Zhimin Li | Visualization, XAI, HPC

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Education

University of Utah
PhD, Computing *2016-2024*
Dissertation: Interactive Tracking, Visualization, and Profiling Error Propagation in HPC numerical kernel and Neural Network Model

Advisor: Valerio Pascucci

University of Utah
Bachelor of Computer Science *2012-2015*
Thesis: "G-MAP: A High Dimension Data Grand Tour Map"

University of Utah
Bachelor of Applied Math *2012-2015*
Member of Pi Mu Epsilon

Work Experience

University of Vanderbilt

Postdoctoral Scholar *Oct,2024 – present*
Advisors: Joshua A. Levine and Matthew Berger
Perform machine learning research that focuses on improving the modeling ability of neural networks (implicit neural representation) on large-scale scientific data compression and exploration. Develop a method to detect the hallucination factors of multi-modal large language models in understanding common data visualizations.

University of Utah

Research Assistant *2017 – 2024*
My research focus encompasses the fields of visualization, explainable AI, and high-performance computing. I am interested in designing novel data visualization techniques to assist researchers from various scientific domains in studying large datasets and complex computational models.

Lawrence Livermore National Laboratory

Apply Lossy Compression in Generative Model Training *May 2023 Aug 2023*
mentor: Harshitha Menon and Peter Lindstrom
Apply state-of-the-art lossy compression technique on generative model training for scientific simulation. The main goal is to reduce the size of training data (3.5TB and 400GB) without affecting the performance of the generative surrogate model. Meanwhile, the new training pipe requires low computational memory, storage, and I/O requirements.

Model and Predict Silent Error Propagation *May 2019 Aug 2019*
mentor: Harshitha Menon and Kathryn Mohror
Apply visualization, machine learning, and data mining techniques to understand the impact of silent data corruption in high-performance computation. Design an efficient data analysis parallel solution to analyze large-scale unstructured datasets.

Visualize Silent Error Propagation *May 2018 Aug 2018*
mentor: Harshitha Menon and Kathryn Mohror
Apply visualization techniques to understand the impact of silent data corruption in high-performance computation. Design efficient data visualization for the computation dependency graph to track the error propagation through program computation.

High Dimensional Data Visualization and Analysis *May 2016 – Aug 2016*

mentor: Peer-Timo Bremer
Apply dimension reduction, clustering, and statistical approaches to understand the complex high-dimensional data. Design an interactive visualization system to facilitate researchers' exploration of high-dimensional data.

Teaching and Mentoring

Ph.D. mentored

Xiaohan Wang - University of Vanderbilt
Ishrat Jahan Eliza - University of Utah
Xing Huang - Kobe University

Teaching Assistant

University of Utah, CS6962 Programming For Engineer — *Fall, 2018*
University of Utah, CS6962 Programming For Engineer — *Fall, 2017*
University of Utah, CS4150 Algorithm — *Spring, 2016*
University of Utah, CS3100 Models Of Computation — *Fall, 2015*

Publications

Journal Articles

2024: **Zhimin, Li**, Shusen Liu, Xin Yu, Kailkhura Bhavya, Jie Cao, Diffenderfer James Daniel, Peer-Timo Bremer, and Valerio Pascucci. "understanding robustness lottery": A geometric comparative visual analysis of neural network pruning approaches. ***IEEE Transactions on Visualization and Computer Graphics***, 2024.

2024: Shusen. Liu, Haichao. Miao, **Zhimin, Li**, M. Olson, V. Pascucci, and P-T. Bremer. Ava: Towards autonomous visualization agents through visual perception-driven decision-making. ***Computer Graphics Forum***, volume 43, page e15093, 2024.

2022: **Zhimin, Li**, Harshitha Menon, Kathryn Mohror, Shusen Liu, Luanzheng Guo, Peer-Timo Bremer, and Valerio Pascucci. A visual comparison of silent error propagation. ***IEEE Transactions on Visualization and Computer Graphics***, volume 30, pages 3268–3282, 2022.

2021: **Zhimin, Li**, Harshitha Menon, Dan Maljovec, Yarden Livnat, Shusen Liu, Kathryn Mohror, Peer-Timo Bremer, and Valerio Pascucci. Spotsdc: Revealing the silent data corruption propagation in high-performance computing systems. ***IEEE Transactions on Visualization and Computer Graphics***, volume 27, pages 3938–3952, 2021.

2019: Shusen Liu, **Zhimin, Li**, Tao Li, Vivek Srikumar, Valerio Pascucci, and Peer-Timo Bremer. Nlize: A perturbation-driven visual interrogation tool for analyzing and interpreting natural language inference models. ***IEEE Transactions on Visualization and Computer Graphics***, volume 25, pages 651–660, 2019.

