Package ‘libcoin’

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Title Linear Test Statistics for Permutation Inference

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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

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**ctabs**  
*R: Cross Tabulation*

**Description**
Efficient weighted cross tabulation of two factors and a block

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

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**doTest**  
*R: Permutation Test*

**Description**
Perform permutation test for a linear statistic

**Usage**
```r
doTest(object, teststat = c("maximum", "quadratic", "scalar"),
        alternative = c("two.sided", "less", "greater"), pvalue = TRUE,
        lower = FALSE, log = FALSE, PermutatedStatistics = 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

```r
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

Examples

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

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