

# Semi-parametric approximation of the Kendall's distribution and multivariate return periods

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Let  $\{\mathbf{X}_1, \dots, \mathbf{X}_N\}$  be a sample of i. i. d.  $d$ -dimensional random vectors, with  $d > 1$ , having unknown multivariate distribution  $\mathbf{F} = \mathbf{C}(F_1, \dots, F_d)$ .

Our target is to provide a general (asymptotic) semi-parametric approximation of the corresponding Kendall's distribution  $\mathbf{K}_\mathbf{C}$ .

In turn, no parametric copula and marginal models would be needed (or should be fitted) on the available data in order to calculate the RP's useful in applications.

We expose an original constructive method in order to find not only the approximation of the Kendall's measure but also the explicit expression of the generator of an Archimedean Copula which has the approximating Kendall's measure.

The last part of the work is the investigation of the behavior of the approximating with a simulation study.

At the end, we indicate some perspectives and refinements for the method implemented.