Sanket Srivastava

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Quantitative researcher with a strong foundation in applied mathematics, bioinformatics, machine learning, and auditory neuroscience. Experienced in developing and optimizing network architectures and statistical models for complex data analysis.

EDUCATION

Northeastern University, College of Science Class of 2025
Master of Science in Bioinformatics, concentrations in Applied Mathematics and CS GPA: 4.0

- **Relevant Coursework:** Machine Learning and Statistical Learning Theory, Algorithms for Optimization, Algorithms, Statistics in Bioinformatics, Bioinformatics Programming, Computational Methods, Linear Algebra, Probability and Statistics
- **Research Conferences:** Advances and Perspectives in Auditory Neuroscience (APAN 2024, presented), Computational and Systems Neuroscience (COSYNE 2025, pending abstract acceptance)

The University of Tulsa, College of Engineering and Natural Science Class of 2023
Bachelor of Science in Biological Sciences, Minor in Neuroscience

Coursera Certifications: IBM: Machine Learning with Python, IBM: Data Science, Imperial College of London: Linear Algebra
EMT-B Certification 2022

RESEARCH EXPERIENCE

Natural Sounds & Neural Coding Lab, Department of Biomedical Engineering, Boston University **Boston, MA**
Graduate Research Assistant under Dr. Kamal Sen April 2024 – Present

- Utilized neural network architectures to define cortical circuits which model the coding of natural sounds in the context of the "cocktail party" problem, aka Complex Scene Analysis
- Focusing on spatial network configuration of both excitation and inhibition. Building from single channel model which incorporates Parvalbumin inhibitory cells. Current model assessing performance of Somatostatin inhibitory cells, which are spatially relevant (localization).
- Conducted advanced neural simulations using the Dynasim package; reduced computational burden of Dynasim by employing CPU parallelization and MATLAB Coder resulting in 98.5% decrease in simulation time.
- Created and fine-tuned genetic algorithm in MATLAB, employing n-dimensional simplex gradient descent to our non-linear landscape, optimizing synaptic strength of both excitation and inhibition.

Department of Biological Science, University of Tulsa **Tulsa, OK**
Undergraduate Research Assistant under Dr. Ron M. Bonett Jan 2021 – Dec 2022

- Fulfilled extraction protocol on muscle and liver tissue of salamanders to sequence genome (wet lab).
- Investigated how repeated transitions between environments shape developmental diversity in salamanders. Applied quantitative analysis to model large genetic datasets and understand phenotypic divergence.
- Analyze timing of developmental events to understand shifts in life cycles and their consequences for developmental diversification.

WORK EXPERIENCE

CytoTronics (Internship) **Boston, MA**
Data Scientist Jan 2025 – June 2025

- Accepted co-op offer as a full-time data scientist at Harvard-based biotechnology startup 'Cytotronics'. 6-month graduate level position that starts in January of 2025. Led by Jeff Abbott and Vince Wu, out of the Donhee Ham Research Group and Park Group.

Best Buy Geek Squad **Tulsa, OK**
Customer Advisor Sep 2021 – May 2022

- Responsible for front-end 1-on-1 work with clients to resolve a myriad of personal electronics issues ranging from smartphones to desktop computers
- Conducted testing on MacOS, IOS, Windows, and Android electronic devices to ensure functional quality, otherwise making the required repairs for customers

TU Center for Student and Academic Services **Tulsa, OK**
Peer Tutor Jan 2019 – Dec 2022

- Academically certified by TU to tutor peers in general chemistry, cellular and molecular biology, and calculus
- Implemented strategies to retain mastery of subject for peers, resulting in a 1-3 letter grade improvement

Chegg **Remote**
Private Tutor Mar-Aug 2020

- Tutored high school students across the country online in math, chemistry, and physics during the COVID-19 quarantine

ACADEMIC PROJECTS

Thermodynamics-based Gene-Specific qPCR primer generator

- Implemented a thermodynamic-based gene-specific qPCR primer design pipeline, replicating the method proposed by Lu et al., utilizing a bash script with the Primer3 software for primer design and MFEprimer-2.0/e-PCR for specificity validation
- Enhanced the project with high-throughput primer testing using the qPCR analysis tool, assessing primer efficiency and specificity across diverse organisms, and managed the generated data in R for robust data analysis and interpretation.

PERSONAL PROJECTS

Brain CT Image Hemorrhage Segmentation

- Developed a convolutional neural network architecture for precise classification of brain hemorrhages in CT scans into 5 subtypes: epidural, subdural, intraparenchymal, intraventricular, subarachnoid.
- Integrated simulated annealing to adaptively adjust learning rate of the ADAM optimizer. Calculated performance using a binary cross-entropy loss function, achieving over 0.95 test accuracy.

