SU-ANN CHONG

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About me

Professional Interest	Machine learning, data science, camera/imaging systems, high performance computing
Programming Languages	Python, C, C++, SQL (MySQL), JavaScript, PHP, HTML/CSS
Developer Tools	Git, svn, Spyder, Jupyter Notebook, VS Code, vim, cmake, make, gdb, valgrind
Libraries	pandas, NumPy, Matplotlib, sklearn, PyTorch, TensorFlow, PySpark, seaborn

Education

Doctor of Philosophy in Nuclear Engineering, University of Tennessee - Knoxville — May 2022
Master of Science in Computer Engineering, University of Tennessee - Knoxville — May 2021
Bachelor of Arts in Physics, Minor in Nuclear Engineering, University of California - Berkeley — May 2016

Selected Projects

Uncertainty Quantification Using Bayesian Inference | *Python, PyMC3, Theano, TensorFlow, git* — May 2021 – Aug 2021

- Implemented a Markov Chain Monte Carlo (MCMC) framework using PyMC3 to better quantify the uncertainty of fusion parameters for the inertial confinement fusion experiments at the National Ignition Facility (NIF). [slides]
- Improved the speedup of MCMC routine 1000x by replacing a computationally expensive forward-fitting physics model for data generation with a deep neural network and demonstrated a close agreement between generated data and experimental data.

ABET Data Collection Web Development | HTML, CSS, Javascript, PHP, SQL, svn — Jan 2021 – Apr 2021

- Designed a website for ABET student management using HTML5 and CSS for user interface, JavaScript frontend for forms handling and PHP bakend for database management. [code]
- Designed and implemented a MySQL database for ABET student management from scratch, which includes entity-relationship modeling, data definition, normalization and data manipulation.

High-Performance Jacobi Method | *C, C++, MPI, OpenMP, CUDA, Git, Linux* — Aug 2020 – Nov 2020

- Implemented various programming models to efficiently compute the Jacobi method using multithreading (OpenMP), multi-processors (MPI) and Nvidia GPU (CUDA), and analyzed the speedup with varying problem size. [code]
- Performed multiple MPI communication modes such as one-sided communications using remote memory access (RMA), blocking and non-blocking two-sided communications, collective communications across multiple processors.

Monte Carlo Particle Transport Simulation | *C++, Python, ROOT, GEANT4, uproot* — May 2020 – Jul 2020

- Developed a particle transport model by simulating neutron capture to detection of scintillations (optical photons) in a neutron imaging system to optimize detector parameters to yield the best performance. [code]
- Integrated multithreading mode for runtime speedup in a high-flux simulation environment, parsed large datasets using a high-performance Python library, and generated 3-D visualizations of the simulated imaging system.

Relevant Courses

Machine Learning	Data Science and Computing	Parallel Programming	Probability and Statistics
Deep Learning	Databases and Scripting Languages	System Programming	Multivariable Calculus
Data Mining	Data Structures and Algorithms	Cloud Computing	Linear Algebra

Research Experience

Graduate Research Assistant, Oak Ridge National Laboratory — Aug 2017 – Present

- Performed cluster analysis and support vector machine (SVM) models to improve neutron-gamma discrimination and achieved 3 orders of magnitude in performance gain when compared to traditional charge-comparison methods. [poster]
- Developed a robust data pipeline for a high-throughput neutron imaging system from raw sensor data conversion, noise filtering, signal processing to predictive modeling and real-time visualization.
- Simulated Monte Carlo particle transport in a neutron imaging system using GEANT4 framework to optimize detector parameters and increased the detection efficiency by 15% when validated with experimental measurements.

Undergraduate Research Assistant, Lawrence Berkeley National Laboratory — Feb 2016 – May 2017

- Analyzed radioactive decay measurements using the probability density function of the double exponential distribution to extract important quantity of a radioactive isotope for accurate nuclear reaction modeling. [paper]
- Performed statistical uncertainty calculations associated with the energy levels, gamma energies and intensities of the prompt gamma from the Atlas neutron inelastic scattering database. [paper]