

YOUJIA ZHOU

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EDUCATION

University of Utah, UT

School of Computing

Ph.D. student in Computer Science

Advisor: Dr. Bei Wang Phillips

Main Courses: Advanced Algorithms, Machine Learning, Deep Learning, Computational Topology, Data Mining, Visualization for Data Science, Advanced Data Visualization, Computer Vision, Information Retrieval

August 2018 - Present

Overall GPA: 4.0/4.0

University of Wisconsin-Madison, WI

Department of Statistics

M.S. in Statistics

September 2015 - May 2017

Overall GPA: 3.87/4.0

Renmin University of China, China

School of Statistics

B.S. in Statistics

September 2012 - June 2016

Overall GPA: 3.51/4.0

PUBLICATIONS

Preprints / Manuscripts

[1] **Youjia Zhou**, Nathaniel Saul, Ilkin Safarli, Bala Krishnamoorthy, Bei Wang. Stitch Fix for Mapper and Information Gains. *Manuscript*, 2021.

Submitted to *Research in Computational Topology 2*.

[2] **Youjia Zhou**, Archit Rathore, Emilie Purvine, Bei Wang. Topological Simplifications of Hypergraphs. *Manuscript in revision*, 2020.

To be submitted to *IEEE Transactions on Visualization and Computer Graphics (TVCG)*.

[3] Jordan A. Berg, **Youjia Zhou**, T. Cameron Waller, Yeyun Ouyang, Sara M. Nowinski, Tyler Van Ry, Ian George, James E. Cox, Bei Wang, Jared Rutter. Gazing Into the Metaverse: Automated Exploration and Contextualization of Metabolic Data. *Manuscript in revision*, 2020.

To be submitted to *eLife*. *bioRxiv:10.1101/2020.06.25.171850v1*.

[4] Ilkin Safarli, **Youjia Zhou**, Bei Wang. Reinterpret Graph Drawing as Multi-Agent Reinforcement Learning. *Manuscript in revision*, 2020. *arXiv:2011.00748*.

[5] **Youjia Zhou**, Janis Lazovskis, Michael J. Catanzaro, Matthew Zabka, Bei Wang. MVF Designer: Design and Visualization of Morse Vector Fields. *Manuscript in revision*, 2019.

To be submitted to *Journal of Computational Geometry*. *arXiv:1912.09580*.

Conference Publications

[1] **Youjia Zhou**, Nithin Chalapathi, Archit Rathore, Yaodong Zhao, Bei Wang. Mapper Interactive: A Scalable, Extendable, and Interactive Toolbox for the Visual Exploration of High-Dimensional Data.

IEEE Pacific Visualization Symposium (Pacific Vis), accepted, 2021. *arXiv:2011.03209*.

- [2] **Youjia Zhou**, Kevin Knudson, Bei Wang. Visual Demo of Discrete Stratified Morse Theory (Media Exposition). *International Symposium on Computational Geometry (SoCG)*, 2020.
DOI: 10.4230/LIPIcs.SoCG.2020.82

Posters

- [1] **Youjia Zhou**, Janis Lazovskis, Michael J. Catanzaro, Matthew Zabka, Bei Wang. A Visual Exploration and Design of Morse Vector Fields (Abstract). *Algebraic Topology: Methods, Computation, & Science (ATMCS)*, poster, 2020.
- [2] **Youjia Zhou**, Janis Lazovskis, Michael J. Catanzaro, Matthew Zabka, Bei Wang. Persistence-Driven Design and Visualization of Morse Vector Fields (Extended Abstract). *China Visualization and Visual Analytics Conference (ChinaVis)*, poster, 2019.

HONORS & AWARDS

- Best Poster Award at China Visualization and Visual Analytics Conference (ChinaVis), 2019
- Visiting International Student Academic Excellence Award, University of Wisconsin-Madison, 2016
- Outstanding Volunteer Award, Renmin University of China, 2015
- Scholarship for Academic Excellence, Renmin University of China, 2014
- Scholarship for Outstanding Student Leaders, Renmin University of China, 2014

INVITED TALKS

- [1] Design and Visualization of Morse Vector Fields.
SIAM CSE Minisymposium: Emerging Directions in Computational Topology, 2021.

SELECTED ACADEMIC PROJECTS

Hypergraph Visualization and Simplification

- Developed an open-source, interactive system that includes modular and easily extendable implementation of a hypergraph simplification algorithm based on topological persistence.

Automated Exploration and Contextualization of Metabolic Data

- Developed a module of Metaboverse, an interactive tool for the exploration of metabolic data, that supports recurring pattern search in metabolic network structure and the organization of network entities.

Reinterpret Graph Drawing as Multi-Agent Reinforcement Learning

- Collaborated in developing an interactive visualization demo to demonstrate various classic and MARL layouts that facilitates visual comparisons.

Design and Visualization of Morse Vector Fields

- Developed a new vector field design and visualization system that provides fine-grained control over vector field geometry, enables the editing of vector field topology, and supports a design process in a simple and efficient way using elementary building blocks.

Jacobi Sets and Comparative Measures for Vector and Tensor Fields

- Extending the notion of Jacobi sets from scalar fields to vector fields and tensor fields.
- Adapting Jacobi sets to derive comparative measures for vector fields and tensor fields.

Mapper Graph Construction for High-Dimensional Data

- Developed Mapper Interactive, a web-based framework for interactive analysis and visualization of high-dimensional point cloud data built upon the Mapper algorithm.
- Built a library of easily-extendable modules for developing interactive visualization of high-dimensional data using the mapper construction.

Discrete Stratified Morse Theory Visualization

- Developed an open-source visualization tool that implements an algorithm given by Knudson and Wang that constructs a discrete stratified Morse function for 2-complexes embedded in the plane.
- Created an interactive demo for users to explore the algorithmic process and to perform homotopy-preserving simplification of the resulting stratified complex.

WORK EXPERIENCE

Graduate Research Assistant

Scientific Computing and Imaging Institute

My research focuses on developing visual analytics systems for large and complex data, mainly through topological techniques. My work couples interactive visual representation with topology-based analytical processes for sense-making. Most of my research projects are collaborative and interdisciplinary, and many of the resulting visual analytics systems have been applied to solve problems in other disciplines, such as bioengineering and mathematics.

May 2019 - Present

Salt Lake City, UT

Data Analyst

Pohoo Credit

Data modeling and risk management.

January 2018 - July 2018

Chengdu, China

TECHNICAL SKILLS

- **Programming:** C++, Java
- **Data analysis:** Python (with NumPy, SciPy, Scikit-learn, Pandas, TensorFlow, PyTorch), R
- **Web and back-end:** HTML, JavaScript (with D3), Python (with Flask)
- **Other tools:** Version Control : Git

TEACHING

Introduction to Data Science

Teaching Assistant

Spring 2020
School of Computing, University of Utah

Visualization for Data Science

Teaching Assistant

Fall 2020
School of Computing, University of Utah