PU JIAO

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Lexington, KY, United States

Research Interests

High-Performance Computing
Scientific Data Management, Analysis, and Reduction
Deep Learning in High-Performance Computing and Data Compression

Education

- **University of Kentucky** *Expected May 2026*
  Ph.D. in Computer Science Lexington, KY
- **Missouri University of Science and Technology** *May 2022*
  M.S. in Civil Engineering Rolla, MO
- **Institute of Engineering Mechanics, China Earthquake Administration** *May 2019*
  M.Eng. in Structural Engineering Harbin, China
- **Xi'an Jiaotong University** *June 2016*
  B.Eng. in Civil Engineering Xi'an, China

Academic Experience

- **Argonne National Laboratory** *August 2022 - Present*
  Visiting Graduate Student Lemont, IL
  - Research on high-performance computing and data compression.
  - Collaborated with multi-institutional teams on scientific data management and analysis.
  - Developed novel algorithms for compression quality improvement.

- **University of Kentucky** *August 2022 - Present*
  Research Assistant Lexington, KY
  - Led research on artifact characterization and mitigation for error-controlled lossy compression, resulting in publications at VLDB, IPDPS, and ICDE.
  - Developed novel adaptive quantization algorithms and quantity-of-interest preservation frameworks for scientific data compression.
  - Collaborated with Argonne National Laboratory and multi-institutional teams on high-performance computing and compression optimization.

- **Missouri University of Science and Technology**
  Research Assistant
  - Computer Science Department (January 2022 - July 2022): Data compression.
  - Civil Engineering Department (September 2019 - December 2021): Research activities include UAV assisted bridge inspection, CFD Simulation, structutral simulation.

