Michael Phillips

Quantitative Scientist
Python Pro

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Key Skills

- *General:* Adaptability, Agility, Analytical Thinking, Creative Problem Solving, Technical Curiosity
- *Coding:* Python, C++, Java, Mathematica, Unix / bash / zsh, HPC
- *Packages:* pandas, numpy, scipy, matplotlib, pyopencl, pycuda, numba
- *Usage:* object class development, multidimensional optimization, GPU parallelization, visualization
- *Science / Math / Statistics:* Markov networks, Bayesian inference (distributions and timeseries), thermodynamics and phase transitions, quantum and classical field theories, physics-based ML
- Familiarity: Machine Learning, PCA, k-means clustering, Monte Carlo & Molecular Dynamics simulations

Select Projects

(1) Forward and Backward Modeling of Timeseries Data

- Built efficient simulations to generate synthetic timeseries data from stochastic interaction networks; analyzed and interpreted results with differential equations of probability (Master Equation).
- Built analysis and computational tools for Bayesian inference (Maximum Likelihood) of interaction rates from real-world timeseries data, utilizing both distributional and dynamical properties.
- Developed GPU kernels for use with PyOpenCL to build large arrays (~18M entries) efficiently.

(2) Machine Learning and Physics-based Modeling of Cooperative Phenomena

- Developed object-oriented approach to informatic analysis of biomolecules, such as proteins.
- Built computationally intensive workflows integrating ML for fully predictive, high throughput calculations of protein properties across scales; applied to datasets of up to 30k, running in ~8 hours.
- Robust coding practices: designed codebases for simultaneous deployment, modularity, readability, broad applicability, and maximum efficiency – my code consistently runs ~50% faster than competitors.

Experience

(1) Theoretical Researcher in Biological Physics & Stochastic Modeling – University of Denver (2021-present)

- First Year: began with zero experience in the field, learned key technologies of the group, developed Python code from scratch, became subject expert and leader of code benchmarks within ~6 months.
- During 4 Years: wrote 150+ files of Python code, including 10+ original classes/objects, obtaining results and writing articles for 5+ intensive projects, saving weeks of computation time over competitors.

(2) College Instructor / Independent Researcher – Central New Mexico Community College (2017-2021)

- Built Python scripts for grade calculations and statistical analysis in support of teaching duties.
- Developed prototypical models of student behavior, including deterministic and Monte Carlo models.
- Constructed and rigorously analyzed a toy model of human behavior, with Python.

Education

(1) University of California, Riverside – Ph.D. in Physics (2012-2016)

- Used Mathematica and Python for intensive calculations and to visualize results in theoretical physics.

(2) University of New Mexico – B.S. in Mathematics and Physics (2006-2011)

- Used LabView to program control of semi-automated electronic probes, and VHDL to program FPGAs for medium-throughput testing of assembled semiconductor devices.