Aidan J Maldonado

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Research Interests

- Statistical Machine Learning
- Artificial Intelligence
- Computer Vision
- Genome Sequencing
- Medical, Biotech, Brain Imaging
- Generative AI
- Deep Learning Optimization
    - Multithreading techniques
    - Developing efficient architecture
    - Designing and improving deep learning models

Education

University of California, Santa Cruz — Santa Cruz, California
BS in Computer Science — Sep 2022 - June 2026
BS in Applied Mathematics — Sep 2022 - June 2026
GPA: 3.62

De Anza College — Santa Clara, California
Trasnferrable Credit
GPA: 4.00

Las Positas College — Livermore, California
Transferrable Credit
GPA: 4.00

Relevant Coursework

Machine Learning

- Introduction to Machine Learning (UCSC - CSE 40 Testout)
- Machine Learning and Data Mining (UCSC - CSE 142)
- Introduction to Natural Language Processing (UCSC - CSE 143)

Software Development

- Programming Abstractions: Python (UCSC - CSE 30)
- Computer Systems and C Programming (UCSC - CSE 13s)
- Data Structures and Algorithms (UCSC - CSE 101)
- Analysis of Algorithms (UCSC - CSE 102)
- Computational Models (UCSC - CSE 103)
- Introduction to Software Engineering (UCSC - CSE 115a)
- Parallel Programming (UCSC - CSE 113)

Computer Hardware / Physics

- Computer Systems and Assembly Language and Lab (UCSC - CSE 12)
- Computer Architecture (UCSC - CSE 120)
- Principles of Computer Systems Design (UCSC - CSE 130)
- Engineering Principles of Electronics (UCSC - ECE 30)

Linear Algebra
- Linear Algebra (UCSC - Math 21)
- Advanced Linear Algebra (UCSC - Math 117)
- Modern Algorithmic Toolbox (UCSC - CSE 105)
- Spectral Graph Theory (UCSC - CSE 258)

Statistics
- Probability Theory (UCSC - Stats 131)
- Classical and Bayesian Inference (UCSC - Stats 132)

Calculus
- Calculus 1, 2, 3 (UCSC - Math 19b, Math 23a, Math 23b)
- Ordinary Differential Equations (UCSC - Math 24)

Abstract Thinking and Proofs
- Applied Discrete Mathematics (UCSC - CSE 16)
- Graph Theory (UCSC - Math 115)

Team Building & Research
- Theory and Practice of Peer-Guided Learning for Tutors and Learning Assistants (UCSC - Stev 96)
- Research Explorations (UCSC - CMPM 15)

Research Labs

Protein Synthesis Modeling - Razvan Marinescu MDML Research Lab
Undergraduate Researcher Dec. 2023 - Present
Assisting in research under the supervision of a professor and their Ph.D. students, where technical skills in Bayesian Statistics, Machine Learning, Discrete Mathematics, Python, and data visualization with libraries such as NumPy, SQL, and Pandas are being applied. Actively working with peers during 3-hour meetings twice a week and more individually to apply a Neural ML model to speed up the process of simulating protein self-assembly in viruses with the goal of a human brain cell simulation for medical applications. Familiarity working with tools such as Bizon and data visualization software.

Computer Vision Video Recognition - Eric Wang Research Lab
Undergraduate Researcher and Data Scientist Jan 2023 - Present
Creating and training a machine learning model to recognize the features of a video by gathering data on dozens of videos, drafting reasoning, counterfactual, future prediction, and domain-specific inquiries to create a tool comparable to Google's Bard in terms of video recognition capabilities. Tasked with developing a model with equally efficient output given resource constraints.

Research and Personal Projects

Generative Language Model / *Python, NumPy, Pandas* Jun 2024
Developed an n-gram corpus perplexity monitor capable of learning speech patterns and predicting text likelihood, used to construct a statistical analysis-based predictive text completer. Implemented various next-word selection methods, including k-random sampling, temperature scaling, and greedy word prediction.

Penny Stock Forecasting Webapp with LSTM Models | *PyTorch, SQL, TensorFlow/Keras, HTML/JS, Flask, Polygon.ioAPI* Jul 2024
Developed a web app using MySQL, Flask, and deep learning frameworks (TensorFlow/Keras, PyTorch) to predict penny stock prices, utilizing an LSTM model with a prediction loss of <0.004 and integrating real-time stock data from Polygon.io. Created an interactive frontend with HTML/JavaScript to display stock forecasts and optimal buy/sell times based on a specified horizon, enabling user interaction and communication with the backend model.

Deep Learning Library from Scratch | *Python, NumPy, Pandas, MatPlotLib* Jan 2024- Present
Combining skills cultivated from clubs, research, coursework, and independent research to create a Machine Learning library from scratch in Python. Utilizing libraries such as NumPy and Pandas to implement various Supervised and Unsupervised models and concepts such as Linear Regression, Logistic Regression, Recurrent Neural Networks, and Clustering with K-means only using math. Created a graphing library as an extension of MatPlotLib to efficiently create detailed plots of datasets.

