

Abstract des Vortrags von Ingo Scholtes am 28. April 2020 im Mathematischen Kolloquium:

Title: Networks in Space and Time

Abstract:

Graph and network models have become a cornerstone in the analysis of complex systems consisting of a large number of interconnected components. While the importance of network models is undisputed, we are increasingly confronted with large volumes of high-dimensional, temporal, and noisy data. Such data question graph and network models of complex systems and pose a threat for interdisciplinary applications of data science.

Addressing this problem, we introduce a novel data analytics framework that accounts for the complex characteristics of time series data on networks. We demonstrate this in time-stamped social networks. Existing methods to analyze such data discard information on the chronological ordering of interactions, which however determines who can influence whom via so-called causal paths. In contrast, our approach (i) generalises network abstractions to higher-order graphical models for causal paths, and (ii) uses statistical methods to find an optimal balance between explanatory power and model complexity. Our work advances the foundations of data analytics and sheds light on the important question when a network-based analysis of complex systems is actually justified.