Kevin Ghorbani

Contact Information

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List of Publications: inspirehep.net/author/profile/Kevin.Ghorbani.1

Data Scientist with experience in Quantitative Analysis, Big Data Queries, Data Mining, Statistics, Predictive Modeling, and Data Visualization. Worked with many types of large and complex datasets in the past 10 years in both small and large multinatoinal teams. Eager to learn new skills everyday and solve unsolved problems.

Education

Ph.D. in Physics – Data Analysis – University of Wisconsin-Madison (2014-2018)

M.S. in Physics – Computational – Leiden University (2012-2014)

B.S. in Physics – Sharif University of Technology (2007-2011)

Experience

2014 – present

Wisconsin IceCube Particle Astrophysics Center

Research Assistant

- Produced an analysis with the **tightest statistical constrains ever** to discover a new elementary particle
- **Increased the efficiency** of particle selection by **over 100%** using **machine learning** techniques and eliminating the background events to one in one billion
- Utilized numerous **statistical techniques**, including sensitivity analysis, likelihood fitting, Bayesian statistics, hypothesis testing
- Implemented a novel technique using machine learning classifiers to separate different types of events seen by the detector modules to be able to identify over **12,000** neutrino events per year (**from previously 2,000** by the collaboration)
- Developed a new reconstruction technique to **increase the energy resolution**
- Working with **large datasets** of O(100TB) per year of data and massive computational processes on CPU and GPU clusters
- Performed detector **data calibration** using statistical methods
- **Teaching** Python and machine learning to graduate students and post-doctoral researchers

2012 – 2014

Lorentz Institute

Research Assistant

- **Produced complex simulations** and studied cosmic strings and their interactions
- **Created a model** to predict cosmic strings' behavior during interactions

2008 - 2011

Institute for Research in Fundamental Sciences

Researcher

- **Data reduction** of raw images from Hubble Space Telescope and **cleaning noisy data** to retrieved useful information
- Analyzing galactic image channels to determine their properties via photometry
- Performing statistical analysis on cluster data to obtain dark matter properties

Programing Skills

Languages: *Expert:* Python, C/C++, SQL, Shell script, *Prior-experience: R*, Matlab, HTML

Machine Learning Techniques: *Expert:* AdaBoost, Regression, Decision Tree, Random Forest, Support Vector Machine using scikit-learn, TensorFlow and Keras

Tools: *Expert:* NumPy, SciPy, pandas, Matplotlib, Jupyter notebook, Subversion, Git, condor, UNIX/Linux, *Prior-experience:* Flask

Independent Data Science Projects

- Analyzed Chicago crime rate over 15 years of police database in order to explain recent increase in the city's homicide rate and its relation to police activities
- Developed a web app (with Google maps APIs) and used machine learning regressors to predict travel time at a given time in New York City and achieved the accuracy of a few minutes

Honors and Awards

- Research Assistantship – WIAC (2014-present)
- Groesbeek-Assenbroek Scholarship (2013)
- Curatorenfonds Universiteit (2012 and 2013)
- Leiden University Excellence Scholarship – Golden Award (2012 and 2013)

Selected Talks

- IC86-II Sterile Neutrino Search, Madison, WI, May 4, 2017
- Sterile Neutrino Search in IceCube using starting tracks, American Physical Society, Washington, DC, January 30, 2017
- Sterile Neutrino Search, Mainz, Germany, September 27, 2016
- Starting Track Sterile Neutrino Search, Stony Brook, NY, April 20, 2016
- IC86-I DeltaT Analysis, Stony Brook, NY, April 19, 2016
- Sterile Neutrino Search in IceCube, Madison, WI, June 11, 2015
- Cosmic Strings Interaction, Instituut-Lorentz, Leiden, January 7, 2014
- Black Holes in General Relativity, Leiden, October 17, 2013
- Cosmic Strings Interaction, KTH, Stockholm, September 12, 2013
- Photometric Redshift, IPM, April 28, 2009

Selected Workshops

- C++ Advanced Bootcamp, Madison, WI (Summer-2016)
- Neutrino R&D workshop, Fermi National Laboratory, IL (Winter-2016)
- Stanford Linear Accelerator Center Summer Institute, Palo Alto, CA (Summer-2015)
- Invisibles School, Madrid, Spain (Summer-2015)
- NuSTEC 2014, Fermi National Laboratory, IL (summer-2014)
- Computational Physics, Leiden Univ. (Spring-2012)

Personal Interests

Swimming, Rowing, Mountaineering (personal record of 18,602 ft elevation), Traveling, Kayaking, Semi-professional Photography, and digging into random data