Joshua Fagin

Contact Information

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Education

Cornell University, Ithaca, NY **August 2016 – May 2020**

B.S., Physics and Mathematics. Minor Public Policy.

Technical Skills

CS Skills: Python, Numpy, Matplotlib, SciPy, Numba, PyROOT, Tensorflow, Keras, Multiprocessing, OOP, Machine Learning, Monte Carlo, Mathematica, Jupyter Notebook, PyGame, LabView
Tools: LaTeX, MS Office, Final Cut Pro, Windows, MacOS, Linux, Github

Relevant Coursework

Physics: Relativistic Quantum Field Theory, Particle Physics, General Relativity, Statistical Mechanics, Quantum Mechanics, Advanced EM, Advanced Classical Mechanics, Waves and Optics

Mathematics: Matrix Groups, Partial Diff Equations, Ordinary Diff Equations, Abstract Algebra, Linear Algebra, Multivariable Calc, AP Statistics

CS: Data Mining Machine Learning and Modeling, Introduction to Computing with Python

Professional Experience

Cornell Fast Rotation, *Research Assistant*, Ithaca, NY **March 2018 – present**

Cornell Fast Rotation works on the Fermilab Muon G-2 experiment which is trying to precisely measure the anomalous magnetic moment of the muon:

- Worked with a postdoc to develop the Fourier method and implement it in Python to recovers the radial distribution of the muon about the ring from the intensity distribution of the muons as they pass the detector
- We ran parameter scans and pseudo-data experiments to estimate the systematic and statistical uncertainty of the method
- Developed the analytic model and implementation of Monte Carlo simulation of the muon beam and optimized it using multiprocessing and Numba in Python.
- Used the Monte Carlo to generate a large ensemble of realistic distributions on the Cornell cluster in order to test the validity of the Fourier method and as another way of assessing the uncertainty
- Wrote many notes and documentation which will be submitted into a peer reviewed journal in the coming months

Ying Bo Summer Program, *Camp Councilor*, Anji, Zhejiang, China **Summer 2017**

- Taught English language, writing, and speaking

Camp Alvernia, *Camp Councilor*, Centerport, NY **Summer 2016**

- Supervised group of eleven children ages nine to ten, including campers with special needs

Projects

Machine Learning on Muon Beam Monte Carlo Simulation
I used Machine Learning on the Monte Carlo simulation I had been developing for the Muon G-2 experiment using Tensorflow and Keras in Python. I used a convolutional neural network to take in the intensity distribution of the muon and output electric field correction which is the important value calculated from the recovered radial distribution.

Evolution Simulator
I worked on simulating the an ecosystem with a food source, bacteria, and predators in python with PyGame. The bacteria flee the predators and go towards the food source while the predators chaise them. Offspring of bacteria and predators have random mutated traits.

Space Invaders
I built an emulation of the Atari game Space Invaders in Python using PyGame including sound effects and scoring.