Benjamin A. Cook

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Profile

Computational astrophysicist with experience in machine learning and high-performance computing. Lead organizer of national conference on science communication. Accomplished teacher with passion for improving science literacy.

Education

Harvard University, Cambridge, MA — 2014 – Present

Ph.D. (*In progress*) Astronomy and Astrophysics — Expected June 2019

Secondary Field: Computational Science and Engineering

M.A. (2016) Astronomy and Astrophysics

Princeton University, Princeton, NJ — 2010 – 2014

A.B. (2014) Astrophysical Sciences – **Magna cum laude**

Selected Awards and Honors

Certificate of Teaching Excellence – Derek Bok Center for Teaching and Learning — 2016 and 2017

Graduate Research Fellowship – National Science Foundation — 2014 – Present

Recent Computational Projects

Ph.D. Thesis (Harvard University) — Fall 2016 – present

Topic: *Bayesian forward modeling of pixel distributions in galaxy images*

Create Bayesian nested sampling framework for analyzing galaxy images, with significant GPU-acceleration. Apply to archived Hubble Space Telescope data and lead public code distribution via GitHub.

Research Exam Project (Harvard University) — Fall 2014 – Summer 2016

Topic: *Analysis of large datasets from hydrodynamical simulations*

Built post-processing pipeline for large (> 10TB) output dataset from cosmological simulation of galaxies

Course Final Project (*Machine Learning*, Harvard University) — Spring 2016

Topic: *Autonomous video game playing with reinforcement learning*

Developed a reinforcement learning (Q-learner) algorithm to autonomously play *Flappy Bird*-inspired video game. After 50 games played, the optimal model out-performed human abilities.

Course Final Project (*Data Science*, Harvard University) — Fall 2015

Topic: *Applying machine learning models to sports statistics*

Scraped baseball reference websites to compile pitcher-batter matchup database. Implemented collaborative filtering models to predict (unsuccessfully) pitcher-batter success rates.

Technical Skills

Machine Learning and Statistics: Collaborative Filtering, Classification, Regression, Clustering, Reinforcement Learning, Markov-Chain Monte Carlo, Bayesian inference

Programming and High-Performance Computing: Python, CUDA, C, Java, Linux, Git, Make, SLURM cluster manager, Google Apps Script

Selected Coursework: Stochastic Methods for Data Analysis, Inference and Optimization; Data Science; Advanced Machine Learning; Noise and Data Analysis in Astrophysics

Selected Professional Activities

ComSciCon National Workshop — 2014 – Present

Leadership workshop series for graduate student leaders in STEM communication and outreach

Chair, Local Organizing Committee (2015+); National Leadership Team (2016+)

Mentor/Instructor – Banneker Institute — 2016, 2017

Astronomy summer program for undergraduate students of color and underrepresented backgrounds

Author/Peer-Editor – Astrobites — 2014 – 2016

Grad student-run astronomy blog summarizing research articles for general public