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“Vine copulas and their applications”

Multivariate data sets often show complex dependency patterns. One approach to model these data sets is copula based. While there are many bivariate copula families, multivariate copula families such as the elliptical or Archimedean copulas show not enough flexibility with regard to symmetry and tail dependence. The class of vine copulas tries to fill this gap. Vine copulas are built using bivariate building blocks. In particular the multivariate copula model consists out of three components. The first component is a sequence of trees identifying the

associated copulas to bivariate conditional distributions, the second one their corresponding bivariate copula families and the third one the parameter values corresponding to the chosen bivariate families.

I will introduce this pair copula construction of multivariate copula and discuss their parameter estimation and model selection of up to all three components. The usefulness of this model class will be illustrated through several real data analyses.

References:

Aas, K., C. Czado, A. Frigessi, and H. Bakken (2009). Pair-copula constructions of multiple dependence. *Insurance: Mathematics and Economics* 44(2), 182-198.

Czado, C. (2010). Pair-copula constructions of multivariate copulas. In P. Jaworski, F. Durante, W. Härdle, and T. Rychlik (Eds.), *Copula Theory and Its Applications*. Berlin: Springer.

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Selection of vine copulas. In F. D. P. Jaworski and W. K. H (Eds.), *Copulae in Mathematical and Quantitative Finance*. Springer.

Further references on vines and their applications can be found at

<http://www-m4.ma.tum.de/forschung/vine-copula-models/#c662>