

MACY MORA-ANTOINETTE

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Data scientist with interdisciplinary background in biomedical sciences, deep learning for video and image classification, and predictive analytics for advertising and user behavior. Earned a reputation as a highly dependable team player, problem-solver, and project manager in multiple environments, especially fast-paced and cross-functional.

Skills

- Python (Pandas, NumPy, SciPy, Scikit-learn, Matplotlib, SQLite, PyTorch)
- R (dplyr, ggplot2, ggsignif, lm)
- MATLAB
- SQL (Google Cloud Platform)
- Analytics and Model Building
- Statistical Methodologies
- Public Speaking and Scientific writing
- Project Management
- Mentorship and Leadership

Research Experience

Cornell University

Aug 2018 – present

Graduate Research Assistant

Ithaca, NY

- Applied time-series change detection analysis in MATLAB on videos of cellular dynamics indicated by fluorescence (16-bit pixel intensity); performed frequency domain analysis as well as network analysis
- Performed image processing, object identification, and histogram statistical analyses of pervasive nerve fibers in 3D reconstructions of bone taken from light-sheet fluorescent microscopy (20-60GB/sample, 60+ samples)
- Designed instrumentation with a MATLAB Design App and printed circuit board that synchronized two high-precision piezo-driven actuators to remove motion artifacts for intravital imaging of living mice with two-photon microscopy
- Established automated image analysis codes using JavaScript-based Macros in ImageJ/FIJI to determine geometric parameters of high resolution (20 μm) X-rays for rapid analysis of hundreds of mouse bone scans
- Applied statistical tests (ANOVA followed by Bonferroni, T-test or Tukey HSD; ANCOVA with generalized linear models (GLM); PCoA dimensional reduction) in R to analyze differences across several bone quantitative assays
- Received Young Investigator Award; published three first-author publications; presented four podium talks at national conferences and the World Congress; mentored and trained 7 undergraduate students

Twitter

June – Aug 2022

PhD Data Science Intern

New York, NY

- Mapped software developers' perceptions of work enablement to behavioral data tracked with tool telemetry
- Cleaned and preprocessed survey data; extracted time series data from Google BigQuery (SQL) and joined across 3 different databases with the survey data to identify related tools for developers
- Used random forests to identify unique tools for each developer category; ran linear and ordinal logistic regressions to determine the relationship of tool usage and latency on work enablement in Python
- Presented final outcomes to stakeholders, specifically heads of research and developer effectiveness

Massachusetts Institute of Technology

June – Aug 2016 and 2017

Engineering Intern

Cambridge, MA

- Prototyped a smart system with a magnetic sensor connected to an Arduino circuit to fit into a nasogastric tube to autonomously identify and retrieve a drug delivery device within the stomach; Demonstrated proof of concept safely inside a living pig
- Programmed a computer numerical control (CNC) mill in preparation for mass production of device manufacturing
- Received return offer and a co-authorship in Science Translation Medicine and on a US patent application

Machine Learning Projects - Semester Long/Capstone

Ads Recommendation for Best Buy

Aug – Dec 2022

Tools: Collaborative and Content-Based Filtering, XGBoost, Synthetic Minority Oversampling Tech (SMOTE)

- Reporting directly to data scientists at Best Buy, used deep learning networks on a dataset of over 2 million customer observations to determine the best 3/130 product category recommendations for personalizing market communications and ads

Human Motion Prediction

Jan – May 2022

Tools: Pytorch, RNN, Transformer-Encoder, Temporal Convolutional Network, MSE, ADE, Google Colab Pro

- As an adaptation of fairmotion from Facebook (META) AI Research, used deep neural networks to predict human motion using an 18GB/25,000 sequence subset from the largest Archive of Motion Capture (AMASS) [[Code](#)]

Sports Analytics Classifiers

Aug – Dec 2021

Tools: Scikit-learn, SVM, Random Forest, Naive Bayes, K-Nearest Neighbor, and QDA, AdaBoost

- Predicted results for the English Premier League from over 5000 games across 18 years. Selected features using mutual information theory and computed rolling/cumulative statistics (Jupyter Notebook; F-1 score, ROC AUC, MSE, recall, precision) [[Code](#)]

Algorithmic Trading

Aug – Dec 2021

Tools: Random Forest, Bag Learner, Sharpe Ratio, Cumulative return, market indicators

- Developed automated stock market trading algorithm combining three market indicators within a Random Forest model nested in a Bag Learner; created market simulator that performs market history analysis [[Code](#)]

Education

Cornell University

Dec 2023

MS, PhD focus on Imaging and Neurotechnology

- Ford Predoctoral Fellowship: Selected from competitive pool of PhD applicants (5% acceptance rate) for 3 years of funding from National Academies of Sciences, Medicine and Engineering. [[Press Release](#)] [[Personal Interview](#)]
- Mong Neurotech Fellowship: Received 1 year of graduate funding from Cornell for neurotechnology development

Georgia Institute of Technology

Aug 2023

MS in Analytics, Computational Data Analytics

- Graduate Courses: Deep Learning, Machine Learning, ML for Trading, High Dimensional Analysis, Discrete Event Simulation, Analytics Modeling, Visual Analytics, Data Structures, Regression Analysis, Applied Mathematics

University of California, San Diego

June 2018

BS in Mechanical Engineering

- Chancellor's Research Excellence Scholarship
- National Action Council for Minorities in Engineering Scholarship

Selected Publications/Patents

*full list on google scholar, other names: Macy Castaneda

1. **M Mora-Antoinette**, M Obaji, A Saffari, KJ Lewis, "Nicotinic Acetylcholine Receptors on Osteocytes Impact Bone Mechanoadaptation in a Sexually Dimorphic Manner," Cold Spring Harbor Laboratory. BioRxiv 2023. doi: <https://doi.org/10.1101/2023.10.01.556129>
2. **M Castaneda**, KM Smith, JC Nixon, CJ Hernandez, and S Rowan, "Alterations to the gut microbiome impair bone tissue strength in aged mice," Bone Reports 2021. doi: [10.1016/j.bonr.2021.101065](https://doi.org/10.1016/j.bonr.2021.101065).
3. CG Traverso, RS Langer, M Verma, N Roxhed, F Eweje, **M Castaneda**. Retrieval Systems and Related Methods. (2019) U.S. Patent Application No.: 16/427,414. <https://patents.google.com/patent/US20190365418A1/en>.