Package 'kcopula'

October 13, 2022

Title The Bivariate K-Copula

Version 0.1.0

Description Provides the density and distribution function of the bivariate K-copula by Wollschläger and Schäfer (2016) <doi:10.21314/JOR.2016.342>.

License GPL-3

URL https://github.com/mlkremer/kcopula

BugReports https://github.com/mlkremer/kcopula/issues

Depends R (>= 3.6.0)

Imports pracma (>= 2.2.9)

Encoding UTF-8

LazyData true

RoxygenNote 7.0.2

NeedsCompilation no

Author Marcel Kremer [aut, cre] (<https://orcid.org/0000-0001-9130-7670>)

Maintainer Marcel Kremer <marcel.kremer@uni-due.de>

Repository CRAN

Date/Publication 2020-04-07 16:00:02 UTC

R topics documented:

kcop *The Bivariate K-Copula*

Description

Density and distribution function of the bivariate K-copula by Wollschläger and Schäfer (2016).

Usage

```
pkcopula(u, v, c, N, output = "vector", method = "interpolate")

dkcopula(u, v, c, N, output = "vector")
```

Arguments

u, v	Numeric vectors with values in $[0, 1]$.
c	Numeric; Pearson correlation coefficient in $[-1, 1]$.
N	Numeric; inverse fluctuation strength of correlations around their average c, $N > 0$. The larger N the smaller the fluctuations around c, and vice versa.
output	Character; output as "vector" (default) for single values of the K-copula, or "matrix" for the full K-copula.
method	Character; method to be used for pkcopula(..., output = "vector"). If method = "interpolate" (default), values are computed by interpolating the bivariate K-copula *distribution function* (computationally faster); returns NA, if u, v are out of range (here: outside of $[.025, .975]$). If method = "integrate", values are computed by integrating the bivariate K-copula *density* (computationally slower).

Value

dkcopula gives the density (PDF), pkcopula gives the distribution function (CDF) of the bivariate K-copula.

Author(s)

Marcel Kremer, <marcel.kremer@uni-due.de>

References

Wollschläger, M. and Schäfer, R. (2016). Impact of nonstationarity on estimating and modeling empirical copulas of daily stock returns. *Journal of Risk*, 19(1):1–23. https://doi.org/10.21314/JOR.2016.342. SSRN version: https://ssrn.com/abstract=3533903.

Chetalova, D., Wollschläger, M., and Schäfer, R. (2015). Dependence structure of market states. *Journal of Statistical Mechanics: Theory and Experiment*, 2015(8):P08012. https://doi.org/10.1088/1742-5468/2015/08/P08012. SSRN version: https://ssrn.com/abstract=3533951.

Examples

```
## Parameters
u <- seq(.05, .95, .05)
v <- u
rho <- .2
N <- 4

## K-copula PDF
dkcopula(.5, .5, rho, N)


## Plot full K-copula PDF
kcopula_pdf <- dkcopula(u, v, rho, N, output = "matrix")
persp(u, v, kcopula_pdf)

## K-copula CDF
pkcopula(.5, .5, rho, N)

## Plot full K-copula CDF
kcopula_cdf <- pkcopula(u, v, rho, N, output = "matrix")
persp(u, v, kcopula_cdf)
```

---

kcopula *kcopula: The Bivariate K-Copula*

Description

kcopula provides the bivariate K-copula by Wollschläger and Schäfer (2016).

Details

kcopula provides two functions:

- pkcopula gives the distribution function of the bivariate K-copula.
- dkcopula gives the density of the bivariate K-copula.

Author(s)

Marcel Kremer, <marcel.kremer@uni-due.de>

References

Wollschläger, M. and Schäfer, R. (2016). Impact of nonstationarity on estimating and modeling empirical copulas of daily stock returns. *Journal of Risk*, 19(1):1–23. https://doi.org/10.21314/JOR.2016.342. SSRN version: https://ssrn.com/abstract=3533903.

Chetalova, D., Wollschläger, M., and Schäfer, R. (2015). Dependence structure of market states. *Journal of Statistical Mechanics: Theory and Experiment*, 2015(8):P08012. https://doi.org/10.1088/1742-5468/2015/08/P08012. SSRN version: https://ssrn.com/abstract=3533951.

See Also

Useful links:

- https://github.com/mlkremer/kcopula
- Report bugs at https://github.com/mlkremer/kcopula/issues

Examples

```
## See README.md on GitHub for a comprehensive example.
```

Index