Exchangeability of Copulas: Limits and Tests

Michael Harder

University of Ulm

Studying the dependence structure in the distribution function H of a d-dimensional continuous random vector $\mathbf{X}$, the so called copula is crucial. Without being independent, $\mathbf{X}$ (i. e. its components) might still be exchangeable. This means that any permutation of the components of $\mathbf{X}$ does not change its distribution. It turns out that exchangeability is a property of the copula. When choosing a family of copulas in order to model a given situation, it is important to know whether an exchangeable copula fits the data.

In this talk, a measure for the absence of exchangeability is presented. At first, explicit bounds for this measure will be given, generalizing a result for dimension two by Nelsen (2007), and Klement and Mesiar (2006). Second, two-dimensional testing procedures by Genest et at. (2012) will be generalized to arbitrary dimension.

References

Genest, C., Nešlehová, J., and Quessy, J.-F. (2012). Tests of symmetry for bivariate copulas. *Annals of the Institute of Statistical Mathematics*, 64(4):811–834.

Harder, M. and Stadtmüller, U. (2014). Maximal non-exchangeability in dimension *d*. *Journal of Multivariate Analysis*, 124:34–41

Harder, M. and Stadtmüller, U. (2017). Testing exchangeability of copulas in arbitrary dimension. *Journal of Nonparametric Statistics*, 29(1):40–60

Klement, E. P. and Mesiar, R. (2006). How non-symmetric can a copula be? *Comment. Math. Univ. Carolinae*, 47(1):199–206

Nelsen, R. B. (2007). Extremes of nonexchangeability. *Statistical Papers*, 48:329–336