CHAD BUSTARD, PHD

Versatile data scientist with a background in computational astrophysics (Physics PhD) and 3 years of post-PhD, team-lead experience. Expertise in Python-based data analysis (10 years), distributed computing, and machine learning model development, leading to 14 publications and driving growth of two early startups.

PROFESSIONAL EXPERIENCE

POSTDOCTORAL FELLOW **September 2020 - September 2023**

KAVLI INSTITUTE FOR THEORETICAL PHYSICS | SANTA BARBARA, CA

Machine Learning Model Development and Interpretation

- Published a novel demonstration of deep convolutional networks learning astrophysical particle propagation modes with unprecedented 95% accuracy from TBs of simulation data (Bustard and Wu 2024, MLST, under review)
- Engineered a pipeline to process 3D data volumes and train, fine-tune, and interpret neural classification and segmentation models (PyTorch, Git, Pandas)

Distributed Computing, Data Analysis, and Project Management

- Awarded and managed > 15 million CPU hours of compute time supporting 10 team members by leading multiple successful proposals and performing code timing and scaling tests on 4 national supercomputers (C++, Fortran, bash)
- Designed and executed a suite of simulations on distributed clusters (C++, bash) and led time series and image analysis (Python, NumPy; regression, Fourier analysis) that reformed two paradigms of magnetic turbulence theory
- Sculpted and advised data-intensive projects for 6 junior scientists; presented collaborative work at over 40 conference talks and lectures, including to a non-technical government committee as a subject matter expert

GRADUATE RESEARCH FELLOW **June 2014 - August 2020**

UNIVERSITY OF WISCONSIN - MADISON | MADISON, WI

Software Development and Data Analysis

- Led a 6-person team in the design, development, and integration of new astrophysics modules into a parallelized, production codebase, enabling state-of-the-art, nationally awarded galaxy modeling and analysis (Fortran, Python)
- Leveraged and advanced Python-based tools (SciPy, Pandas) to transform > 10 TBs of simulation data into bespoke, high-utility, mock observables, yielding published comparisons to galaxy observations with 5 remote collaborations
- Awarded a nationally renowned NSF Graduate Research Fellowship based on past and proposed research demonstrating intellectual merit and broad impact

OTHER PROJECTS/ACTIVITIES

Geospatial Analysis and Front-End Development

- Mapped transit data (GeoPandas, Folium) and developed a cost estimator tool (HTML, JavaScript) for Down the Block, a new carshare co-op in Madison, WI
- Trained a Gaussian process regression model (Scikit-learn) to interpolate geospatial noise pollution data and quantify uncertainty

Data Engineering and Predictive Modeling

- Collaborating with 6 other data scientists to predict the ROI of clean energy home retrofits using gradient boosted trees (Scikit-learn) for FutureZero

CONTACT

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GitHub | LinkedIn | Webpage

SKILLS

LANGUAGES: Python, C/C++, Fortran, JavaScript, SQL

LIBRARIES & FRAMEWORKS: PyTorch, TensorFlow, Pandas, GeoPandas, Scikit-learn, SciPy, NumPy, matplotlib, Plotly, Seaborn, Jupyter, bash, LaTeX

TOOLS & PLATFORMS: Linux, Git, Docker, Kubernetes, Google Cloud Platform, Slurm, Jira

COURSES

Machine Learning Engineering for Production (MLOps)
DeepLearning.AI on Coursera
(Kubernetes, Google Cloud Platform (GCP), Docker, TensorFlow Extended)

Deep Learning Specialization
DeepLearning.AI on Coursera
(TensorFlow, CNNs, RNNs, Transformers)

Climatebase Fellowship
(Selective, project-based climate tech accelerator, Fall 2023)

EDUCATION

PH.D. PHYSICS
University of Wisconsin - Madison
August 2020

B.S. ASTROPHYSICS
B.A. MATHEMATICS
Rice University
May 2013