**Jointly Modelling the Body and Tail of Multivariate Data**

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**Abstract**

In situations where both extreme and non-extreme data are of interest, modelling the whole distribution accurately is important. For example, in some urban areas, air pollution may be so routinely high that harmful levels are actually within the body of the dataset. From a public health perspective, we not only want to learn about the probability of exceeding harmful yet locally moderate levels, but also the probability of exceeding extreme and potentially more dangerous levels. Moreover, the increasing mutual impact of air pollution and climate change makes it an important topic to address. In a univariate setting, there is an increasingly rich literature which concerns the fit of both the bulk and tail of a distribution. However, little work has been done when more than one variable is involved motivating the need for novel approaches.

We propose a dependence model which blends two copulas, with different characteristics, over the whole range of the support. A copula is a joint distribution with uniform margins which is often used to describe the dependence between variables independently from the marginal structure. Then, by means of a weighting function, that depends on the data available, one of the copulas is tailored to the body and the other to the tails of the distribution. In this way, we are able to capture a smooth transition between the non-extreme to the extreme events.