

Computational Scientist - Data Engineer

Creatively utilizing my unique collection and diverse background in mathematics and computational science to develop tools to explore and uncover solutions in engineering and data science.

Relevant Projects

ANALYSIS OF GENETIC MUTATIONS OF COVID-19 GENOMES

Description: Exploring the novel CoVID-19 viral genome through analysis of large biological datasets

Project Highlights

- Generate a phylogenetic lineage among 200 COVID-19 genome samples from the United States through identification of unique point mutations and polymorphisms over the entire sample set with each genome being approximately 30K nucleotide in length using various mathematical tools and graph theory algorithms.
- Created custom Python scripts in PyCharm and Jupyter Notebooks to query and collect data from NCBI Genbank database of over 200 unique COVID-19 genomes and extract each individual sample's metadata regarding collection date, city and state location information, and other qualifiers within various data structures in database.
- Developed detailed project roadmap and coordinated team members to fulfill baseline expectations and achieve multiple ambitious stretch goals resulting in successfully generating comprehensive dataset and visualization of complex network of phylogenetic relationships among the large sample set of genomes by using over 1000 unique point mutations found among the 30K genome with limited use and dependence of outside libraries. Analysis and visualization tools used to plot point mutations and create ancestral phylogenetic tree with the aid of libraries such as NetworkX, BioPython, RAxML, Pandas, Numpy, PyDot, Matplotlib, and collections.
- Implemented comprehensive computational analysis of data with limited reliance on libraries in order to maintain high levels of fidelity and successive computation for analysis further down the project pipeline while handling twice the number of data samples recommended by instructor.
- Constructed impactful data plots to accurately and concisely present results to instructor and classmates.

SIMULATION OF 2-DIMENSIONAL ISING MODEL WITH METROPOLIS-HASTINGS ALGORITHM

Project Description: Computational stochastic project that used the efficiency of the Metropolis-Hastings algorithm to simulate folding protein structures.

Project Highlights

- Extend the 1-Dimensional Ising model to simulate the behavior and study properties of a system to possibly predict parameters and conditions facilitating states of in random ordering of amino acids and overall protein structure.
- Created models written in Python in Jupyter Notebook with Numpy library for numerical computation and Matplotlib to generate visualizations and plots for simulation with variational parameters.
- Collect parameters to consider in estimating entropy of the stable Hamiltonian states.

ANALYZING PREDICTION INDEX OF STUDENT ASSESSMENT USING LOGISTIC REGRESSION

Description: Project demonstrating the utility of logistic regression in training and analyzing data and applications in machine learning

Project Highlights

- Present the utility of applications of machine learning with logistic regression and construct various live demonstrations outlining the steps needed to collect, clean, organize, and process data to generate viable models with Scipy, Numpy, Pandas, and SciKit-learn libraries.
- Compare the reliability and consistency of building models trained using logistic regression against other classification and regression models using supervised learning written in Jupyter Notebooks in Python.
- Demonstrate possible applications of and resources to implement logistic regression in Python and other computational tools.
- Comparing the reliability and consistency of logistic regression for training purposes the prediction of student outcomes based on intermittent assessments and against other strategies with machine learning.

AN ANALYSIS OF NEURAL ORGANOID INTEGRATION WITH MICE IN VIVO

Description: Project demonstrating the utility of logistic regression in training and analyzing data and applications in machine learning

Project Highlights

- Segregate and filter independent components and frequencies of recorded signal from implanted organoid using independent component analysis (ICA) and to measure the strength of specific frequencies over time to measure the level of coherence between different regions on the organoid implant using ICA, coherence, and cross spectrum functions in Matlab.
- Measured and mapped the coherence organoid integration into the mouse cortex by analyzing the power spectrum density (PSD) and identifying the viable frequencies using Fast Fourier Transform (FFT) algorithm in Matlab to identify delta, theta, beta, alpha and gamma waves in recorded signals.

Career History & Achievements

GRADUATE TEACHING ASSISTANT/STUDENT RESEARCHER

UC SAN DIEGO, DEPARTMENT OF MATHEMATICS — La Jolla, CA

2018 to Present

- Design instructional plans and implement learning strategies to support students in critical prerequisite math courses.
- Cultivate and effectively facilitate the academic growth of students by engaging with and communicating to students with diverse academic backgrounds from an individual to group scale of over 30 students.
- Create and adapt weekly lesson plans to an unique set of students to efficiently distribute information within a 50-minute session to help build on the prior knowledge of students and prime them future challenges.

LEARNING SKILLS AND ACADEMIC CONSULTANT

INDEPENDENT — San Diego, CA

2007 to Present

- Developed strong relationships with students and parents to create strategies supporting students to achieve concurrent short term academic goals and long-term higher education goals.
- Interpret objectives for and negotiate between students, parents, and teachers in order to reach attainable expectations among individuals and parties. Designed and created individualized supplemental resources to reinforce concepts and prepare for future assessments.

Education & Degrees

MASTERS OF SCIENCE IN COMPUTATIONAL SCIENCE, MATHEMATICS, AND ENGINEERING

University of California, San Diego — La Jolla, California

MASTERS OF EDUCATION IN EDUCATION PSYCHOLOGY - INSTRUCTIONAL DESIGN

University of Southern California — Los Angeles, California

BACHELOR OF ARTS IN HUMAN DEVELOPMENT AND MATHEMATICS-SECONDARY EDUCATION (DOUBLE MAJOR) MINOR IN HISTORY

University of California, San Diego — La Jolla, California

Technical Language Proficiency ...



PYTHON



C/C++



BASH



JAVA



R

L^AT_EX

LaTeX



Git



SQL

Affiliations and Leadership

UNIVERSITY OF CALIFORNIA, NATURAL RESERVE SYSTEM

ENVIRONMENTAL MAINTENANCE AND LANDSCAPE VOLUNTEER

UNIVERSITY OF CALIFORNIA, SAN DIEGO HEALTH VACCINATION CENTER

INTAKE AND MEDICAL SCRIBE VOLUNTEER

GATES MILLENNIUM SCHOLARS ALUMNI ASSOCIATION

INAUGURAL BOARD MEMBER, TECHNOLOGY AND COMMUNICATIONS CHAIR

Early career highlights at University of California, San Diego and University of Southern California,
(2010 to 2018) discussed during a personal interview.