Brian Zhang

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Education

Rutgers University Honors College — New Brunswick, NJ

B.S. in Mathematics and Computer Science; ***GPA: 3.98/4.00*** — *Sep. 2021 – May 2025*

- Honors: Dean's List, Rutgers Trustee Awards, Henry Rutgers Scholarship, Sanofi US Scholarship
- Coursework: Linear Algebra, Convex Optimization, Real Analysis, Stochastic Processes, Differential Equations, Math Finance, Data Structures & Algorithms, Formal Languages, Deep Learning, Systems Programming

Research Experience

Undergraduate Research Assistant — Aug. 2023 – Present

Rutgers Mathematical Optimization Research Group

- Advisor: Dr. Farzad Yousefian
- Contribute to development and design of randomized distributed and federated algorithms to solve non-smooth and game-theoretic bilevel optimization problems
- Implement and test bilevel distributed stochastic gradient descent methods in Python using NumPy, pandas, and various datasets (MNIST, CIFAR, MultiNLI) to numerically validate proofs of convergence
- Develop Python library using NetworkX to generate large time-varying graphs with stochastic edge weight matrices for simulation of complex agent networks

DRP Mentee — Jan. 2023 – Present

Rutgers Mathematics Directed Reading Program

- Advisors: Dr. Vladimír Sedláček (2023), Forrest Thurman (2023), Samuel Wallace (2024)
- Studied elliptic curves and its applications to cryptography using existing texts
- Investigated special properties of elliptic curves and implemented the MOV attack in SageMath
- Studied Axiomatic Probability and connections to measure theory and analysis
- Present findings at end-of-semester talks to 40+ graduate students and faculty

Research & Development Intern — May 2022 – Dec. 2022

AI Onco/Avellino Lab — *Palo Alto, CA*

- Conducted research on the CKKS algorithm and other fully homomorphic encryption techniques, including protection heuristics and noise analysis.
- Developed proprietary FHE pipeline using Python and C++ to protect private health information in oncological AI/ML models and genomic cancer screening tests
- Integrated workflow using Apache Airflow, Docker, and Python
- Presented research findings in encryption and privacy to AI/ML and biomedical departments
- Collaborated with business and law teams in patent filings to protect and commercialize encryption processes

Professional Experience

Teaching Assistant & Undergraduate Grader — Sep. 2022 – Dec. 2023

Rutgers University — *New Brunswick, NJ*

- TA: Calculus I for Engineers (640:151)
- Grader: Intro to Math Reasoning (640:300), Theory of Probability (640:477)

Software Development Engineer Intern — May 2023 – Aug. 2023

Amazon — *Seattle, WA*

- Composed graph algorithms using Java, AWS Neptune, and SageMaker-DGL to identify and track suspicious money flows, fraud patterns, and bad actors within Amazon retail stores
- Created Typescript-React web app to provide Bad Actor Investigation Team with interactive, automated reports of suspicious money flows, reducing per-case investigation time by 10-15%
- Decreased per-query wait time of ML compute jobs by up to 70 minutes and automatically queued 50 jobs per second in pipelines by deploying job scheduling and queuing prototype using AWS Batch

SEE Program - Quant Trading May 2022
Jane Street *New York, NY*

- Learned about various mathematical and financial topics, including probability, arbitrage, and market structure
- Engaged in a variety of short lectures, mock trading sessions, and one-on-one discussions with Jane Street traders

Software Engineer Intern Jan. 2021 – Jul. 2021
Nokia Bell Labs *Holmdel, NJ*

- Developed a human-computer interaction web app using Node.JS to enhance audience experience at live music venues with 200+ attendees
- Promoted multi-modal musical interaction at live concerts by using heart-rate monitors and haptic motors to provide sensory feedback for audiences and performers

Leadership & Extracurriculars

Backend Engineering Director Jan. 2022 – Present
Hack4Impact

- Supervise team of eight students to develop backend web applications and maintain databases using a MERN stack to serve non-profit organizations across the US
- Lead bimonthly workshops with 30+ participants, teaching fundamentals of database design, developing CRUD apps, and writing REST APIs
- Projects include a web app to track customers and inventory for Combined Community Action in Giddings, TX, and a volunteer management system for Meals on Wheels of Greater New Brunswick

HC Ally Peer Mentor Sep. 2022 – Present
Rutgers University Honors College

- Provide personal guidance and resources in one-on-one setting to ensure first-year student success

Advocacy Committee Chair Member Sep. 2021 – Dec. 2022
RU Ethitech

- Led small-group discussions exploring ethical issues in technology
- Connected with Rutgers social justice organizations to spur discussion about data ethics and engagement in the local community

Technical Skills

Languages: Java, Python, C/C++, JavaScript, SQL (Postgres)
Frameworks: React, Node.js, Express, JUnit
Developer Tools: Jupyter Notebook, Git, Docker, AWS, VS Code, IntelliJ
Libraries: pandas, scikit-learn, NumPy, NetworkX, Matplotlib, PyTorch