Jinyang Liu

Contact

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EDUCATION

Ph.D. in Computer Science

September 2019-Present

University of California, Riverside, CA

M.S. in Data Science

September 2016-July 2019

Peking University, Beijing, China

B.S. in Mathematics and Applied Mathematics

September 2011–July 2016

Peking University, Beijing, China

RESEARCH Interest **High-Performance Computing**

Scientific Data Management, Analysis, and Reduction

Deep Learning in High-Performance Computing and Data Compression

AI for Science

Work Experience **Research Intern**, Extreme Scale Resilience Group, Argonne National Laboratory, Lemont, IL, May 2020–Present

Graduate Student Researcher, Supercomputing Laboratory, University of California, Riverside, Riverside, CA, September 2019–Present

Honours and Awards Best Paper Finalist in International Conference on Supercomputing 2023 (ICS '23).
Dissertation Year Program Fellowship, University of California, Riverside.
2023
2023
2021 R&D 100 Award (SZ compression framework).
Outstanding Graduate Student, Peking University.
Outstanding Research Award, Peking University.
2018

PROJECTS
PARTICAPATED

- NSF CSSI ROCCI: Integrated Cyberinfrastructure for In Situ Lossy Compression Optimization Based on Post Hoc Analysis Requirements
- DOE ASCR SDR: Scalable Dynamic Scientific Data Reduction
- NSF CDS&E HyLoC: Objective-driven Adaptive Hybrid Lossy Compression Framework for Extreme-Scale Scientific Application
- ECP VeloC/SZ: Ensuring high reliability for long-running exascale simulations and reducing the data while keeping important scientific outcomes intact
- ARAMCO: Exploration of Lossy Data Compression for Seismic Imaging Application

REFEREED CONFERENCE PUBLICATIONS

- [SIGMOD '24] Jinyang Liu, Sheng Di, Kai Zhao, Xin Liang, Sian Jin, Zizhe Jian, Jiajun Huang, Shixun Wu, Zizhong Chen, and Franck Cappello. 2023. "High-performance Effective Scientific Error-bounded Lossy Compression with Auto-tuned Multi-component Interpolation."
- [ICS '23 (Best Paper Finalist)] Jinyang Liu, Sheng Di, Kai Zhao, Xin Liang, Zizhong Chen, and Franck Cappello. "FAZ: A flexible auto-tuned modular error-bounded compression framework for scientific data." In *Proceedings of the 37th International Conference on Supercomputing*, pp. 1-13. 2023.
- [SC '22] Jinyang Liu, Sheng Di, Sian Jin, Kai Zhao, Xin Liang, Zizhong Chen, and Franck Cappello. "Dynamic quality metric oriented error bounded lossy compression for scientific datasets." In SC22: International Conference for High Performance Computing, Networking, Storage and Analysis, pp. 1-15. IEEE, 2022.
- [BigData '23] Jinyang Liu, Sheng Di, Kai Zhao, Xin Liang, Zizhong Chen, and Franck Cappello. "Scientific Error-bounded Lossy Compression with Super-resolution Neural Networks." In 2023 IEEE International Conference on Big Data (BigData), pp. 229-236. IEEE Computer Society, 2023.
- [Cluster '21] Jinyang Liu, Sheng Di, Kai Zhao, Sian Jin, Dingwen Tao, Xin Liang, Zizhong Chen, and Franck Cappello. "Exploring autoencoder-based error-bounded compression for sci-