Stochastic Optimization Using Cross-Entropy Method

- Applied the Cross-Entropy Method from scratch, utilizing adaptive importance sampling and rare event simulation to minimize the notoriously difficult, non-convex Ackley function, successfully navigating its numerous local minima. Optimized global minima results were comparable with CEopt, a published MATLAB package.
- Conducted manual hyperparameter tuning, optimizing critical parameters such as elite fraction and distribution variance to enhance convergence speed and sampling efficiency.

Options Pricing Model with Black-Scholes

- Trained an artificial neural network model with TensorFlow to compute theoretical prices for call and put options. Compared predictions with real-time data from Yahoo Finance API, achieving a test RMSE of 0.056.
- Utilized Seaborn to visualize relationships between features such as options greeks, volatility, and time to maturity, exploring correlations that impact pricing.

PubMed Data Analysis Tool

- Developed a sophisticated PubMed Data Analysis Tool leveraging the OpenAI API, enabling users to harness advanced Natural Language Processing (NLP) capabilities of Chat-GPT
- The tool facilitates comprehensive analysis of PubMed article data, empowering users to cross-reference multiple sources and derive in-depth insights from scientific queries.

Walmart Store Item Locator

- Created a functional python application that takes a shopping list and provides aisle location and price of all items

Healthcare Assistant Tool

- Utilizing OpenAI's Chat-GPT API, created a healthcare tool that parses the Mayo Clinic for medical information, and responds to user queries

LEADERSHIP AND VOLUNTEERING

TU Asian American Student Association **Tulsa, OK**
Cofounder, Treasurer, Member Feb 2019 – May 2022

- In charge of working with TU senate to negotiate budgets for activities that we host on campus
- Collaborate with members of the executive council at the University of Oklahoma to hoist joint events, encouraging strong relationships and building networks in the state of OK

Music Content Creator: TikTok

- During COVID-19, created music related content, namely piano performances on TikTok, amassing over 27,000 followers, 6 million views, and 2 million likes. Played pieces that ranged from classical piano to song covers. Was able to monetize videos.

Pi Kappa Alpha Fraternity **Tulsa, OK**
Scholarship Chair, Social Committee, Musician Jan 2019 – May 2022

- Responsible for monthly grade checks and supervision of study hours for all members of the fraternity, leading the membership

to having the 2nd highest GPA on campus

- Lead pianist and vocalist for fraternity band, performing at Greek Life events on campus, responsible for scheduling practices for members as well as maintain personnel
- Competed in annual music competitions hosted by Chi Omega sorority, winning 3 out of 4 years

St. John's Hospital **Tulsa, OK**
Student Volunteer Aug 2021 – May 2022

- Helped package and deliver treatments to all locations in the hospital both through the tube system and physically in collaboration with the nurses
- Fostered an atmosphere of engagement and inclusivity while emotionally supporting patients ranging from ages newborn to 17 on the pediatric floor

Laureate Institute of Brain Research **Tulsa, OK**
Volunteer 2020-2021

- Interviewed parents of long-term patients to gather data for analysis in the context of the longitudinal Adolescent Brain Cognitive Development study
- Conducted initial contact and interviews with research participants, both before and on the day of their participation.
- Supported investigators and research assistants in data collection sessions involving adult or child participants.
- Organized and maintained research records, ensuring accurate management of both digital and paper copies.

COMPETITIONS/HONOR SOCIETY

ASMTA Classical Piano Competition: 2013, 2014, 2015, 2016, 2017, 2018
Arkansas Council of Teachers of Mathematics Competition (ACTM): 2015, 2016, 2017
Mu Alpha Theta Mathematics Honor Society: 2014, 2015, 2016, 2017
Arkansas Quiz Bowl: 2011, 2012, 2013
NAQT Quiz Bowl: 2014, 2015, 2016, 2017

SKILLS AND INTERESTS

Technical Skills: Python, R, C/C++, Bash/Unix, MATLAB, LaTeX, Anaconda, Pytorch, Tensorflow, Keras, Biopython, NumPy, Pandas, Matplotlib, Seaborn, Sklearn, Scipy, HuggingFace, SAMtools, Nextflow, BLAST, NGS, Dynasim
Optimization Techniques: Linear Programming, Stochastic Methods, CVX, Simulated Annealing, Cross Entropy, Genetic Algorithm
Interests: Travel, Classical Music, Space Exploration, Tennis, Cars