MACY MORA-ANTOINETTE

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Data scientist with interdisciplinary background in Biomedical Sciences, Imaging and Mechanical Systems, Perception-to-Behavioral Mapping, Ads Recommendations and Human Motion Prediction. Earned a reputation as a highly dependable team player, problem-solver, and project manager in a fast paced, cross-functional environment.

Skills

- Python (Pandas, NumPy, SciPy, Scikit-learn, Matplotlib, SQLite, PyTorch)
- R (dplyr, ggplot2, ggsignif, lm)
- MATLAB
- Platforms: Jupyter Notebook, Spyder, Visual Studio, Google Cloud

- 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 fluorescence dynamics taken in mice; performed frequency domain analysis as well as network analysis on groups of responding cells
- 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)
- Created a GUI using MATLAB Design App and a printed circuit board that synchronized two high-precision piezo-driven actuators for simultaneous mechanical loading and imaging of live mice using two-photon microscopy
- Established automated image analysis codes using JavaScript-based Macros in ImageJ/FIJI to determine geometric parameters of high resolution (20 μm) microcomputed tomography scans from 240 mouse femurs
- 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

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

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 for retrieval system safely inside the stomach of a living pig; as a result, 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)
- Working with 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
- This project was 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).

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).

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

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.

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.