Rik Voorhaar

Resume

Geneva, Switzerland
+31 6 3986 5964
Rik.Voorhaar@unige.ch
rikvoorhaar.com

Work experience

2018–present **Doctoral candidate**, *University of Geneva*, Academic advisor: *Bart Vandereycken*. Expected to graduate March 2023 at the latest.

I do research in numerical linear algebra, low-rank tensor decompositions and Riemannian optimization, all with applications to machine learning in mind. Specifically I'm developing a novel class of machine learning models based on Tensor-Train decompositions. These models behave similarly to tree-based models, and are specifically good at modeling highly non-linear functions. I also put particular focus on implementing this using high-level fast code inherently compatible with multiple numerical Python libraries such as NumPy/SciPy, Torch, and Tensorflow. This research has also led to significant contribution to two open source projects.

At the start of my PhD I did research in pure mathematics; in deformation quantization and Poisson geometry. I also did a side project involving the implementation of a very complex computer algebra algorithm, which led to a publication in a high-impact peer reviewed journal and another preprint currently in preparation.

I spend part of my free time studying different topics in applied mathematics and data science. Eventually I realized I enjoy this much more than pure mathematics and I changed my supervisor and research topic. I still enjoy learning about various topics in data science, and I keep a blog detailing some of my hobby projects. This blog is a great way for me to practice my data visualization and writing skills.

About 20% of my time is spent on teaching, which is something I enjoy very much. I like to incorporate Python programming projects in the form of Jupyter notebooks. This way I can expose my students to modern best practices in coding, and I have received a lot of positive feedback from this approach.

Education

2021 **Neuroscience and Neuroimaging Specialization**, *John Hopkins University, on Coursera*.

2020 **Genomic Data Science Specialization**, *John Hopkins University, on Coursera*.

2019 **Advanced Machine Learning Specialization**, *Higher School of Economics, on Coursera*.

2015–2018 **Master's degree Mathematical Sciences**, *Utrecht University*, *cum laude*.

Honor's degree Utrecht Geometry Center, *Utrecht University*.

2016-2017 **Masterclass Geometry, Topology and Physics**, *University of Geneva*.

2012–2015 **Bachelor degree Mathematics**, *Utrecht University*, *cum laude*.

Bachelor degree Physics and Astronomy, *Utrecht University*, *cum laude*.

Kyoto University International Exchange Program, *Kyoto University*.

2006–2012 **International Baccalaureate**, *International School Hilversum*.

Technical Skills

Languages Native Dutch, native level English (C2)
French (B1), Japanese (A2), Russian (A2), Spanish (A2)

Computing Python (Advanced), Mathematica (Intermediate), LaTeX(Intermediate), C++ (Basic), R (Basic)

Technologies Armadillo, CVXPY, Cython, Docker, Linux, Matplotlib, NumPy, Pandas, PyTorch, Sagemath, SciPy, Sphinx, Tensorflow, Windows

Publications and preprints

2021 **On certain Hochschild cohomology groups for the small quantum group**, In preparation (joint work with Nicolas Hemelsoet).

2021 **A computer algorithm for the BGG resolution**, Journal of Algebra (joint work with Nicolas Hemelsoet).

2018 **Parallel 2-transport and 2-group torsors**, arXiv:1811.10060.