Andrew Casey-Clyde, Ph.D.

Research Scientist | Data Scientist

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Summary

Ph.D.-trained data scientist with 8+ years of experience in statistical modeling, predictive analytics, and machine learning. Expertise in Python, SQL, and deriving actionable insights with Bayesian inference. Skilled in cross-functional collaboration, technical communication, and optimizing workflows. Passionate about creating data-driven solutions to complex problems.

Skills

Programming Languages: Python, SQL, Java, C++, C

Data Science & Machine Learning: Predictive Modeling, Bayesian Inference, Regression Analysis, Neural Networks, Causal Inference, Data Visualization, Optimization, Experimental Design, Hypothesis Testing

Tools & Platforms: NumPy, SciPy, Scikit-learn, Keras, TensorFlow, Git, Jupyter

Soft skills: Communication, Leadership, Collaboration, Problem-Solving, Project Management

Experience

Yale University — **New Haven, Connecticut**
Visiting Research Assistant — *Aug. 2023 – Dec. 2024*
- Developed hierarchical Bayesian models for multi-modal astrophysical datasets, improving population predictions.
- Led cross-functional collaboration with 100+ scientists; published results in a top-tier journal.
- Leveraged survival analysis techniques to analyze noisy, incomplete datasets, producing actionable insights.

University of Connecticut — **Storrs, Connecticut**
Graduate Research and Teaching Assistant — *Aug. 2019 – Dec. 2024*
- Designed hierarchical Bayesian models to enhance predictive analytics; published methods in a high-impact journal.
- Optimized predictive model efficiency by $300\times$ using Hamiltonian Monte Carlo, reducing computational costs significantly.
- Secured $8,000 NASA Space Grant Fellowship based on innovative research proposal.

San José State University — **San Jose, California**
Graduate Research and Teaching Associate — *Sep. 2016 – Aug. 2019*
- Built convolutional neural network pipelines for galaxy classification across large datasets.
- Developed Bayesian analysis techniques for predictive spatial mapping of astronomical datasets.
- Presented research findings to academic and professional audiences.

Salient Process, Inc. — **Sacramento, California**
Software Engineer — *Feb. 2015 – Aug. 2016*
- Led development of SPARK UI toolkit, acquired by IBM.
- Pioneered Git-based version control for streamlined project management.
- Designed and maintained software tools, improving productivity and quality of deliverables.

Education

University of Connecticut — **Storrs, Connecticut**
Ph.D. Physics, GPA: 3.823 — *2024*
Dissertation: *Multi-messenger Constraints on Supermassive Black Hole Binaries.*

San José State University — **San Jose, California**
M.S. Physics, GPA: 3.791 — *2019*
Select courses: Machine Learning & Data Analysis in Astronomy, Statistical & Machine Learning Classification, Deep Learning

University of California, Davis — **Davis, California**
B.S. Physics, GPA: 2.945 — *2014*

Selected Projects

Optimized Predictive Modeling for Multi-Modal Data
- Built hierarchical Bayesian models to identify patterns in datasets using diverse inputs
- Improved computational efficiency by $300\times$ using advanced statistical methods.
- Improved prediction robustness for astrophysical populations, with direct applications to forecasting models.

Advanced Gravitational Signal Detection Techniques
- Led a 100+ scientist collaboration analyzing NANOGrav data, identifying subtle potential signals from black hole mergers.
- Applied advanced modeling to extract insights from noisy, multi-modal datasets, demonstrating predictive modeling expertise.

Image Classification Pipeline for Large Datasets
- Designed machine learning workflows to classify over 300,000 images with convolutional neural networks.
- Streamlined preprocessing and training for large-scale datasets, adaptable for diverse applications.

Publications & Presentations Summary

- Co-authored 18 peer-reviewed papers on Bayesian inference, gravitational waves, and large-scale data analysis.
- Delivered 35 presentations and seminars to technical and professional audiences.

Selected Coursework & Professional Development

Center for Computational Astronomy, Flatiron Institute — **New York, New York**
Machine Learning Workshop — *Apr. 6 – Jun. 17, 2021*

University of Connecticut
Stars and Compact Objects · General Relativity and Cosmology

San José State University
Machine Learning and Data Analysis in Astronomy · Statistical and Machine Learning Classification · Deep Learning · Computational Physics · Numerical Analysis and Scientific Computing · Methods in Mathematical Physics

Ph.D. Dissertation

Title: *Multi-Messenger Constraints on Supermassive Black Hole Binaries*

Advisors: Chiara M. F. Mingarelli, Jonathan R. Trump, Daniel Anglès-Alcàzar

Description: Developed statistical and computational models to analyze the nanohertz gravitational wave background (GWB) and its connection to supermassive black hole binaries (SMBHBs) using observational data. Found SMBHBs may be eight times more prevalent than expected, quasars up to seven times more likely to host SMBHBs, and identified a 16 nHz anomaly in the GWB spectrum ($\sim 2\sigma$ confidence). Demonstrated expertise in data modeling, statistical inference, and analyzing complex datasets.

Master's Thesis

Title: *Integrated Kinematic Fitting of Gas Streams in the Milky Way's Circumnuclear Disk*

Advisors: Elisabeth A. C. Mills, Aaron Romanowsky

Description: Developed a computational model to simulate the orbit of dense molecular gas around our galaxy's central supermassive black hole (SMBH). Built a Bayesian pipeline to fit the model to observational data, estimating the gas passes within ~ 5 lightyears of the SMBH. Demonstrated expertise in algorithm development, statistical modeling, and data analysis.

Professional Associations

International Pulsar Timing Array
Full Member — *2021–present*
Participated in conferences and presented technical findings to an international audience.

NANOGrav
Full Member — *2021–present*
Contributed to collaborative research on gravitational waves, including publishing findings and developing data analysis techniques.

UConn Physics Graduate Student Association
Member — *2019–2024*
Elected to Event Coordinator executive position for the 2019–2020 and 2022–2023 terms.