PUBLICATIONS

1. **[IPDPS'26] Jiao, Pu**, Sheng Di, Jiannan Tian, Mingze Xia, Xuan Wu, Yang Zhang, Xin Liang, Franck Cappello. **Mitigating Artifacts in Pre-quantization Based Scientific Data Compressors with Quantization-aware Interpolation**.
2. **[VLDB'25]** Jinyang Liu*, **Pu Jiao***, Kai Zhao, Xin Liang, Sheng Di, Franck Cappello,(2025). **QPET: A Versatile and Portable Quantity-of-Interest-Preservation Framework for Error-Bounded Lossy Compression**. *Proceedings of the VLDB Endowment*, Vol. 18. 2025. (*Equal contribution)
3. **[IPDPS'25] Pu Jiao**, Sheng Di, Mingze Xia, Xuan Wu, Jinyang Liu, Xin Liang, Franck Cappello (2025). **Improving the Efficiency of Interpolation-Based Scientific Data Compressors with Adaptive Quantization Index Prediction**. In *2025 IEEE International Parallel and Distributed Processing Symposium (IPDPS)*. IEEE. 2025.
4. **[IPDPS'25]** Wu Xuan, Sheng Di, Ren Congrong, **Pu Jiao**, Mingze Xia, Cheng Wang, Hanqi Guo, Xin Liang, Franck Cappello (2025). **Enabling Efficient Error-controlled Lossy Compression for Unstructured Scientific Data**. In *2025 IEEE International Parallel and Distributed Processing Symposium (IPDPS)*. IEEE. 2025. **[Best Paper Award]**
5. **[ICDE'25]** Mingze Xia, Bei Wang, Yuxiao Li, **Pu Jiao**, Xin Liang, Hanqi Guo (2025). **TspSZ: An Efficient Parallel Error-Bounded Lossy Compressor for Topological Skeleton Preservation**. In *2025 IEEE 41st International Conference on Data Engineering (ICDE)*, pp. 3682-3695. IEEE. May 2025. DOI: 10.1109/ICDE65448.2025.00275
6. **[ICDE'24]** Mingze Xia , Sheng Di, Franck Cappello, **Pu Jiao**, Kai Zhao, Jinyang Liu, Xuan Wu, Xin Liang, Handi Guo (2024). **Preserving Topological Feature with Sign-of-Determinant Predicates in Lossy Compression: A Case Study of Vector Field Critical Points**. In *2024 IEEE 40th International Conference on Data Engineering (ICDE)*, pp. 4979-4992. IEEE. May 2024. DOI: 10.1109/ICDE60146.2024.00378
7. **[HiPC'23] Pu Jiao**, Sheng Di, Jinyang Liu, Xin Liang, Franck Cappello (2023). **Characterization and Detection of Artifacts for Error-Controlled Lossy Compressors**. In *2023 IEEE 30th International Conference on High Performance Computing, Data, and Analytics (HiPC)*, pp. 117-126. IEEE. December 2023, Goa, India. DOI: 10.1109/HiPC58850.2023.00027
8. **[VLDB'22] Pu Jiao**, Sheng Di, Hanqi Guo, Kai Zhao, Jiannan Tian, Dingwen Tao, Xin Liang, Franck Cappello (2022). **Toward Quantity-of-Interest Preserving Lossy Compression for Scientific Data**. *Proceedings of the VLDB Endowment*, Vol. 16, Issue 4, pp. 697-710. DOI: 10.14778/3574245.3574264s
9. Ma, Pengfei, Li, Jiaoli, Zhuo, Ying, **Jiao, Pu**, Chen, Genda (2023). **Coating Condition Detection and Assessment on the Steel Girder of a Bridge through Hyperspectral Imaging**. *Coatings*, Vol. 13, Issue 6, pp. 1008. DOI: 10.3390/coatings13061008
10. Yuan, Xinzhe, Chen, Genda, **Jiao, Pu**, Li, Liujun, Han, Jun, Zhang, Haibin (2022). **A neural network-based multivariate seismic classifier for simultaneous post-earthquake fragility estimation and damage classification**. *Engineering Structures*, Vol. 255, pp. 113918. DOI: 10.1016/j.engstruct.2022.113918
11. Yuan, Xinzhe, Tanksley, Dustin, **Jiao, Pu**, Li, Liujun, Chen, Genda, Wunsch, Donald (2021). **Encoding time-series ground motions as images for convolutional neural networks-based seismic damage evaluation**. *Frontiers in Built Environment*, Vol. 7, pp. 660103. DOI: 10.3389/fbuil.2021.660103

TEACHING EXPERIENCE

• **University of Kentucky** *August 2022 - Present*
Teaching Assistant, Computer Science Department Lexington, KY

- **CS216: Intro to Software Engineering Techniques**
  - Led in-person lab sessions for two sections , guided students through programming assignments.
  - Received "Excellent" ratings and 4.1-4.4/5 student evaluations for clarity and debugging assistance.
- **CS218: Advanced Programming and Operating System Interfaces**
  - Guided students through programming assignments and held regular office hours.
  - Graded assignments promptly and participated in TA meetings.

SERVICE

- **Reviewer:** IEEE Transactions on Parallel and Distributed Systems, Frontiers of Computer Science.
- **Conference Volunteer:** Student Volunteer, SC24 and SC25

AWARDS

- **Best Paper Award, IPDPS 2025**
- **SC25 Travel Grant**
- **SC24 Travel Grant**

SKILLS

- **Programming Languages:** C++, Python, JavaScript, Java, SQL, R, MATLAB
- **High-Performance Computing:** MPI, OpenMP, CUDA, parallel algorithms, scientific computing
- **Build Systems & Tools:** CMake, Spack, Git, Linux/Unix systems
- **Data Science & Analysis:** NumPy, Pandas, SciPy, Matplotlib, scikit-learn
- **Databases:** MongoDB, MySQL, SQLite
- **Compression Technologies:** SZ2.1, SZ3, SZx, FPZIP, ZFP, lossy compression algorithms
- **Simulation Software:** OpenSees, CFD, ANSYS, structural analysis tools
- **Research Methodologies:** Algorithm design, performance optimization, artifact detection, experimental validation