Adaptive Hybrid Lossy Compression Framework *Aug. 2020–present*

- An efficient, adaptive, hybrid framework that can always choose the best-fit compression strategy.
- The project aims to decouple the state-of-the-art error-bounded lossy compression approaches into multiple stages and effectively models the working efficiency of particular approaches in each stage.
- The project will also develop a loosely-coupled framework to aggregate the decoupled compression stages together and also explores as many compression pipelines composed of different stages as possible.
- Now we are studying how to adjust the SZ compressor to make it compress the core tensor produce by HOSVD more effectively.

FFIS: FUSE-Based Fault Injection Framework *Sep. 2020–Jan. 2021*

- Systematically introduced faults into the application layer to model the errors originated from SSDs.
- Able to plant different I/O related faults into the data returned from underline file systems and characterize the outcomes of the applications against those faults.
- Demonstrated the usage of FFIS with two data formats and three representative real HPC applications, show how each data format and application reacts to the data corruptions.

NBA Data Website *graduate project*

- Captured 200,000 NBA game data, cleaned and adapted the data and loaded it into the database. The front and back ends are written in php, which supports query, analysis and summary of player and team data.
- Mainly responsible for functional design, ER diagram, UI design, database schema design and implementation, data organization and loading, and SQL query writing.

Java Compiler *graduate project*

- A Java language compiler implemented in Java. First, enter text into the lexer part and perform lexical analysis to obtain a token list. Then enter the token into the parser part to generate an abstract syntax tree. Then generate a symbol table for the tree and perform semantic check. After that, the ASM operation instructions are used to obtain Java byte code, and finally run on the JVM.

Plane Geometry Human Like Answering System *undergraduate project*

- Based on the analysis of expert system and production system, the project uses Drools rule engine as inference engine and uses Java multi-threading technology to design and implement a parallel reasoning system based on plane geometry multi-inference engine.
- First, the knowledge in plane geometry is classified and the appropriate knowledge representation method

is selected. Secondly, use the Drools rule engine as the inference engine of the inference system. When designing knowledge inference, the rule based production system structure is adopted and the forward reasoning method is used.

Awards

Cluster 2021 Student Attendance Award