Yiheng Su

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Education

University of Wisconsin-Madison, **Ph.D. in Computer Sciences, Starting Fall 2024**

Colby College, Waterville, Maine **Bachelor of Arts, May 2024**
Majors: Mathematics and Computer Science ***GPA: 4.00/4.00***
Honors: Dean's List (Fall 2021, Spring 2022, Fall 2022, Fall 2023)

Budapest Semesters in Mathematics, Budapest, Hungary **Feb. 2023 – May 2023**
Main Courseworks: Graph Theory and Functional Analysis

Publications

Peer-Reviewed Conference Publications

- Hannen Wolfe, Yiheng Su, and Jue Wang (2024). *Dimensional Design of Emotive Sounds for Robots.* To appear at *the 19th Annual ACM/IEEE International Conference on Human-Robot Interaction (HRI 2024)*, March 11, 2024.

Manuscripts in progress

- Yiheng Su, Jonathan Kerby-White, Luke Rogers, and Alexander Teplyaev (2023). *Laplacian Eigenmaps and Chebyshev Polynomials. PDF on REU Website.*
- Peter Engel, Yiheng Su, Owen Hammond-Lee, Pál Zsámboki, and Dániel Varga (2023). *Artificial Intelligence and Dense Unit Distance Graphs.*

Research Experience

Optimization of Unit Distance Graph Edge Numbers Feb. 2023 – Present
Supervised by Dr. Pál Zsámboki, Alfréd Rényi Institute of Mathematics, Budapest, Hungary

- Designed a novel heuristic beam search algorithm to improved the maximum number of edges in unit distance graphs across various sizes of vertices.
- Explored graph constructions from the Moser Lattice and Moser Ring with heuristic generating rules like rotation, translation, and reflection.
- Used multiprocessor and GPU implementations to optimize the efficiency of the search algorithms.

Convergence, Optimization and Stabilization of Laplacian Eigenmaps May 2023 – Dec. 2023
Supervised by Prof. Luke Rogers and Sasha Teplyaev, UConn Math REU *UConn Math REU Website*

- Studied eigenmaps of Laplacian matrices transforming high-dimensional data into graph representations.
- Designed programs to visualize the eigenmaps.
- Explored the properties of eigenmaps, including data distribution, manifold smoothness, and boundary conditions.
- Analyzed eigenmaps on structures including intervals, squares, torus, and the Sierpinski triangle, emphasizing their connections to orthogonal polynomials and optimal parameter choices.

Dimensional Design of Emotive Sounds for Robots May 2022 – Apr. 2023
Supervised by Professor Hannen Wolfe, Colby College

- Implemented a non-linguistic utterances generator conveying emotions on the DARwIn-OP robot.
- Designed motions for the robot and developed the user study.
- Conducted user studies to explore the perception of non-linguistic utterances generated by the robot.
- Analyzed experimental data to explore the correlation between non-linguistic utterances and emotions.

Conferences

- **Joint Mathematics Meetings (San Francisco, CA), January 2024**
Y. Su, *Laplacian Eigenmaps and Orthogonal Polynomials.* [Oral presentation, PME Undergraduate Session]
- **Young Mathematicians Conference, (The Ohio State University, OH), August 2023:**
Y. Su, J. Kerby-White, *Laplacian Eigenmaps and Orthogonal Polynomials.* [Poster presentation]
- **Joint Mathematics Meetings (Boston, MA), January 2023**
- **Colby Undergraduate Student Summer Research Symposium (Waterville, ME), July 2022:**
Y. Su, J. Wang, H. Wolfe, *Generative Emotive Sounds for Robots.* [Oral presentation]

Other Experience

Database Engineer, Bigelow Laboratory for Ocean Sciences Dec. 2022 – Feb. 2023

Coast-Cow-Consumers Project, USDA Funded

- The project goal is to create a balanced seaweed additive for cattle feed, targeting the suppression of enteric methane emissions from livestock. My role included designing and implementing an extensive database system that consolidated data on algae, cows, chemicals, environmental, and economic factors.

Teaching Assistant, Colby College Sep. 2021 – Dec. 2022

Abstract Algebra(F23), Algorithms (F22, S22), Vector Calculus(F22, F21), ODE(S22)

- I facilitated weekly sessions, graded assignments, offered feedback, supported students through academic challenges, collaborated with the professor on curriculum enhancements, and contributed to course improvement efforts.

Volunteer Math Teacher, Albert S. Hall School Feb. 2022 – May 2022

5th-grade Mathematics: Numbers and Operations

- I volunteered to teach 5th-grade Mathematics to elementary school students on a weekly basis and helped them learn concepts including the order of operations and basic algebra.

Skills & Interests

Programming: Python, Java, Matlab, Mathematica, C++, JavaScript, R, MySQL, VHDL

Languages: English, Native Chinese (Mandarin)

Interests: Badminton, Ukulele