

Package: AUKtest (via r-universe)

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Title Calculate the AUK Estimator

Version 0.1.0

Description Computes the Area Under the Kendall (AUK) estimator for multivariate independence. The AUK estimator is based on the survival copula and quantifies the deviation from the null hypothesis of independence. The methodology implemented in this package is based on the work of 'Afendras', 'Markatou', and 'Papantonis' (2025) <[doi:10.1016/j.jmva.2025.105589](https://doi.org/10.1016/j.jmva.2025.105589)>.

Depends R (>= 4.0.0)

License GPL-3

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NeedsCompilation no

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Description

Computes the Area Under the Kendall (AUK) estimator for multivariate independence. The AUK estimator is based on the survival copula and quantifies the deviation from the null hypothesis of independence.

Usage

```
AUKtest(data)
```

Arguments

`data` A matrix or data frame of observations where columns represent variables. Must contain at least 2 observations and 2 variables, with no missing values.

Details

The AUK estimator utilizes the empirical distribution function F_n and a generalized function $g(t)$ to quantify independence in d dimensions. Under the null hypothesis of independence, the AUK value tends toward 0.5. The implementation includes numerical stability fixes for high-dimensional data.

Value

A numeric value in the interval $[0, 1]$ representing the AUK estimator.

References

Afendras, G., Markatou, M., & Papantonis, N. (2025). AUK-based test for mutual independence and an index of mutual dependence. *Journal of Multivariate Analysis*, 105589. <doi:10.1016/j.jmva.2025.105589>

Examples

```
# Example 1: Independent Data
set.seed(123)
data_indep <- matrix(runif(300), 100, 3)
AUKtest(data_indep)

# Example 2: Dependent Data
x <- runif(100)
data_dep <- cbind(x, x^2, sqrt(x))
AUKtest(data_dep)
```

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