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Alex McDaniel

PhD, Postdoctoral Fellow (Astrophysics)

Summary of Qualifications

- Extensive experience in applying data analysis and statistical methods to astrophysical data, and excited to transition to an industry position.
- Strong programming skills (primarily python, C++) for scientific computing, data manipulation, and visualization. Well-versed in implementing data analysis pipelines on distributed computing platforms.
- Demonstrated ability to lead and perform complex scientific research through several peer-reviewed publications (6 first-author, full publication list available at NASA Abstract Service), mentorship of > 10 undergraduate and graduate students in astrophysics research, and multiple successful research grants.

Experience

2020 – Present **Postdoctoral Fellow (Astrophysics)**, *Clemson University*, Clemson, SC

- Extracted, cleaned, and organized datasets from various astrophysical catalogs containing ∼100s-1,000s of sources to obtain optimal samples for analysis, primarily using pandas and numpy/scipy for relevant data transformations.
- Applied joint maximum likelihood methods to search for gamma-ray emission over the course of several distinct projects, performing simultaneous fits to source populations with typical sample sizes ranging from $\sim$ 30 to >500 objects.
- Optimized performance and increased parallelization of python based analysis pipelines for performing maximum likelihood estimation analysis on remote computing clusters, reducing pipeline runtimes by a factor of $\sim$ 10−15x.
- Awarded >$150,000 in grant funding as well as observation time as Principal Investigator (PI) across multiple instruments and organizations.

2015 – 2020 **Graduate Student Researcher**, *UC Santa Cruz*, Santa Cruz, CA

- Analyzed X-ray telescope data, combining over 25 observations from multiple instruments observing 11 separate targets. This work used custom developed X-ray data reduction tools along with Python, numpy, pandas and OpenCV.
- Developed in C++ and publicly released the scientific computing tool RX-DMFit tool (>35 citations), used for modeling and predicting astrophysical emission from dark matter annihilations.
- Served as the graduate student representative on the campus-wide Committee on Research, responsible for advising the Chancellor on stakeholder interests related to the university research mission and granting faculty funding awards.

Skills

Tools Python (pandas, matplotlib, numpy, scipy, scikit-learn, xgboost, JupyterLab, seaborn), C++, SQL, R, ArcGISPro

Concepts Statistics, Hypothesis Testing, Differential Equations, Linear Algebra, Machine Learning, Regression & Classification, Random Forest, Boosting Trees, Computer Vision

Education

2020 **Physics PhD**, *University of California, Santa Cruz*, Santa Cruz, CA
Dissertation: Multiwavelength Astrophysical Probes of Dark Matter Properties

2015 **Bachelor of Science**, *University of California, Santa Barbara*, Santa Barbara, CA
Physics Major (Honors), English Minor