DION HÄFNER

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I am a Physics graduate specialized on all things scientific computing, with industry experience in data processing and machine learning.

My main research interest is "human learning": How can we build machines that teach us something about our physical world?

Education

Dec 2018 – present **PhD in Physical Oceanography @ University of Copenhagen**

In my PhD project, I infer the relative importance of different hypothesized causes of extreme ocean waves ("rogue waves") in the real world. To this end, I analyze over 1 Terabyte of observational data with data mining and probabilistic machine learning to extract robust, interpretable insights.

Sep 2011 – Dec 2016 **BSc and MSc in Physics @ Heidelberg University**

GPA of 1.3 and 1.2, respectively ("very good"). Exchange year at KTH Stockholm in 2014. Specialization in computational physics.

Professional Experience

Sep 2017 – Dec 2018 **Software development specialist @ DHI GRAS**

At DHI GRAS, I built robust data pipelines and powerful machine learning tools on satellite images. Through low-level optimizations on one particularly expensive algorithm, I was able to cut processing times by over 3 orders of magnitude (from weeks to hours), while minimizing human supervision.

Jan 2017 – Aug 2017 **Scientific assistant @ Niels Bohr Institute**

I am the main developer of a full-blown, distributed ocean model written in pure Python with full GPU support (*Veros*, available on GitHub). Large simulations are only about 2 times slower than a Fortran reference implementation, while being orders of magnitude more approachable for students and scientists.

Jun 2014 – Dec 2016 **Research assistant @ Institute of Environmental Physics**

I enhanced a numerical simulation package based on the DUNE framework (*DORiE*), written in C++ and Python. By implementing adaptive grid refinement, I was able to speed up simulations by a factor of up to 100.

Programming and Technology

ML frameworks I am familiar with modern machine learning workflows and have good knowledge of scikit-learn, Tensorflow / Keras, PyMC3, and JAX.

Python I have both deep and broad experience within the Python ecosystem, especially concerning (but not limited to) data analysis, machine learning, visualization, and scientific computing.

I love working with the modern scientific Python stack and am well-versed with NumPy, SciPy, matplotlib, xarray, JAX, Numba, and Pandas.

Other languages Basic knowledge of object-oriented programming in C++, including debugging applications with GDB. Elementary knowledge of OpenCL / CUDA.

Tools Experience with tools handling version control (git), documentation (Sphinx, Doxygen), build systems (CMake), deployment (Docker), testing (pytest), GUI (Qt), continuous integration (Travis CI / Github Actions), typesetting (LaTeX).

I am comfortable working in all major operating systems, and am familiar with basic server administration tasks.

Other Skills & Interests

- Strong mathematical and analytical skills, and an affection for data
- A knack for Bayesian data analysis: I like to make my assumptions and uncertainties explicit.
- I am passionate about open-source software development, and am a frequent contributor to various projects on GitHub (github.com/dionhaefner).
- A special interest in effective communication through writing, oral presentations, and data visualization. I take the quality of my publications seriously, and love to present my work.
- Languages: German (native) , English (fully proficient) , Swedish (proficient) , Danish (elementary)

Awards & Honors

- (2021) Virtual Outstanding Student and PhD candidate Presentation (vOSPP) by European Geophysical Union

Peer-reviewed Publications

[1] Dion Häfner, Johannes Gemmrich, and Markus Jochum. “Real-world rogue wave probabilities”. In: *Scientific Reports* 11.1 (May 2021). DOI: 10.1038/s41598-021-89359-1. URL: https://doi.org/10.1038%2Fs41598-021-89359-1.