

COLLOQUIUM

Functional Directed Acyclic Graphs -
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Zoom - 3:00-4:00 pm

Abstract:

We introduce a new method to estimate directed acyclic graphs from multi-variate functional data, based on the notion of faithfulness that relates a directed acyclic graph with a set of conditional independence relations among the random functions. To characterize and evaluate these relations, we propose two linear operators, the conditional covariance operator and the partial correlation operator.

Based on these operators, we adapt and extend the PC-algorithm to estimate the functional directed graph, so that the computation time depends on the sparsity rather than the full size of the graph. We study the asymptotic properties of the two operators, derive their uniform convergence rates, and establish the uniform consistency of the estimated graph, all of which are obtained while allowing the graph size to diverge to infinity with the sample size. We demonstrate the efficacy of our method through both simulations and an application to a time-course proteomic dataset.