CHAD BUSTARD, PHD

Versatile scientist with a background in computational astrophysics (physics PhD). Expertise in Python-based data analysis (10 years experience), collaborative software engineering, and machine learning model development, leading to 14 high-impact scientific publications and driving growth of two data-driven 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 and Data Analysis

- 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
- Presented data-driven results 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, created to "identify future science and engineering leaders", by writing a technical proposal demonstrating high intellectual merit and broad impact on the field

OTHER ACTIVITIES/PROJECTS

Data Scientist and Developer for Down the Block | September 2023-present
- Conducted geospatial data analysis (GeoPandas) and front-end development of maps and cost estimators (JavaScript, HTML) for a new carshare startup

Data Scientist for FutureZero | September 2023-present
- Processing housing data (Pandas) and developing an interpretable machine learning model using gradient boosted trees (Scikit-learn, SHAP) to predict the added value of clean energy retrofits on home appraisals; FutureZero

CONTACT

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Madison, WI 53704
bustardchad@gmail.com
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