Brian Bollen

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briancbollen.com ⊕

Research Assistant

Education

Ph.D. Applied Mathematics
University of Arizona

August 2017 - May 2022 (Expected)

B.Sc. Mathematics
University at Albany

August 2013 - May 2017
3.83 GPA

Research Experience

University of Arizona
Advised by Josh Levine

January 2020 - Present

- Analysis of scalar field data using topological data analysis (TDA)
- Worked heavily with python to design algorithms for comparison of graph structures
- Implemented an existing neural network designed for graph similarity and adjusted it for use in TDA graph structures
- Designed a multitude of experiments to analyize the efficacy of neural networks on learning such comparison

University at Albany
Advised by Elizabeth Munch

January 2016 - May 2017

- Nonlinear time series analysis using TDA.
- Implemented python modules for analysis of time series using various embeddings of the series and then performing additional analysis using persistent homology.

Publications and Preprints

Brian Bollen, Pasindu Tennakoon, & Joshua A. Levine. (2022). "Computing A Stable Distance on Merge Trees". *In Submission*

Brian Bollen, Erin Chambers, Joshua A. Levine, & Elizabeth Munch. (2021). "Reeb Graph Metrics from the Ground Up". In: (October 11, 2021). arXiv: 2110.05631 [cs.CG] *(Under Review)*

(Undergraduate Thesis) Bollen, Brian, "Irrational Eigenvalues of the Discrete Laplacian: A Study of Simplical Complexes" (2017). Psychology. 32. https://scholarsarchive.library.albany.edu/honorscollege_psych/32

Relevant Coursework

University at Arizona

MATH 563 - Probability Math
MATH 583 - Pinciples+Methods of Applied Mathematics
MATH 527 - Pinciples of Analysis
CSC 544 - Advanced Data Visualization
MATH 574M - Statistical Machine Learning
MATH 573 - Theory of Computation
SIE 640 - Large Scale Optimization
PSY 596L - Neural Data Analysis
MATH 575B - Numerical Analysis

University At Albany

AMAT 520A Algebra I
AMAT 520B Algebra II
AMAT 540A Topology I
AMAT 540B Topology II
AMAT 513A Complex Analysis
AMAT 502 - Computing for Mathematicians

Tutoring and Teaching Experience

Private Tutor
January 2015 - Present

Mathematics
- Calculus I,II,III
- Linear Algebra
- Differential Equations
- Financial/Business Calculus
- Probability Theory

Computer Science
- Python
- C++
- SQL

University at Arizona
Instructor, *August 2017 - May 2020*

Mathematics
- College Algebra (MATH 112) - *2 semesters*
- Pre-Calculus (MATH 120R) - *4 semesters*
- Calculus (MATH 122A) - *1 semester*

Technical Experience

TutorYard
September 2018 - July 2020
Co-Founder, Web Developer

- Designed and implemented website to host tutor profiles, allow online scheduling, and securely capture payment information. Also developed an internal tutor portal and admin system to manage sessions and tutor payments. Built using a Node.js with MongoDB backend.

- Designed a functional, prototype for a real-time assessment application for student progress. Built using react.js and D3.js. Prototype can be viewed at briancbollen.com

MuView
December 2018
Sole Designer

- Designed an interactive visualization tool to analyze music review data.
- Built using a react.js frontend equipped with D3.js for complex data interaction. Prototype can be viewd at http:muview.net

Independent Courier
May 2017 - August 2017
Programmer

- Implemented new modules into existing scheduling system for 40+ employee courier service
- Had extensive work with SQL databases for querying scheduling system

Awards and Honors

Outstanding Achievement in Mathematics
May 2017
University at Albany

Awarded to one student per graduating class who has shown exemplary work in Mathematics both in research and course work.

Presidential Undergraduate Award for Research
April 2016
University at Albany

Awarded for submision of project titled "Irrational Eigenvalues of the Discrete Laplacian after Subdivision" under advisment of Prof. Alexandre Tchernev