Computer Vision Online Course | *Python, NumPy, Pandas* Dec. 2023 - Present
Working through a self-paced online course for learning Computer Vision Principles offered by Columbia University, as well as following alongside several textbooks in anticipation of taking a Computer Vision class at UCSC. Applying skills such as image processing, linear algebra, signal processing, statistics, calculus, and the perceptron to classify images and short videos.

Beleaguer | *Python, PyQt, NumPy, C++, Godot* Mar. 2019 - Present
Developed a virtual adaptation of my board game in Python using UI libraries such as PyGame and PyQt, and data handling with Pandas NumPy to control the logic of the board itself and piece characteristics. Knowledge of these libraries was self-taught over 9 months. Rebuilt the project starting in July 2023; now utilizing C++ with the Godot game engine. Leveraging C memory management capabilities C from CSE 13s and 101 cojoined with self-taught for three months; class handling in C++, game engine usage, and sprite work.

Huffman Encryption Project | *C* May 2023
Developed a C-based text encryption and decryption program utilizing the Huffman encoding algorithm, which applied data structures such as Priority Queues, Data Buffers, and Bitwriters to transform the character data, along with my expertise in file handling, debugging, and memory management. Demonstrated a thorough understanding of and proficiency in implementing complex algorithms to transcribe encrypted input message strings safely.

Color Blindness Simulator | *C* May 2023
Developed a C-based image manipulation program that transformed any BMP to simulate how people with various forms of color blindness, such as deuteranopia, perceive the world. Applied proficiency in file handling, buffer writing, transformation matrices, bitmatsking, and image metadata processing to write to an output image with zero memory leaks.

Personal Website | *HTML/CSS - https://aidanjmaldonado.github.io/* Nov. 2023 - Present
Published a website on GitHub to showcase professional accomplishments and research, such as the photography page and soon-to-be-published game on itch.io called Beleaguer.
Spent approximately 16 hours learning HTML/CSS while constructing the website over four weeks between November and December 2023.

Professional Experience

Learning Support Services | *Tutor* Sep. 2023 - Present
Facilitated and engaged large groups of 10-20 students through collaborative and individual activities each tutoring session. Provided individualized, equitable tutoring and conceptual help for my smaller 2-5-person sessions. Prepared and hosted three one-hour weekly sessions and three-hour long Midterm and Final review sessions with up to 90 people. Communicated punctually and concisely; effectively conveyed thoughts verbally, visually, and interactively to a diverse range of listeners while perceiving and catering to individual student needs. Maintained an efficient and well-organized schedule by actively collaborating with my co-tutor to plan and host joint sessions, attending weekly meetings with my mentor and supervisors, and ensuring timely communication through Slack and email. Consistently outline to incorporate feedback to improve every new session. Utilized retained knowledge

from time taking Discrete Math to help others through places I know are demanding.

Extracurricular

Santa Cruz Artificial Intelligence | *Club Member* Sep 2023 - Present
Engage in weekly workshops, study sessions, community outreach, informational lectures, hackathons, and group projects with peers and mentors who share a passion for everything related to Machine Learning and Artificial Intelligence.

Neurotech UCSC | *Club Member* Sep 2022 - Present
Attend weekly meetings both with a general body and with 4-8 team members to work on the machine learning and data processing aspect of our Virtual Reality Electromyography project.

Hackathon | *ForAllSecure* April 2023
Participated in a ForAllSecure Hackathon, learned about program fuzzing, and applied it to small tasks.
April 2023

Shutterslug Photography| *Club Member* Sep 2022 - Present
Took an interest in photography in 2021 and keep practicing/learning about it every day. Attend weekly meetings with peers to showcase our works and findings.

Bass Feb 2023 - Present
Started playing the bass guitar and practiced about 8 hours a week. Learning music theory and applying mathematical reasoning.

Gym Feb 2023 - Present
Train in the gym roughly four days a week and guide multiple friends who recently started.

Technical Proficiencies

Programming Languages / Libraries
- Python
- C
- C++
- NumPy/Pandas
- PyTorch
- TensorFlow
- SNN Torch
- SKLearn

Programming Languages / Libraries (Emerging)
- SQL
- HTM/CSS/JS

Developer Tools
- VSCode
- PyCharm
- Google Workspace

Technologies
- GitHub
- Linux
- Ubuntu
- Bizon
- Virtualbox
- Parallels

Languages (Speak/Read/Write Proficient)
- Speak/Read/Write English and Spanish, studying Japanese

Awards and Scholarships

Dean’s Honor List (USCS) Sep 2023 - Present