- entific data." In 2021 IEEE International Conference on Cluster Computing (CLUSTER), pp. 294-306. IEEE, 2021.
- [BigData '21] Jinyang Liu, Sihuan Li, Sheng Di, Xin Liang, Kai Zhao, Dingwen Tao, Zizhong Chen, and Franck Cappello. "Improving lossy compression for SZ by exploring the best-fit lossless compression techniques." In 2021 IEEE International Conference on Big Data (Big Data), pp. 2986-2991. IEEE, 2021.
- [IPDPS '24] Zizhe Jian, Sheng Di, Jinyang Liu, Kai Zhao, Xin Liang, Haiying Xu, Robert Underwood, Shixun Wu, Jiajun Huang, Zizhong Chen, and Franck Cappello. "CliZ: Optimizing Lossy Compression for Climate Datasets with Adaptive Fine-tuned Data Prediction."
- [IPDPS '24] Jiajun Huang, Sheng Di, Xiaodong Yu, Yujia Zhai, Zhaorui Zhang, Jinyang Liu, Xiaoyi Lu, Ken Raffenetti, Hui Zhou, Kai Zhao, Zizhong Chen, Franck Cappello, Yanfei Guo, and Rajeev Thakur. "An Optimized Error-controlled MPI Collective Framework Integrated with Lossy Compression."
- [ICDE '24] Mingze Xia, Sheng Di, Franck Cappello, Pu Jiao, Kai Zhao, Jinyang Liu, Xuan Wu, Xin Liang, and Hanqi Guo. "Preserving Topological Feature with Sign-of-Determinant Predicates in Lossy Compression: A Case Study of Vector Field Critical Points."
- [HiPC '23] Arham Khan, Sheng Di, Kai Zhao, Jinyang Liu, Kyle Chard, Ian Foster, and Franck Cappello. "SECRE: Surrogate-based Error-controlled Lossy Compression Ratio Estimation Framework."
- [HiPC '23] Pu Jiao, Sheng Di, Jinyang Liu, Xin Liang, and Franck Cappello. "Characterization and Detection of Artifacts for Error-controlled Lossy Compressors."
- [ICS '23] Shixun Wu, Yujia Zhai, Jinyang Liu, Jiajun Huang, Zizhe Jian, Bryan Wong, and Zizhong Chen. "Anatomy of High-Performance GEMM with Online Fault Tolerance on GPUs." In Proceedings of the 37th International Conference on Supercomputing, pp. 360-372. 2023.
- [Cluster '23] Jiajun Huang, Kaiming Ouyang, Yujia Zhai, Jinyang Liu, Min Si, Ken Raffenetti, Hui Zhou, Atsushi Hori, Zizhong Chen, Yanfei Guo, and Rajeev Thakur. PiP-MColl: Process-in-Process-based Multi-object MPI Collectives.
- [BigData '23] Kaiming Ouyang, Vincent Tran, Jinyang Liu, Bryan M. Wong, and Zizhong Chen. "KF K-means: A High Performance K-means Implementation using Kernel Fusion."
- [ICS '21] Yujia Zhai, Elisabeth Giem, Quan Fan, Kai Zhao, Jinyang Liu, and Zizhong Chen. "FT-BLAS: a high performance BLAS implementation with online fault tolerance." In Proceedings of the ACM International Conference on Supercomputing, pp. 127-138. 2021.
- [FAIML '19] Shuai Wang*, Jinyang Liu*, Ye Qiu, Zhiyi Ma, Junfei Liu, and Zhonghai Wu. "Deep learning based code completion models for programming codes." In *Proceedings of the 2019 3rd International Symposium on Computer Science and Intelligent Control*, pp. 1-9. 2019. (*: Co-first authors)
- [ICCSE '19] Jinyang Liu, Ye Qiu, Zhiyi Ma, and Zhonghai Wu. "Autoencoder based API recommendation system for Android programming." In 2019 14th International Conference on Computer Science Education (ICCSE), pp. 273-277. IEEE, 2019.

Under-review Conference Papers • [TBD] Jinyang Liu*, Jiannan Tian*, Shixun Wu*, Sheng Di, Boyuan Zhang, Yafan Huang, Kai Zhao, Guanpeng Li, Dingwen Tao, Zizhong Chen, and Franck Cappello. "cuSZ-I: High-Fidelity Error-Bounded Lossy Compression for Scientific Data on GPUs." (*: Co-first authors)

REFEREED WORKSHOP PUBLICATIONS • [IWBDR-4] Jiajun Huang, Jinyang Liu, Sheng Di, Yujia Zhai, Zizhe Jian, Shixun Wu, Kai Zhao, Zizhong Chen, Yanfei Guo, and Franck Cappello. "Exploring Wavelet Transform Usages for Error-bounded Scientific Data Compression." In 2023 IEEE International Conference on Big Data (BigData), pp. 4233-4239. IEEE, 2023.

