Matthew Meehan

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Professional Summary

Particle astrophysicist with five years of experience performing data-driven research and analysis in Python, building statistical models, and communicating complex, technical results to diverse audiences. Analytical problem solver looking forward to collaborating across disciplines to tackle novel, human-oriented problems.

Skills

- **General**: Data science, statistics, data visualization, machine learning, deep learning, computer vision
- **Technical**: Python, NumPy, SciPy, scikit-learn, Tensorflow, matplotlib, scikit-image, HTCondor, linux, Git
- **Mathematics**: Monte Carlo simulation, hypothesis testing, confidence interval estimation, linear algebra
- **Other**: Scientific communication, technical problem solving, teaching, mentoring, outreach

Work Experience

Wisconsin IceCube Particle Astrophysics Center — Madison, WI
Research Assistant — May 2014 – Present

- Performed big data analysis of astrophysical data from NASA's telescope on a distributed, high-throughput computing cluster (100 GB - 100 TB scale pipelines)
- Developed, validated, and deployed a convolutional neural network to identify images of particles detected by a network of smartphones with 95% accuracy
- Rapidly prototyped data pipelines and performed exploratory data analysis and visualization when presented with new problems
- Collaborated with a team of international scientists to identify research problems and formulate analysis plans
- Utilized Monte-Carlo simulations to model systems, quantify algorithmic biases, and understand systematic uncertainties in data sets
- Performed statistical hypothesis tests to compare scenarios of interest to alternative hypotheses
- Developed machine learning models to solve classification and regression problems, e.g., convolutional neural networks, decision trees
- Worked in an international collaboration of 400+ scientists, coordinated working group, co-chaired weekly international conference calls
- Mentored undergraduate researchers and high school students on data analysis projects
- Regularly presented work to scientists at national and international conferences and lay audiences in outreach settings

Department of Physics, University of Wisconsin-Madison — Madison, WI
Teaching Assistant — August 2013 – May 2014

- Taught calculus-based electricity and magnetism course to 50 engineering students each semester and received Honored Instructor award for teaching excellence (nominated by students)

Education

University of Wisconsin-Madison — Madison, WI
Ph.D., Physics (graduating Dec 2018) — 2013 – 2018
M.S., Physics — 2013 – 2016

Kutztown University of Pennsylvania — Kutztown, PA
B.S., Physics, Minor, Mathematics — 2010 – 2013

Selected Publications

- M. Winter, J. Bourbeau, M. Meehan, J. Vandenbroucke, et al., **Particle Identification In Camera Image Sensors Using Computer Vision**. Astroparticle Physics, 104 (2018), 42-53. https://doi.org/10.1016/j.astropartphys.2018.08.009.