# Jinyang Liu


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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
Lossy Compression & Data reduction &Data Management
Deep Learning in High Performance Computing
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*

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

- [**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, 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.
- [**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 scientific 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 teques." In *2021 IEEE International Conference on Big Data (Big Data)*, pp. 2986-2991. IEEE, 2021.
- [**ISCSIC '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.

- [**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.
- [**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.
- [**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.

Under-review Conference Papers

- [**Submitted to 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.
- [**Submitted to PPoPP '24**] Jiajun Huang, Sheng Di, Xiaodong Yu, Yujia Zhai, **Jinyang Liu**, Yafan Huang, Ken Raffenetti, Hui Zhou, Kai Zhao, Zizhong Chen, Franck Cappello, Yanfei Guo, and Rajeev Thakur. gZCCL: Compression-Accelerated Collective Communication Framework for GPU Clusters.
- [**Submitted to PPoPP '24**] Shixun Wu, Yujia Zhai, **Jinyang Liu**, Jiajun Huang, Zizhe Jian, Yiliu Li, and Zizhong Chen. TurboFFT: A High-Performance Fast Fourier Transform with Fault Tolerance on GPUs.
- [**Submitted to 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.
- [**Submitted to 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.
- [**Submitted to HiPC '23**] Pu Jiao, Sheng Di, **Jinyang Liu**, Xin Liang, and Franck Cappello. Characterization and Detection of Artifacts for Error-controlled Lossy Compressors.

Refereed Journal Publications

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

Conference Posters

- [**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:** ICS 2023, DCC 2023, HDIS 2022, IWBDR 2022, ICMLA 2021

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

- 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, 2021 IEEE International Conference on Big Data (Big Data), online.

- 2021/09, presentation, 2021 IEEE International Conference on Cluster Computing (CLUSTER), online.

## Honours and Awards

- Best Paper Finalist in International Conference on Supercomputing 2023 (ICS '23). **2023**
- Dissertation Year Program Fellowship, University of California, Riverside **2023**
- 2021 R&D 100 Award (SZ compression framework). **2021**
- Outstanding Graduate Student, Peking University. **2019**
- Outstanding Research Award, Peking University. **2018**

## 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.

## reference

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