Package 'libcoin'

July 22, 2025

Title Linear Test Statistics for Permutation Inference

Date 2023-09-26

Version 1.0-10

Description Basic infrastructure for linear test statistics and permutation inference in the framework of Strasser and Weber (1999) <https://epub.wu.ac.at/102/>. This package must not be used by end-users. CRAN package 'coin' implements all user interfaces and is ready to be used by anyone.

Depends R (>= 3.4.0)

Suggests coin

Imports stats, mvtnorm

LinkingTo mvtnorm

NeedsCompilation yes

License GPL-2

Author Torsten Hothorn [aut, cre] (ORCID: <https://orcid.org/0000-0001-8301-0471>), Henric Winell [aut] (ORCID: <https://orcid.org/0000-0001-7995-3047>)

Maintainer Torsten Hothorn <Torsten.Hothorn@R-project.org>

Repository CRAN

Date/Publication 2023-09-27 10:30:07 UTC

Contents

ctabs *Cross Tabulation*

Description

Efficient weighted cross tabulation of two factors and a block

Usage

```
ctabs(ix, iy = integer(0), block = integer(0), weights = integer(0),
      subset = integer(0), checkNAs = TRUE)
```

Arguments

ix	a integer of positive values with zero indicating a missing.
iy	an optional integer of positive values with zero indicating a missing.
block	an optional blocking factor without missings.
weights	an optional vector of case weights, integer or double.
subset	an optional integer vector indicating a subset.
checkNAs	a logical for switching off missing value checks.

Details

A faster version of `xtabs(weights ~ ix + iy + block, subset)`.

Value

If `block` is present, a three-way table. Otherwise, a one- or two-dimensional table.

Examples

```
ctabs(ix = 1:5, iy = 1:5, weights = 1:5 / 5)
```

doTest *Permutation Test*

Description

Perform permutation test for a linear statistic

Usage

```
doTest(object, teststat = c("maximum", "quadratic", "scalar"),
       alternative = c("two.sided", "less", "greater"), pvalue = TRUE,
       lower = FALSE, log = FALSE, PermutedStatistics = FALSE,
       minbucket = 10L, ordered = TRUE, maxselect = object$Xfactor,
       pargs = GenzBretz())
```

Arguments

object	an object returned by LinStatExpCov.
teststat	type of test statistic to use.
alternative	alternative for scalar or maximum-type statistics.
pvalue	a logical indicating if a p-value shall be computed.
lower	a logical indicating if a p-value (lower is FALSE) or 1 - p-value (lower is TRUE) shall be returned.
log	a logical, if TRUE probabilities are log-probabilities.
PermutedStatistics	a logical, return permuted test statistics.
minbucket	minimum weight in either of two groups for maximally selected statistics.
ordered	a logical, if TRUE maximally selected statistics assume that the cutpoints are ordered.
maxselect	a logical, if TRUE maximally selected statistics are computed. This requires that X was an implicitly defined design matrix in LinStatExpCov.
pargs	arguments as in GenzBretz.

Details

Computes a test statistic, a corresponding p-value and, optionally, cutpoints for maximally selected statistics.

Value

A list.

LinStatExpCov *Linear Statistics with Expectation and Covariance*

Description

Strasser-Weber type linear statistics and their expectation and covariance under the independence hypothesis

Usage

```
LinStatExpCov(X, Y, ix = NULL, iy = NULL, weights = integer(0),
              subset = integer(0), block = integer(0), checkNAs = TRUE,
              varonly = FALSE, nresample = 0, standardise = FALSE,
              tol = sqrt(.Machine$double.eps))
lmult(x, object)
```

Arguments

X	numeric matrix of transformations.
Y	numeric matrix of influence functions.
ix	an optional integer vector expanding X.
iy	an optional integer vector expanding Y.
weights	an optional integer vector of non-negative case weights.
subset	an optional integer vector defining a subset of observations.
block	an optional factor defining independent blocks of observations.
checkNAs	a logical for switching off missing value checks. This included switching off checks for suitable values of subset. Use at your own risk.
varonly	a logical asking for variances only.
nresample	an integer defining the number of permuted statistics to draw.
standardise	a logical asking to standardise the permuted statistics.
tol	tolerance for zero variances.
x	a contrast matrix to be left-multiplied in case X was a factor.
object	an object of class "LinStatExpCov".

Details

The function, after minimal preprocessing, calls the underlying C code and computes the linear statistic, its expectation and covariance and, optionally, nresample samples from its permutation distribution.

When both ix and iy are missing, the number of rows of X and Y is the same, ie the number of observations.

When X is missing and ix a factor, the code proceeds as if X were a dummy matrix of ix without explicitly computing this matrix.

Both ix and iy being present means the code treats them as subsetting vectors for X and Y. Note that ix = 0 or iy = 0 means that the corresponding observation is missing and the first row or X and Y must be zero.

lmult allows left-multiplication of a contrast matrix when X was (equivalent to) a factor.

Value

A list.

References

Strasser, H. and Weber, C. (1999). On the asymptotic theory of permutation statistics. *Mathematical Methods of Statistics* **8**(2), 220–250.

Examples

```
wilcox.test(Ozone ~ Month, data = airquality, subset = Month %in% c(5, 8),
            exact = FALSE, correct = FALSE)

aq <- subset(airquality, Month %in% c(5, 8))
X <- as.double(aq$Month == 5)
Y <- as.double(rank(aq$Ozone, na.last = "keep"))
doTest(LinStatExpCov(X, Y))
```

Index