

Brandon McKinzie

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EDUCATION

University of California, Berkeley

- B.A. in Physics, Dec. 2016
- Minor in Computer Science
- 3.82 GPA

AWARDS

- Dean's Honor List – UC Berkeley
- Best Undergrad. Theoretical Research – APS Conference
- Laslett Scholarship – UC Berkeley Physics Department
- Longest-Serving Intern – Congressman Dan Lungren

RESEARCH AND WORK EXPERIENCE

Automatic Generation of Deep Neural Networks – UC Berkeley

Sept. 2016 - Dec. 2016

Advised by Prof. Dawn Song, Gilad Katz, and Jose Rozanec

- Designed software to automatically generate DNN architectures with meta-learning.
- Refactored initial codebase to improve stability & scalability.
- Implemented support for early-stopping during the architecture search process.
- Automated conversion from Scala (architecture generation) to Python (Tensorflow/TFLearn).

Virtual Reality – MIT Media Laboratory

Summer 2016

Living Mobile Group

- Designed full-body virtual training environments in Unity3D for use with the HTC Vive.
- Implemented support for full-body tracking with inertial measurement units coupled to Arduinos.
- Built circuits containing inertial measurement units, bend sensors, and Arduinos.
- Gained experience developing with the Unity3D game engine and C#.

Clustering Algorithm for the sPHENIX Collaboration – MIT

Summer 2016

Heavy Ion Group, Laboratory for Nuclear Science

- Implemented the photon clustering algorithm (C++) for the sPHENIX collaboration.
- Designed cluster visualization software and user interface.
- Optimized algorithms previously used at the Large Hadron Collider for new detector hardware.

Event Generation & Jet Finding - Berkeley National Laboratory

Jan. 2015 - June 2016

Relativistic Nuclear Collisions Program

- Built a toy model event generator (C++) for particle collisions at the Large Hadron Collider (LHC).
- Designed an analysis framework for identifying jets in both simulations and LHC data.
- Primary contributor to both the design and 3D-printing of the Event-Plane Detector (STAR collaboration).
- Optimized topological cuts for D0 meson decays detected at STAR.
- Official member of the ALICE and STAR collaborations.

Lattice Quantum Chromodynamics - Brookhaven National Lab

June 2015 - August 2015

Advised by Dr. Meifeng Lin

- Employed novel lattice QCD techniques to compute the proton isovector scalar charge.
- Computed the pion mass from a set of simulated gauge configurations.
- Studied modern methods for calculating nucleon form factors.

Nuclear Physics Research - UC Davis

August 2013 - August 2014

Advised by Profs. Manuel Calderon and Daniel Cebra

- Provided first estimate for the systematic uncertainty of Upsilon polarization at CMS.
- Optimized effective signal of Upsilon produced at $\sqrt{s_{NN}} = 200$ GeV in 2012 p-p STAR dataset.

Lead Tutor - Folsom Lake College Tutoring Center

August 2013 - May 2014

- Lead tutor for Departments of Physics, Mathematics, and Chemistry.
- Held walk-in and private tutoring sessions daily.
- Organized class/group tutoring sessions weekly.

ADDITIONAL SKILLS

Programming Languages	Strong proficiency: C, C++, Java, and Python (numpy, scipy, etc). Working proficiency: HTML/CSS, JavaScript, R, MATLAB.
Linux	Experienced with advanced BASH scripting and Unix customization. Primary distributions: Arch, CrunchBang, and Ubuntu derivatives.
Miscellaneous	Daily user of the TensorFlow and Keras libraries. Vim and \LaTeX enthusiast – regularly write plugins/packages for both. Passionate learner – work through online courses & textbooks in spare time.

NOTEWORTHY COURSEWORK

Artificial Intelligence Grade: A	Search algorithms, Markov decision processes and reinforcement learning. Overview of research topics in machine learning and deep learning.
Machine Learning Grade: A-	Classification, regression, density estimation, clustering, dimensionality reduction. Implemented all algorithms in <i>Elements of Statistical Learning</i> from scratch.
Neural Computation Grade: A	Sparse coding, RNNs, Boltzmann Machines, and dynamical models. Hebbian learning, autoencoders, and locally competitive algorithms.
Data Structures Grade Received: A	Designed text editor in Java supporting word wrapping, text selection, etc. Implemented web mapping application inspired by Google Maps.
Adv. Linear Algebra Grade Received: A	Emphasis on formulating proofs with advanced notation. QR factorization, rayleigh's principle, Jordan canonical form, etc.
Quantum Computing Grade Received: A	Emphasis on quantum computational algorithms and efficiency. Models for quantum error correction and complexity theory.
Laboratory Experience Grades Received: A, A	Hands-on preparation for experimental physics research. Data collection/analysis, equipment operation, and error analysis.
Particle Physics Grade Received: A	Feynman calculus, cross sections, decay rates, and fundamental interactions. Quantum field theory, gauge theories, symmetry breaking, and more.