On a Mixture of Gaussian Copula Graphical Model

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Abstract

Identifying dependence between variables has always been an interesting question for researchers. Understanding the dependencies provide insight in many fields of applications including biostatistics, social science, etc. One of the classical approaches to target the problem is the use of a graphical model: A graph $G = (V, E)$ with each vertex $v \in V$ representing a variable and edge $e \in E$ governing the conditional dependency between the connected vertices. Researches in Graphical Model are almost exclusively based on Gaussian assumption or more general, Gaussian copula: Prior choices of a single precision matrix Σ^{-1} including Wishart for complete graphs, Hyper Wishart for decomposable graphs and G-Wishart in general are developed over past decades. Nevertheless, using a single covariance structure can still be restrictive for certain applications. In this paper, we extend existing approaches by considering a mixture of Gaussian copula in graphical models with the use of a set of latent indicator variables. Bayesian inference of the indicators and precision matrices will be discussed. Simulation study will also be conducted to examine the efficiency and accuracy of our model.

KEYWORDS: Graphical Models, Mixture of Gaussian Copula, Bayesian Inference