MINGZHE LI

mingzhefluorite@gmail.com | +1(213)732-4781 | https://mingzhefluorite.github.io

EDUCATION

University of Utah, United States 8/2020-present
Ph.D. candidate in Computing (Data Management and Analysis)

University of Southern California, United States 1/2018-12/2019
M.S. in Computer Science

Zhejiang University, China 9/2013-6/2017
B.Eng. in Computer Science

RESEARCH INTEREST

- Topological data analysis, scientific visualization, machine learning, high-performance computing

PUBLICATION

- Mingzhe Li, Hamish Carr, Oliver Rubel, Bei Wang, Gunther H. Weber. Distributed Augmentation, Hypersweeps, and Branch Decomposition of Contour Trees for Scientific Exploration. *IEEE Transactions on Visualization and Computer Graphics (Early Access)*, pages 1-11, 2024.
- Mingzhe Li, Carson Storm, Austin Yang Li, Tom Needham, Bei Wang. Comparing Morse Complexes Using Optimal Transport: An Experimental Study. *IEEE Visualization and Visual Analytics (VIS) Short Paper*, pages 41-45, 2023.
- Mingzhe Li, Sourabh Palande, Lin Yan, Bei Wang. Sketching Merge Trees for Scientific Visualization. *IEEE Workshop on Topological Data Analysis and Visualization (TopoInVis) at IEEE VIS*, pages 61-71, 2023.

MANUSCRIPTS

- Mingzhe Li, Xinyuan Yan, Lin Yan, Tom Needham, Bei Wang. Flexible and Probabilistic Topology Tracking with Partial Optimal Transport. Under review by *IEEE Transactions on Visualization and Computer Graphics (TVCG)*, 2023.

SELECTED ACADEMIC PROJECTS

Cloud Tracking Based on Topological Features, SCI, University of Utah 8/2023-present
- Develop a framework for tracking clouds in satellite images using topological features.
- Evaluate performance against existing tracking frameworks based on robustness and statistics.

3D Microstructure Generation Using Topology-Preserving Generative Models, SCI, University of Utah 8/2022-present
- Create topology-preserving generative models for 3D material microstructures.
- Assessing topology preservation and its influence on material microstructure generation.

Distributed Branch Decomposition for Scientific Exploration, SCI, University of Utah 8/2023-3/2024
- Collaborated with Lawrence Berkeley National Laboratory on distributed algorithms for contour tree simplification, achieving performance improvements of up to 98.76 times compared to state-of-the-art parallel methods, published in IEEE VIS 2024.

Comparing Morse Complexes using Optimal Transport, SCI, University of Utah 1/2023-5/2023
- Proposed methods for the comparative analysis of Morse complexes using optimal transport distances, published in IEEE VIS 2023 Short Paper.

Flexible Topology Tracking with Partial Optimal Transport, SCI, University of Utah 4/2021-12/2022
- Designed a framework for matching merge tree structures with tools from partial optimal transport, enabling feature tracking.
- Achieved better continuity preservation for feature trajectories and accuracy on feature matching than existing tracking methods.
- Submitted a paper to TVCG, which is currently under review.

Sketching Merge Trees, SCI, University of Utah 8/2020-5/2023
- Created a framework utilizing matrix sketching techniques with merge trees using tools from optimal transport, leading to applications such as finding data representatives, data clustering and outlier detection, published in TopoInVis 2023.

SELECTED INTERNSHIP EXPERIENCES

Lawrence Berkeley National Laboratory, CA, USA 5/2024-8/2024
Graduate Student, Scientific Data Division
- Extending distributed computations on contour trees to improve the contour extraction performance in scientific data
- Applying contour extraction using distributed contour trees for exa-scale scientific data analysis

Lawrence Berkeley National Laboratory, CA, USA 5/2023-8/2023
Graduate Student, Scientific Data Division

- Collaborated on designing and developing distributed algorithms to simplify contour trees for scientific visualization tasks

Los Alamos National Laboratory, NM, USA 5/2022-8/2022
Graduate Student, ISTI

- Verified and tested augmented contour tree generation code in VTK-m, collaborating on API consistency improvements.

Desay SV Automotive, Nanjing, China 8/2017-11/2017
Machine Learning Intern, "Lane Recognition Based on Various Neural Networks" Project, R&D department

- Developed a lane recognition model for real-world driving recording videos using neural networks, achieving 96% accuracy

RELATED COURSE WORK

- Computational Topology, Advanced Algorithms, Scientific Data Visualization, Advanced Data Visualization, Machine Learning, Data Mining, Natural Language Processing, High-performance Computing and Parallelization, Parallel Programming for Many-core Architectures

EXTRACURRICULAR ACTIVITIES

Volunteer, Olympiad for Informatics Class, Hengyang No.8 High School, China 12/2015-6/2017

- Organized a series of activities to introduce the programming knowledge and motivate students' interest in computer algorithms within the local high school community.
- Provided monthly training to students concerning mathematical modeling and general algorithms

AWARDS AND HONORS

Second Prize in the 14th Zhejiang University Programming Contest	4/2014
Second Prize in the 11th ACM/ICPC College Student Programming Contest in Zhejiang Province	5/2014
Second Prize of Science and Technology Innovation at Zhejiang University	6/2014
First Prize in the 15th Zhejiang University Programming Contest	4/2015
Second Prize in the 12th ACM/ICPC College Student Programming Contest in Zhejiang Province	5/2015
Second Prize of Science and Technology Innovation at Zhejiang University	6/2015
Third-class Honorary Scholarship at Zhejiang University	7/2015

SKILLS

Programming Languages / Tools: Paraview, VTK-m, TTK, VTK, Python, C/C++, JavaScript, CUDA, Java, MATLAB, HTML, CSS, Pytorch, Tensorflow, caffe, MySQL, Node.js, Angular, OpenCV, OpenGL

Hobbies: Cooking, Travelling