NATHANIEL CLAUSE

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Education

The Ohio State University   **Expected Graduation: May 2024**
PhD in Mathematics   *Columbus, OH*

The Ohio State University   **August 2018 – May 2021**
Masters of Science in Mathematics   *Columbus, OH*

Vanderbilt University   **August 2014 – May 2018**
Bachelor of the Arts in Mathematics, Highest Honors in Mathematics   *Nashville, TN*

Relevant Coursework

- Data structures and algorithms
- High Performance Computing
- Linear and Nonlinear Optimization
- Optimal transport
- Topological Data Analysis (TDA)
- TDA in Neuroscience

Experience

The Ohio State University   **August 2018 – August 2019, August 2023 – present**
Graduate Research Fellow   *Columbus, OH*

- Performed research in topological data analysis under my advisor Dr. Facundo Mémoli whilst supported by the Distinguished University Fellowship at The Ohio State University.
- Wrote multiple papers, and gave conference talks, see "Nate Clause" google scholar page.
- Worked on a dissertation on new invariants for multiparameter persistent homology.

The Ohio State University   **August 2019 – August 2023**
Graduate Teaching Assistant

- Worked as a teaching assistant for multiple courses at The Ohio State University including Calculus I, Introduction to TDA, and TDA in Neuroscience.
- Responsibilities included leading large recitation sections, proctoring quizzes and exams, writing homeworks, quizzes and projects, and grading homeworks, quizzes, exams, and projects.

Vanderbilt University   **January 2016 – May 2018**
Undergraduate Teaching Assistant

- Worked as a teaching assistant at Vanderbilt University for Calculus I, Abstract Algebra, and Number Theory courses.
- Tasks included leading small recitation sections, proctoring quizzes, and projects, and grading homeworks, quizzes and exams

ICERM   **June 2017 – August 2017**
Undergraduate Student Researcher

- Worked as a student researcher at the NSF funded Summer@ICERM 2017: Topological Data Analysis REU program.
- Attended numerous lectures on state of the art TDA research.
- Performed research under Dr. Facundo Mémoli on new families of stable filtration functors, which lead to a publication.

Projects

Invariants for Dynamic Metric Spaces | *Python*   **August 2019 – February 2020**

- Created and implemented algorithms for computing the betti functions and rank invariants for persistent homology of dynamic metric spaces, found at https://github.com/ndag/PHoDMSs.
- Implemented known algorithm for computing the erosion distance between betti-0 functions or rank invariants.
- Performed a classification experiment on simulated data of different types of bird flocking behaviors using betti-0 functions and rank invariants, using a k-nearest neighbor classifier.

Meta-Diagrams for 2-Parameter Persistence | *Python*   **December 2022 – March 2023**

- Created and implemented an algorithm for computing the meta-diagram corresponding to a bifiltration, found at https://github.com/NateClause/Meta-Diagrams .
- Developed a GUI for interactive visualization of a meta-diagram.

Technical Skills

Languages: Python (advanced); French, MATLAB (intermediate); C, C++, HTML, SQL (beginner)
Libraries: Numpy, Scipy, Pandas, Scikit-learn

Leadership / Extracurricular

Network Data Analysis Group   **June 2019 – present**
Coordinator   *The Ohio State University*
- Organized weekly meetings for the network data analysis group, preparing discussion content and organizing speakers.
- Managed the group's website: https://ndag.github.io/index.html, updating the group's achievements.
- Gave at least one oral presentation per semester in the group meetings, ranging from 30 minutes to 90 minutes.

Topology, Geometry, and Data Analysis Seminar   **August 2023 – present**
Co-Coordinator   *The Ohio State University*
- Organized regular meetings for the Topology, Geometry, and Data Analysis Seminar, planning and inviting speakers and organizing travel arrangements for them.