Arun Ravishankar

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About me

I'm a Theoretical Physicist and a Pharmacist by training and I have experience in Mathematics & Data Science. I'm keen to leverage my diverse and strong mathematical background to tackle important, interesting and challenging problems in the biomedical field using computational methods and AI. The fields that interest me are Organ-on-chips, Genomics, Medical Imaging, Diagnosis, Drug discovery, Computational Toxicology, Clinical Trials.

Education

PhD in Physics — Expected Summer. 2020

MS. in Physics — May 2019
University of Arizona, Tucson, AZ, USA

MSc (hons.). in Physics
(with thesis at LMU, Munich, Germany)
B.Pharmacy (hons.) — May 2014
Birla Institute of Technology & Science Pilani, India

Skills

Programming Languages & OS

Python, Wolfram Mathematica, R, LaTeX
Linux, MacOS, Windows

Packages and Platforms

Numpy, Scipy, Matplotlib, Scikit-Learn, Pandas, Keras*, Tensorflow*, Seaborn*
Github, Jupyter

Data Analysis

Data Visualization, Machine Learning & Deep Learning, High Performance Computing

*Tutorials/Workshop

Work Experience

Physics

Univ. of Arizona, USA
Graduate Research Associate — Fall 15 - Current

- Discovered an instability of a maximally charged black hole (Ravishankar, A, et al. J. High Energ. Phys. (2018) 2018: 87) - doi.org/10.1007/JHEP12(2018)087.
- Identified the cause of the instability to be certain null geodesics (Ravishankar, A, et al. J. High Energ. Phys. (2020) 2020:94) - doi.org/10.1007/JHEP05(2020)094
- Designed and ran simulations in Python on a supercomputer (El Gato) by parallel job scheduling with PBS scripts to investigate the instability.

Graduate Teaching Associate

- Conducted introductory physics lab sessions (~25 students per lab) for undergraduate students and received very good reviews from my students.
- Led discussion sessions (~100 students per section) where I guided groups of students (~4 students per group) to work together to solve problem sets.
- Conducted lectures and tutorials to help students that needed more time and help in understanding the subject.

Independent work

(Details on my webpage - arunravishankar.github.io)

- Wrote a program to simulate an epidemic (the spread of a disease through a community) with various parameters. The model highlights the importance of social distancing and personal protective equipment.
- Analyzed histology tiles of Colorectal cancer patients - used clustering algorithms to understand the data better. Built a Convolutional Neural Network model to predict the type of tissue of a given image.
- Building regression models to predict drug response in cancerous tissues based on genomic data from the Genomic Data Commons Data Portal of the NIH. Comparing different methods of feature selection on a high dimensional feature space to balance interpretability and accuracy of the supervised learning model in order to identify the biological pathway causing the cancer.
- Built and compared classification models to predict a patient's risk of being diagnosed with Cervical Cancer.

Startup - Fascination Based Learning

Munich, Germany
Content Producer — Fall 13 - Summer 14

- Worked on the incubation stages of a startup for online-based education with the founder of Ideas Roadshow and The Founding Executive Director of the Perimeter Institute for Theoretical Physics, Waterloo, Canada, Dr. Howard Burton.
- Coordinated with an interdisciplinary team of entrepreneurs, educationalists, researchers and philosophers to come up with a working form of the online tool.
- Created appropriate content for the preliminary product based on lectures in cosmology by Prof. Roger Penrose which was then used to pitch the product to different universities including the National University of Singapore.

Workshops And Conferences

Organ-on-chip and Machine Learning

- Attended the 2nd European Organ-on-chip Conference 2019, Graz, Austria
- Attended the 4th Barcelona Summer School 2019 organized by the Virtual Physiological Human Institute on Machine Learning and Mechanistic Modelling - with a workshop on Computational anatomy, Deep Learning and Convolutional Neural Networks to segment a time series of images with PyTorch
- Will be presenting a poster at Summer School on Innovative Science without Animals, June 2020

Physics

- Invited as a guest speaker at Chennai Mathematical Institute, India in July 2019
- Presented at the American Physical Society, April Meeting 2019 in Denver, CO
- Presented at the Pacific Coast Gravity Meet, March 2018 in CalTech, Pasadena, CA