

Arjun Rana

Los Angeles, CA

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Education

Ph.D., Physics

UNIVERSITY OF CALIFORNIA, LOS ANGELES

Los Angeles, CA

April 2021

B.S., Physics/Economics

RUTGERS UNIVERSITY

New Brunswick, NJ

May 2011

Technical Skills

General

optimization, quantitative analysis, high performance computing (HPC), machine learning, data management, visualization

Languages

Python, Matlab, C++

Systems/Packages

Linux/bash, TensorFlow, Keras, Docker, Git, Google Cloud Platform (GCP), scikit-learn, SciPy, NumPy, Pandas, Jupyter, Matplotlib, Globus, ParaView, Blender, SolidWorks

Experience

PhD Researcher

DEPT. OF PHYSICS & ASTRONOMY, UCLA

09/2015-04/2021

- Advanced the understanding of magnetic nanomaterials through computational reconstruction of 3D experimental data
 - Led a multidisciplinary team through 2 intensive experiments at a national x-ray imaging facility
 - Designed a parallel 3D reconstruction algorithm to probe magnetism in structured materials and deployed it on the UCLA HPC to analyze experimental data (**Matlab**, **HPC**)
- Extended the capability of computational imaging by creating reconstruction algorithm that can utilize broadband light sources
 - Devised a novel, GPU-accelerated algorithm with regularization techniques to remove aberrations induced by broadband light sources (**Matlab**, **HPC**)
 - Designed and built a tabletop broadband light diffraction experiment to provide benchmark data for reconstruction algorithms (**Matlab**, **Labview**, **SolidWorks**, **C++**)
- Presented research findings to peers and executive faculty at National Science Foundation (NSF) meetings
- Redesigned software pipeline for capture and analysis of optical light diffraction data, improving reliability and ease of use
- Negotiated large (10+Tb) parallel data transfers between national lab and university HPCs (**Globus**, **GridFTP**)
- Designed and fabricated a holder for cryogenic transport of transmission electron microscope samples (**SolidWorks**, **3d printing**)
- Communicated scientific and technical concepts to undergraduate students while teaching a physics lab course at UCLA
- Managed a group of fellow graduate students as the lead teaching assistant for an undergraduate physics course

Projects

HoneyNet (arjunrana.com/projects/honeynet)

TENSORFLOW, KERAS, GCP, C++

- Implemented a regularized Generative Adversarial Network (GAN) to synthesize photorealistic images from a small training dataset
- Deployed a model on Google Compute Engine and accelerated training with GPU (**TensorFlow**, **Keras**, **GCP**)
- Utilized transfer learning and iterative data augmentation scheme to improve generator output
- Automated data pre-processing with facial-recognition CNN (**dlib**, **C++**)

MMA Gym Analysis (TBA)

PANDAS, SCIKIT-LEARN, JUPYTER, MATPLOTLIB

- A data-driven assessment of amateur mixed martial arts (MMA) gyms across California
- Generated and processed a dataframe of MMA bouts from scraped data (**Pandas**)
- Scraped thousands of datapoints from amateur MMA athletic commission website (**Pandas**, **BeautifulSoup**)
- Extracted features from raw data to assess overall gym quality
- Performed agglomerative text clustering to get accurate gym-wise statistics (**scikit-learn**, **jellyfish**)
- Conveyed novel insight about gym quality through visualization (**Matplotlib**, **folium**, **Google Maps API**)