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# Vine copulas as a mean for the construction of high dimensional probability distribution associated to a Markov Network

Edith Kovacs, Tamas Szantai

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Building higher-dimensional copulas is generally recognized as a difficult problem. Regular-vines using bivariate copulas provide a flexible class of high-dimensional dependency models. In large dimensions, the drawback of the model is the exponentially increasing complexity. Recognizing some of the conditional independences is a possibility for reducing the number of levels of the pair-copula decomposition, and hence to simplify its construction Aas et al (2009). The idea of using conditional independences was already performed under elliptical copula assumptions Hanea, Kurowicka and Cooke (2006), Kurowicka and Cooke (2002) and in the case of DAGs in a recent work Bauer, Czado and Klein (2011). We provide a method which uses some of the conditional independences encoded by the Markov network underlying the variables. We give a theorem which under some graph conditions makes possible to derive pair-copula decomposition of the probability density function associated to a Markov network. As the underlying Markov network is usually unknown, we first have to discover it from the sample data. Using our results published in Szantai and Kovacs (2008) and Kovacs and Szantai (2010a) we will show how to derive a multidimensional copula model exploiting the information on conditional independences hidden in the sample data.

Comments: the paper will be presented at the 4th Workshop on Vine Copula Distributions and Applications, May 11-12, 2011, Technische Universitat Muenchen

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