REFEREED JOURNAL PUBLICATIONS • [TPDS] Yujia Zhai, Elisabeth Giem, Kai Zhao, Jinyang Liu, Jiajun Huang, Bryan Wong, Christian Shelton, and Zizhong Chen, "FT-BLAS: A Fault Tolerant High Performance BLAS Implementation on x86 CPUs." *IEEE Transactions on Parallel and Distributed Systems*.

Conference Posters

- [Cluster '23] Arham Khan, Sheng Di, Kai Zhao, Jinyang Liu, Kyle Chard, Ian Foster, and Franck Cappello. "An Efficient and Accurate Compression Ratio Estimation Model for SZx."
- [HPDC '23] Jiajun Huang, Kaiming Ouyang, Yujia Zhai, Jinyang Liu, Min Si, Ken Raffenetti, and Hui Zhou. "Accelerating MPI Collectives with Process-in-Process-based Multi-object Techniques." arXiv preprint arXiv:2305.10612 (2023).

Services

- Programs Committee: IWBDR 2023.
- Reviewers: IPDPS 2024, ICS 2023, DCC 2023, HDIS 2022, IWBDR 2022, ICMLA 2021.
- Artifact Evaluation Committee: SC 2024

Teaching

- Teaching Assistant, CS211: High Performance Computing, University of California, Riverside, Riverside, CA, September–December, 2022.
- Teaching Assistant, CS211: High Performance Computing, University of California, Riverside, Riverside, CA, September–December, 2021.
- Teaching Assistant, CS160: Concurrent Programming and Parallel Systems, University of California, Riverside, Riverside, CA, January–March, 2021.
- Teaching Assistant, CS211: High Performance Computing, University of California, Riverside, Riverside, CA, September–December, 2020.

Talks and Presentations

- 2024/03, research seminar, Managing Exa-scale Scientific Data with Error-bounded Lossy Compression, Oregon State University, Corvallis, OR, USA.
- 2024/02, research seminar, Managing Exa-scale Scientific Data with Error-bounded Lossy Compression, University of Houston, Houston, TX, USA.
- 2024/01, research seminar, Managing Exa-scale Scientific Data with Error-bounded Lossy Compression, University of South Florida, Tampa, FL, USA.
- 2023/06, presentation, FAZ: A flexible auto-tuned modular error-bounded compression framework for scientific data, the 37th International Conference on Supercomputing, Orlando, FL, USA.
- 2022/11, presentation, **Dynamic quality metric oriented error bounded lossy compression for scientific datasets**, SC22: International Conference for High Performance Computing, Networking, Storage and Analysis, Dallas, TX, USA.
- 2021/12, presentation, Improving lossy compression for SZ by exploring the best-fit lossless compression techniques, 2021 IEEE International Conference on Big Data (Big Data), online.
- 2021/09, presentation, Exploring autoencoder-based error-bounded compression for scientific data, 2021 IEEE International Conference on Cluster Computing (CLUSTER), online.

SOFTWARE DEVELOPED OR PARTICIPATED

- SZ3, https://github.com/szcompressor/SZ3, SZ3: A Modular Error-bounded Lossy Compression Framework for Scientific Datasets.
- QoZ, https://github.com/szcompressor/QoZ, QoZ: Dynamic Quality Metric Oriented Error Bounded Lossy Compression for Scientific Datasets.
- HPEZ, https://github.com/JLiu-1/HPEZ, HPEZ: High-performance Effective Scientific Error-bounded Lossy Compression with Auto-tuned Multi-component Interpolation.