

MINGZHE LI

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EDUCATION BACKGROUND

University of Utah, United States Ph.D. candidate in Computing (Data Management and Analysis), GPA: 3.962/4.0	8/2020-present
University of Southern California, United States M.S. in Computer Science, GPA: 3.81/4.0	1/2018-12/2019
Zhejiang University, China B.Eng. in Computer Science, GPA: 3.61/4.0; Major GPA: 3.82/4.0	9/2013-6/2017

RESEARCH INTEREST

- Data visualization, topological data analysis, machine learning, high-performance computing

PUBLICATION

- [Mingzhe Li](#), Xinyuan Yan, Lin Yan, Tom Needham, Bei Wang. Flexible and Probabilistic Topology Tracking with Partial Optimal Transport. *IEEE Transactions on Visualization and Computer Graphics*, to appear, 2025. [arXiv link](#)
- [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*, (31)1: 152-162, 2025. [DOI link](#)
- [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. [DOI link](#)
- [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. [DOI link](#)

MANUSCRIPTS

- [Mingzhe Li](#), Dwaipayan Chatterjee, Franziska Glassmeier, Fabian Senf, Bei Wang. Tracking Low-Level Cloud Systems with Topology. *Submitted to IEEE VIS 2025, under review*.
- [Mingzhe Li](#), Hamish Carr, Oliver Rubel, Bei Wang, Gunther H. Weber. Pre-simplifying Distributed Hierarchical Contour Trees. *In preparation*, 2025.

SELECTED INTERNSHIP EXPERIENCES

Lawrence Berkeley National Laboratory, CA, USA Graduate Student, Scientific Data Division Supervisor: Dr. Michael Mohoney <ul style="list-style-type: none">Extending distributed computations on contour trees to enhance the performance of important contour extraction	5/2024-8/2024
Lawrence Berkeley National Laboratory, CA, USA Graduate Student, Scientific Data Division Supervisor: Dr. Gunther Weber <ul style="list-style-type: none">Collaborated on designing and developing distributed algorithms to simplify contour trees for scientific visualization tasks	5/2023-8/2023
Los Alamos National Laboratory, NM, USA Graduate Student, ISTI Supervisor: Dr. Li-Ta Lo <ul style="list-style-type: none">Collaborated with VTK-m contributors to verify, test, and refactorize the code to compute augmented contour trees.Made the first documentation for the related filters for multiple contour tree generation algorithms.	5/2022-8/2022
Microsoft, Beijing, China Software Engineer Intern, STCA <ul style="list-style-type: none">Collaborated on extending Microsoft Excel's max path length limit (C/C++), enabling access to long-path files from Windows Explorer, Excel backstage, and external links.Updated document inspector and compatibility checker (C/C++) to support backward compatibility with legacy Excel files.	5/2019-8/2019
Desay SV Automotive, Nanjing, China Machine Learning Intern, "Lane Recognition Based on Various Neural Networks" Project, R&D department <ul style="list-style-type: none">Collaborating with machine learning scientists to apply real-world road videos to distinguish lanes for autonomous drivingDesigned and implemented a model of road lane recognition using different neural networks, including Deeplab-v2 and FCN (Fully Convolutional Networks); achieved an accuracy of 96% for lane recognition	8/2017-11/2017

RELATED COURSEWORK

- Computational Topology, Advanced Algorithms, Scientific Data Visualization, Advanced Data Visualization, Machine Learning, Data Mining, Natural Language Processing, Parallel Computing

SELECTED ACADEMIC PROJECTS

Tracking Low-Level Cloud Systems with Topology, SCI, University of Utah 8/2023-present

- Designed and implemented a framework to track clouds from satellite images based on merge trees.
- Compared to existing cloud-tracking frameworks and other topology-based tracking methods.
- Evaluated the performance of tracking methods based on robustness and other statistics such as timespan.
- Submitted a paper to IEEE VIS 2025, which is currently under review.

Distributed Branch Decomposition for scientific exploration, SCI, University of Utah 8/2023-3/2024

- Collaborated with researchers from Lawrence Berkeley National Laboratory
- Designed and implemented distributed algorithms to compute the geometry-based importance and simplification of contour trees
- Enabled highly efficient distributed contour tree simplification and contour extraction, outperforming the state-of-the-art single-node parallel implementation by up to 98.76 times.
- Published a paper in IEEE VIS 2024

Comparing Morse Complexes using Optimal Transport, SCI, University of Utah 1/2023-5/2023

- Proposed methods to apply distances based on optimal transport (OT) to the comparative analysis of Morse Complexes.
- Demonstrated structural alignment from optimal transport to evaluate the effectiveness of OT-type distances in terms of feature correspondence and classification.
- Provided a guideline for choosing the OT-type distances under various data assumptions.
- Published a paper in IEEE VIS 2023 Short Paper.

Flexible Topology Tracking with Partial Optimal Transport, SCI, University of Utah 4/2021-1/2024

- Designed a novel framework to compare merge trees with partial optimal transport, enabling topological feature tracking
- Compared with existing topological feature tracking methods, showing the strength of our work on preserving the continuity of trajectories and accuracy on feature matching
- Submitted a paper to IEEE TVCG (to appear).

Sketching Merge Trees, SCI, University of Utah 8/2020-5/2023

- Created a new framework to apply matrix sketching techniques to analyze ensembles of merge trees for scientific visualization.
- Enabled computing the Fréchet Mean (i.e., barycenter) of merge trees and vectorizing the merge trees.
- Demonstrated applications of the framework, including finding representatives and modes from the scientific data ensembles, clustering the scientific data based on merge trees, and detecting outliers from the ensemble of merge trees.
- Published a paper in TopoInVis 2023.

SERVICE

Reviewer for EuroVis 2025

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 in 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++, OpenMP, MPI, JavaScript, Java, MySQL, MATLAB, HTML, CSS, Pytorch, Tensorflow, scikit-learn, Node.js, Angular, OpenCV, OpenGL

Hobbies: Cooking, Travelling