Brian Bollen, Ph.D.

(315) 507-0131 — briancbollen@gmail.com — LinkedIn Profile — Github

Software Engineer with 5+ years of experience developing end-to-end applications with a focus on front-end development using React and Typescript. Skilled in building performant, scalable, and intuitive user interfaces, integrating APIs, and creating responsive designs. Strong background in data visualization, data pipelines, and developing tools for complex analysis.

Education

Ph.D. in Applied Mathematics August 2017 - May 2022
University Of Arizona, Tucson, AZ

B.Sc in Mathematics August 2013 - May 2017
University At Albany, Albany, NY **GPA: 3.83/4.0**

Work Experience

Senior Software Engineer **Remote**
SCI Institute at The University of Utah March 2024 - Present

- Contribute to several key projects for the Visualization Design Lab with applications in cell microscopy, visualization study creation, and infectious disease spread.
- Developed serverless authentication system for our reVISit application using Google SSO, Firebase, and React.js
- Created the entire dockerized backend architecture for our cell microscopy visualization platform using Django, MySQL, DuckDB, Celery, Redis, and MinIO.
- Integrated a cutting-edge, open-source visualization library into the Vue.js front end of our cell microscopy platform, enabling visualization of millions of data points with advanced cross-filtering between charts.

Data Analyst **Remote**
Gravy Analytics June 2022 - March 2024

- Developed a React.js application with a Python (Flask) back-end to simplify our data extraction process.
- Engineered the application to integrate with our existing core platform which resulted in a 50% reduction in delivery time. This optimization enabled non-technical teams to easily extract data samples while minimizing the likelihood of human error.
- Decreased the time to run our quality assurance process by over 97% by creating an internal API which reads information from DynamoDB, dispatches and monitors queries in AWS Athena, then reports results in Google Sheets.
- Removed the need for manual intervention in the quality assurance process for over 80% of data deliveries.
- Implemented several data pipelines (using Snowflake, AWS, Matillion, and Tableau) to identify possible problems with data that are delivered to customers on a daily basis.
- Managed key revenue-driving product which ensured the renewal of 90% of existing customers and increased new client acquisition by approximately 30%.
- Ensured timely data delivery through code refactoring for improved robustness, standardization of the integration and delivery process, and collaboration with several other teams for weekly execution.

Mathematics Instructor **Tucson, AZ & Colorado Springs, CO**
University of Arizona September 2017 - May 2020
University of Colorado - Colorado Springs September 2024 - Present

- Primary instructor for several college courses such as college algebra, pre-calculus, and calculus I.
- Designed lesson plans, homework assignments, quizzes, and tests
- Taught calculus primarily online through zoom lectures due to the pandemic with little to no reduced attendance from students.

Co-Founder, Web Developer **Tucson, AZ**
TutorYard September 2018 - July 2020

- Designed a website to host tutor profiles, allow online scheduling, and securely capture payment information.
- Developed an internal tutor portal and admin system to manage sessions and tutor payments. Built using Node.js with MongoDB backend.
- Created a real-time assessment application to track student progress and identify weaknesses. This was used to help modify curriculum to meet classroom needs.
- Aided in the growth of TutorYard to a $200,000 per year revenue company.
- Managed more than 20 tutors working across three campuses throughout Tucson.

Research Experience

Research Assisstant **Tucson, AZ**
Advised by Prof. Josh Levine, University of Arizona January 2020 - June 2022

- Focused on the analysis of complex scalar field data through Topological Data Analysis (TDA). Specifically worked on defining metrics between scalar fields which is applicable to problems such as determining outliers and averages of climate simulations, defining and removing noise from medical images, and detecting structural differences between porous materials.
- Lead author of a paper published in IEEE VIS in which we describe an algorithm that satisfies two properties which are desirable for scalar field similarity analysis.
- Implemented a parallelized A* algorithm in Python to decrease the computation time and demonstrate efficacy of the algorithm when run on more sophisticated hardware.
- Provided experimental results for how this algorithm can be used to detect periodicity in the Von-Karmen Vortex street and show similarity between three-dimensional animal models.

Research Assisstant **Albany, NY**
Advised by Prof. Elizabeth Munch, University At Albany May 2016 - May 2017

- Nonlinear time series analysis using Topological Data Analysis.
- 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

B. Bollen, P. Tennakoo and J. A. Levine, "Computing a Stable Distance on Merge Trees," in IEEE Transactions on Visualization and Computer Graphics, 2022, doi: 10.1109/TVCG.2022.3209395.

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

Relevant Coursework

CSC 544 - Advanced Data Visualization
MATH 574M - Statistical Machine Learning
MATH 573 - Theory of Computation
SIE 640 - Large Scale Optimization
INFO 516 - Human Computer Interaction
INFO 580 - Data for the Semantic Web
MATH 563 - Probability Math
PSY 596L - Neural Data Analysis
MATH 575B - Numerical Analysis

Technical Skills

Programming Languages: Typescript, React.js, Python, Node.js, Django, Vue.js, Next.js, Java

Data Analysis: Dynamo DB, Snowflake, MongoDB, Pandas, MySQL, AWS Athena, Tableau, D3.js, Mosaic, Vega, R, DuckDB

Machine Learning: PyTorch, scikit-learn

Tools: Git, Jupyter