

Bayesian Model Selection for Regular Vine Copulas Using Reversible Jump MCMC

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Abstract

Multivariate data with rich patterns of dependence are found in many fields in business and science. Increasingly, practitioners choose regular vine copulas over the multivariate Gaussian copula or the multivariate Student-t copula to model these dependencies. We present a fully Bayesian model selection algorithm to jointly estimate the pair copula families and parameters of a regular vine copula. This compares favorably to existing Bayesian model selection methods which can only detect conditional independencies and are not able to choose between competing pair copula families. Furthermore, we discuss a sequential Bayesian algorithm to estimate the tree structure, pair copula families, and parameters of a regular vine copula. This first-of-its-kind approach allows model selection for regular vine copulas without the use of heuristics and is fully likelihood-based. A case study with historical stock prices illustrates the viability of our approach and shows its advantages over non-Bayesian heuristic-based estimation methods using real-world data.

Keywords: Dependence Modeling, Family Selection, R-Vine, Applications and Case Studies

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