Nathaniel Clause

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Summary

I am a Mathematics PhD candidate at The Ohio State University, with experience in algorithm development, implementation, and testing using Python, C, and MATLAB. I am pursuing quantitative research positions in the financial sector where I can use my skills in mathematical and creative reasoning, critical thinking and machine learning to develop and optimize trading strategies. For further information, see my linkedin: https://www.linkedin.com/in/nathaniel-clause.

Skills

Languages and Platforms: Python, MATLAB, C, Linux, LaTeX, HTML, SQL, Tableau
Libraries: Numpy, Scipy, Pandas, Scikit-learn, Tensorflow, Keras
Quantitative: Data Analysis, Machine learning, Graph Theory, Probability, Combinatorics, Optimization
Soft skills: Problem-Solving, Organization, Collaboration, Written and Verbal Communication, Leadership

Experience

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

- Performed research projects in topological data analysis under Dr. Facundo Mémoli whilst supported by the Distinguished University Fellowship at The Ohio State University.
- Introduced new invariants for multiparameter persistence and hierarchical clustering, and developed and implemented algorithms for their computation.
- Wrote 5 academic papers in journals or in submission, and gave 20 academic talks at conferences/seminars.

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

- Taught 1 semester as lead instructor and 7 semesters as teaching assistant, for ∼60 students per semester.
- Structured course syllabi and generated course materials including writing lectures, homeworks, exams and projects, and proctored and graded various assessments.

Selected Projects

Classification of Flocking Behaviors | *Python* **August 2019 – February 2020**

- Created and implemented algorithms for computing betti functions and rank invariants for persistent homology of dynamic metric spaces (DMS), alongside zigzag persistence.
- Implemented an adjusted boids model to simulate flocking behavior, and used the model to generate thousands of DMS of flocking behaviors within five different behavioral classes.
- Performed a classification experiment on this data with the aforementioned invariants, utilizing a k-nearest neighbor classifier resulting in a classification accuracy of over 97%.

LSTM Stock Price Predictor | *Python* **February 2024**

- Implemented an LSTM model in Python using the tensorflow library to predict future stock prices.
- Designed and implemented a mid-frequency trading strategy based on trading signals given by the model.
- Tested the trading strategy on holdout data from 100 stocks over two year timespans, consistently demonstrating annual returns over 200% higher compared to holding the stock from beginning to end.

Leadership

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 TGDA seminar, inviting speakers and organizing travel arrangements for them.

Education

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

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