Daniel Santiago Fleming

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EDUCATION

Massachusetts Institute of Technology (MIT), *Cambridge, MA* Class of 2024

- Bachelor of Science in Computer Science and Engineering
- Activities and Societies: Society of Hispanic Professional Engineers(SHPE), Consulting Club(TAMID Group), Latinos in Science and Engineering(MAES), Chess Club, Poker Club, Sigma Nu Fraternity
- Relevant Coursework: Machine Learning (6.3900), Python Programming (6.101), Algorithms (6.1220), Software Construction (6.102), Probability (18.600), Embedded Systems (6.08), Discrete Math (6.042), Computation Structures (6.004), Computer Systems (6.1800), Data Science (IDS.012), Computer Vision (6.8300)

RESEARCH

Undergraduate Researcher for the MIT Sports Lab 2023-Present

- Improved data utilization, as measured by an 83% increase, by translating complex data into clear instructions
- Enhanced NBA injury risk prediction by a 14% accuracy improvement by analyzing NBA skeletal tracking data

Undergraduate Researcher for The Digital Humanities Lab at MIT 2021-2022

- Accelerated the formatting of over 100,000 images by 50% through implementing a multithreaded architecture

Researcher at The Summer Science Program for Astrophysics 2019

- Determined the orbital elements of asteroid (2001 XT30) with 99.6% accuracy via Gauss's method, Monte Carlo analysis, and differential correction.
- Published asteroid data to the Minor Planet Center by submitting verified observations.

WORK EXPERIENCES

Mathematics Instructor at Mathnasium 2017-2020

- Accomplished fostering math skills growth with a 100% pass rate among all tutored students by providing personalized instruction to an average of 8 students daily

PROJECTS

AI Mammogram Analysis

- Improved breast cancer detection to 93.4% validation accuracy by training a Mask R-CNN model for classifying and segmenting mammogram images
- Evaluated model performance, achieving recall of 1.0 with confusion matrices and precision-recall curves.

Enhancing Stable Diffusion with ControlNet

- Fine-tuned Stable Diffusion by integrating ControlNet to incorporate color information by conditioning the model on colored edge maps alongside text prompts to improve image fidelity.
- Improved image quality by 11% using Color Mean Squared Error (MSE) to compare an enhanced model against a baseline Stable Diffusion model.

Computational Analysis of Hi-C and RNA-seq Datasets

- Identified interchromosomal interactions in Hi-C data by detecting 442 high-interaction regions ($p < 0.01$) by developing a greedy search algorithm
- Identified key genomic markers for cell clusters using PCA and regularized logistic regression on single-cell RNA-seq data

Custom Chess Bot

- Engineered a full-stack chess web app with a CNN-based engine trained on 1 Million+ Lichess games and fine-tuned to my opening preferences, mimicking my play style
- Developed the backend with Flask and leveraged GCP with an NVIDIA L4 GPU for efficient training.

PUBLICATIONS

New Observations of Near-Earth Asteroid 153842 (2001 XT30) June 2019 - July 2019

- We used astrometry and photometry to analyze the data collected from the asteroid before performing the Method of Gauss to calculate the trajectory of our asteroid. Our analysis of its orbit and information obtained from JPL Horizons shows that the asteroid 2001 XT30 is a Mars-crossing asteroid with unlikely potential to hit Earth soon.
- Minor Planet Center, July 27, 2019; Rolfness, J., Liang, L., Fleming, D., et al. 2019 “New Observations of Near-Earth Asteroid 153842 (2001 XT30),” M.P.S. 906049, M.P.C 110641

SKILLS

Computer: Python, TypeScript, Next.js, Tailwind CSS, SQL, R, Git, Angular, Flask, Google Cloud Platform, C++, Assembly, Django REST Framework, Arduino, Minispec

Language: Spanish (ILR Level 4)