Package 'wdm'

January 7, 2025

Title Weighted Dependence Measures

Version 0.2.6

Description Provides efficient implementations of weighted dependence measures and related asymptotic tests for independence. Implemented measures are the Pearson correlation, Spearman's rho, Kendall's tau, Blomqvist's beta, and Hoeffding's D; see, e.g., Nelsen (2006) <doi:10.1007/0-387-28678-0> and Hollander et al. (2015, ISBN:9780470387375).

Depends R (>= 3.2.0)

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Encoding UTF-8

LinkingTo Rcpp

Imports Rcpp

RoxygenNote 7.3.2

URL https://github.com/tnagler/wdm-r

BugReports https://github.com/tnagler/wdm-r/issues

Suggests testthat, Hmisc, copula, covr

NeedsCompilation yes

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Repository CRAN

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wdm-package *Weighted Dependence Measures*

Description

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Details

The DESCRIPTION file: This package was not yet installed at build time.

Author(s)

Maintainer: Thomas Nagler <mail@tnagler.com>

See Also

Useful links:

- https://github.com/tnagler/wdm-r
- Report bugs at https://github.com/tnagler/wdm-r/issues

indep_test *Independence Tests for Weighted Dependence Measures*

Description

Computes a (possibly weighted) dependence measure between x and y if these are vectors. If x and y are matrices then the measure between the columns of x and the columns of y are computed.

Usage

```
indep_test(
  x,
  y,
  method = "pearson",
  weights = NULL,
  remove_missing = TRUE,
  alternative = "two-sided"
)
```

Arguments

x, y	numeric vectors of data values. x and y must have the same length.
method	the dependence measure; see *Details* for possible values.
weights	an optional vector of weights for the observations.
remove_missing	if TRUE, all (pairswise) incomplete observations are removed; if FALSE, the function throws an error if there are incomplete observations.
alternative	indicates the alternative hypothesis and must be one of "two-sided", "greater" or "less". You can specify just the initial letter. "greater" corresponds to positive association, "less" to negative association.

Details

Available methods:

- "pearson": Pearson correlation
- "spearman": Spearman's ρ
- "kendall": Kendall's τ
- "blomqvist": Blomqvist's β
- "hoeffding": Hoeffding's D

Partial matching of method names is enabled. All methods except "hoeffding" work with discrete variables.

Examples

```
x <- rnorm(100)
y <- rpois(100, 1)  # all but Hoeffding's D can handle ties
w <- runif(100)

indep_test(x, y, method = "kendall")               # unweighted
indep_test(x, y, method = "kendall", weights = w)  # weighted
```

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rank_wtd *Computing weighted ranks*

Description

The weighted rank of X_i among $X_1, \ldots, X_n$ with weights $w_1, \ldots, w_n$ is defined as

$$\frac{1}{n} \sum_{j=1}^{n} w_i 1[X_j \leq X_i].$$

Usage

```
rank_wtd(x, weights = numeric(), ties_method = "average")
```

Arguments

x	a numeric vector.
weights	a vector of weights (same length as x).
ties_method	Indicates how to treat ties; same as in R, see https://stat.ethz.ch/R-manual/R-devel/library/base/html/rank.html.

Value

a vector of ranks.

Examples

```
x <- rnorm(100)
w <- rexp(100)
rank(x)
rank_wtd(x, w)
```

---

wdm *Weighted Dependence Measures*

Description

Computes a (possibly weighted) dependence measure between x and y if these are vectors. If x and y are matrices then the measure between the columns of x and the columns of y are computed.

Usage

```
wdm(x, y = NULL, method = "pearson", weights = NULL, remove_missing = TRUE)
```

Arguments

x	a numeric vector, matrix or data frame.
y	NULL (default) or a vector, matrix or data frame with compatible dimensions to x. The default is equivalent to 'y = x" (but more efficient).
method	the dependence measure; see *Details* for possible values.
weights	an optional vector of weights for the observations.
remove_missing	if TRUE, all (pairswise) incomplete observations are removed; if FALSE, the function throws an error if there are incomplete observations.

Details

Available methods:

- "pearson": Pearson correlation
- "spearman": Spearman's ρ
- "kendall": Kendall's τ
- "blomqvist": Blomqvist's β
- "hoeffding": Hoeffding's D Partial matching of method names is enabled.

Spearman's ρ and Kendall's τ are corrected for ties if there are any.

Examples

```
##  dependence between two vectors
x <- rnorm(100)
y <- rpois(100, 1)  # all but Hoeffding's D can handle ties
w <- runif(100)
wdm(x, y, method = "kendall")               # unweighted
wdm(x, y, method = "kendall", weights = w)  # weighted

##  dependence in a matrix
x <- matrix(rnorm(100 * 3), 100, 3)
wdm(x, method = "spearman")               # unweighted
wdm(x, method = "spearman", weights = w)  # weighted

##  dependence between columns of two matrices
y <- matrix(rnorm(100 * 2), 100, 2)
wdm(x, y, method = "hoeffding")               # unweighted
wdm(x, y, method = "hoeffding", weights = w)  # weighted
```

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