

HPI Colloquium

20.01.2022, 4.00 pm

Hybrid at HPI in HS 1 and via tele-TASK and Zoom

Campus Griebnitzsee, 14482 Potsdam

"Causal Inference in Machine Learning: From Correlation to Causation"

Prof. Dr. Jakob Runge

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and

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Abstract

In the past decades machine learning has had a rapidly growing impact on many fields of natural-, life- and social sciences as well as engineering. Machine learning excels at classification and regression tasks from complex heterogeneous datasets and can answer questions like "What statistical associations or correlations can we see in the data?", "What objects are in this picture?", or "What is the most likely next data point?". But many questions in science, engineering, and politics are about "What are the causal relations underlying the data?" or "What if a certain variable changes or is changed?" or "What would have happened if some variable had another value?". Data-driven machine learning alone fails to answer such questions. Causal inference provides the theory and methods to learn and utilize qualitative knowledge about causal relations. Together with machine learning it enables causal reasoning given complex data. In this talk I will present an overview of this exciting and widely applicable framework and illustrate it with some examples from Earth sciences and beyond.

Short CV

Jakob Runge heads the Causal Inference group at the German Aerospace Center's Institute of Data Science in Jena since 2017 and is guest professor of computer science at TU Berlin since 2021. His group combines innovative data science methods from different fields (graphical models, causal inference, nonlinear dynamics, deep learning) and closely works with experts in the climate sciences and beyond. Jakob studied physics at Humboldt University Berlin and finished his PhD project at the Potsdam Institute for Climate Impact Research in 2014. For his studies he was funded by the German National Foundation (Studienstiftung) and his thesis was awarded the Carl-Ramsauer prize by the Berlin Physical Society. In 2014 he won a \$200.000 Fellowship Award in Studying Complex Systems by the James S. McDonnell Foundation and joined the Grantham Institute, Imperial College London, from 2016 to 2017. In 2020 he won an ERC Starting Grant with his interdisciplinary project CausalEarth. On <https://github.com/jakobrunge/tigramite.git> he provides Tigramite, a time series analysis python module for causal inference. For more details, see: www.climateinformaticslab.com

Zoom: <https://zoom.us/j/97894794343?pwd=UE5rYzE0R21PNm5mRk9kZkxQYnZXQT09>

Host: Prof. Dr. Tobias Friedrich