Conference Proceedings

2021: **Zhimin, Li**, Harshitha Menon, Kathryn Mohror, Peer-Timo Bremer, Yarden Livant, and Valerio Pascucci. Understanding a program's resiliency through error propagation. In ***Proceedings of the 26th ACM SIGPLAN Symposium on Principles and Practice of Parallel Programming***, PPoPP '21, page 362–373, New York, NY, USA, 2021. Association for Computing Machinery.

2018: Shusen Liu, Tao Li, **Zhimin, Li**, Vivek Srikumar, Valerio Pascucci, and Peer-Timo Bremer. Visual interrogation of attention-based models for natural language inference and machine comprehension. In ***Proceedings of the 2018 Conference on Empirical Methods in Natural Language Processing: System Demonstrations***, pages 36–41, 2018.

Preprint

2025: **Zhimin, Li**, Haichao Miao, Xinyuan Yan, Valerio Pascucci, Matthew Berger, and Shusen Liu. See or recall: A sanity check for the role of vision in solving visualization understanding tasks with multimodal llms. *(**Under Submission**)*, 2025.

2025: **Zhimin, Li**, Harshitha Menon, Charles Fredrick Jekel, Peter Lindstrom, and Valerio Pascucci. Quantifying the impact of lossy compression on neural generative surrogate modeling. *(**IPDPS Under Submission**)*, 2025.

2024: **Zhimin, Li**, Haichao Miao, Valerio Pascucci, and Shusen Liu. Visualization literacy of multimodal large language models: A comparative study. *arXiv preprint arXiv:2407.10996*, 2024.

2023: **Zhimin, Li**, Shusen Liu, Kailkhura Bhavya, Timo Bremer, and Valerio Pascucci. Instance-wise linearization of neural network for model interpretation. *arXiv preprint arXiv:2310.16295*, 2023.

Workshop

2025: Xiaohan Wang, **Zhimin Li**, Joshua A. Levine, and Matthew Berger. Seeing the many: Exploring parameter distributions conditioned on features in surrogates. ***IEEE Workshop on Uncertainty Visualization: Unraveling Relationships of Uncertainty, AI, and Decision-Making***, 2025.

2025: Kuangshi Ai, Haichao Miao, **Li, Zhimin**, Chaoli Wang, and Shusen Liu. An evaluation-centric paradigm for scientific visualization agents. ***1st Workshop on GenAI, Agents, and the Future of VIS (IEEE VIS 2025)***, 2025.

2016: **Zhimin, Li**. Grand-map: A high-dimensional grand tour map. ***Utah UROP***, 2016.

Poster

2020: **Zhimin Li** Harshitha Menons Yarden Livnat Kathryn Mohror and Valerio Pascucci. An information visualization system to analyze silent data corruption. ***The International Conference for High Performance Computing, Networking, Storage, and Analysis***, 2020.

Talks and Presentation

National Renewable Energy Laboratory April 2024: Interactive Tracking, Visualizing, and Profiling Data Corruption Propagation with Applications to Improve Interpretability of Neural Network Models and Reliability of Numerical Kernels

Dolby Laboratories, Inc Nov 2023: "Understanding Robustness Lottery": A Geometric Visual Comparative Analysis of Neural Network Pruning Approaches

PPOPP May 2021: Understanding a program's resiliency through error propagation

IEEE VIS Oct 2020: Spotsdc: Revealing the silent data corruption propagation in high-performance computing systems

Grands

DOE *- Neural Field Processing for Visual Analysis, 09/2025 - 09/2026* *Total: 130k*
Former PI (Matthew Berger)
Role:PI

Scholarship & Awards

2023: NSDF SC23 Travel Award

2022: IEEE E-science 18th Conference 2022 traveling scholarship

2015: KLW Artificial/Machine Learning scholarship

2015: C.M. Collins Endowed Scholarship

Position of Responsibility

IEEE Transactions on Visualization and Computer Graphics Reviewer	*2025*
Computer Graphics Forum (CGF) Reviwer	*2025*
ISAV Program Committee	*2025*
IEEE VIS Reviewer	*2021-2025*
IEEE Pacific VIS Conference Track Reviewer	*2023-2024*
IEEE Pacific VIS TVCG Journal Track Reviewer	*2024-2026*
SC Reviewer	*2025*
IEEE VIS Volunteer	*2020*

References

Dr. Valerio Pascucci
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Dr. Joshua A. Levine
Associate Professor
University of Arizona
Department of Computer Science
✉ josh@arizona.edu

Dr. Shusen Liu
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Dr. Peer-Timo Bremer
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Research Scientist
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