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Copula Gaussian graphical models for functional data

We consider the problem of constructing statistical graphical models for functional data; that is, the observations on the vertices are random functions. These types of data are common in medical applications such as EEG and fMRI. Recently published functional graphical models rely on the assumption that the random functions are Hilbert-space-valued Gaussian random elements. We relax this assumption by introducing a copula Gaussian random elements Hilbert spaces, leading to what we call the Functional Copula Gaussian Graphical Model (FCGGM). This model removes the marginal Gaussian assumption but retains the simplicity of the Gaussian dependence structure, which is particularly attractive for large data. We develop four estimators, together with their implementation algorithms, for the FCGGM. We establish the consistency and the convergence rates of one of the estimators under different sets of enough conditions with varying strengths. We compare our FCGGM with the existing functional Gaussian graphical model by simulation, under both non-Gaussian and Gaussian graphical models and apply our method to an EEG data set to construct brain networks.

Biography

Bing Li has completed his PhD at the age of 32 years from the Department of Statistics, University of Chicago. He is a Professor of Statistics at the Department of Statistics of the Pennsylvania State University. He is an IMS fellow and an ASA fellow. He serves as an Associate Editor for the Annals of Statistics and Journal of the American Statistical Association.

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