Graz University of Technology

Institut für Statistik

Seminarvortrag

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SR für Statistik (NT03098), Kopernikusgasse 24, 3.OG.

How knowledge of graphical structures helps in the estimation of probability measures

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Abstract:

Estimating the distribution of a d-dimensional random variable (i.e., a d-dimensional probability measure) from data is a fundamental instance of the curse of dimensionality. In this talk, we explore whether structural knowledge about the data-generating process which gives rise to the distribution can help overcome this curse. More precisely, we work with the set of distributions of probabilistic graphical models for a known directed acyclic graph with no colliders. We establish that this knowledge is only helpful if it holds in a suitably quantitative way, which is formalized via smoothness conditions on the stochastic kernels in the disintegration according to the graph. We provide explicit estimators which can leverage the graphical structure and we measure the estimation error in Wasserstein distance. We show that the rate of estimation becomes faster the fewer edges are in the graph and is sharp in many cases. The results are compared to existing works focusing on knowledge of smooth densities instead of graphical structures.

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