Package ‘XICOR’

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Type Package

Title Association Measurement Through Cross Rank Increments

Version 0.3.3

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Description Computes robust association measures that do not presuppose linearity. The xi correlation (xicor) is based on cross correlation between ranked increments. The reference for the methods implemented here is Chatterjee, Sourav (2020) <arXiv:1909.10140> This package includes the Galton peas example.

Depends R (>= 3.5.0)

License GPL-3

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LazyData true

Imports psychTools, stats

Suggests testthat (>= 2.1.0), ggplot2

RoxygenNote 7.1.0

NeedsCompilation no

Repository CRAN

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R topics documented:

calculateXI *Compute the cross rank coefficient xi on two vectors.*

Description

This function computes the xi coefficient between two vectors x and y.

Usage

```
calculateXI(xvec, yvec, simple = TRUE, seed = 12133331)
```

Arguments

`xvec`	Vector of numeric values in the first coordinate.
`yvec`	Vector of numeric values in the second coordinate.
`simple`	Whether auxiliary information is kept to pass on.
`seed`	Ties are removed randomly, setting a seed ensures reproducibility.

Value

In the case simple = TRUE, function returns the value of the xi coefficient, If simple = FALSE is chosen, the function returns a list:

xi The xi coefficient

fr rearranged rank of yvec

CU `mean(gr*(1-gr))`

Note

Auxiliary function with no checks for NA, etc.

Author(s)

Sourav Chatterjee, Susan Holmes

References

Chatterjee, S. (2020) A New Coefficient Of Correlation, <arXiv:1909.10140>.

See Also

xicor

Examples

```
# Compute one of the coefficients
library("psychTools")
data(peas)
calculateXI(peas$parent,peas$child)
calculateXI(peas$child,peas$parent)
```

`FRpredcor` *Compute the FR coefficient on two vectors based exactly on Gamma2.*

Description

This function computes the unidimensional graph prediction coefficient between two vectors xvec and yvec.

Usage

```
FRpredcor(xvec, yvec, tiemethod = "average")
```

Arguments

`xvec`	Vector of numeric values in the first coordinate.
`yvec`	Vector of numeric values in the second coordinate.
`tiemethod`	Choice of treatment for ties, default is the "average"

Value

In the case simple = TRUE, function returns the value of the FR standardized coefficient.

Note

Auxiliary function with no checks for NA, etc.

Author(s)

Sourav Chatterjee, Susan Holmes

References

Chatterjee, S. and Holmes, S (2020) Practical observations and applications of the robust prediction coefficient.

See Also

xicor FRpredcorhalf

Examples

```
# Compute  the coefficient and compare to the xi coefficient
simulCompare <- function(n = 20, B = 1000)
{
 diffs<- rep(0,B)
 xvec <- 1:n
 for (i in 1:B)
 {
   yvec <- runif(n)
   diffs[i] <- FRpredcor(xvec, yvec) - xicor(xvec, yvec)
 }
 return(diffs)
 }

 simulcompare1K <- simulCompare()
 summary(simulcompare1K)
```

FRpredcorhalf *Compute the FR half coefficient on two vectors based on half Gamma 2.*

Description

This function computes the unidimensional ranked half graph prediction coefficient between two vectors xvec and yvec.

Usage

```
FRpredcorhalf(xvec, yvec, tiemethod = "average")
```

Arguments

xvec	Vector of numeric values in the first coordinate.
yvec	Vector of numeric values in the second coordinate.
tiemethod	Choice of treatment for ties, default is the "average"

Value

In the case simple = TRUE, function returns the value of the FR standardized coefficient.

Note

Auxiliary function with no checks for NA, etc.

Author(s)

Sourav Chatterjee, Susan Holmes

References

Chatterjee, S. and Holmes, S (2020) Practical observations and applications of the robust prediction coefficient.

See Also

xicor FRpredcor

Examples

```
# Compute  the coefficient and compare to the xi coefficient
simulCompare <- function(n = 20, B = 1000)
{
 diffsim <- rep(0,B)
 xvec <- 1:n
 for (i in 1:B)
 {
   yvec <- sample(n,n)
   diffsim[i] <- FRpredcorhalf(xvec,yvec)-xicor(xvec,yvec)
 }
 return(diffsim)
 }

 compare1K <- simulCompare()
 summary(compare1K)
```

`xicor` *Compute the cross rank increment correlation coefficient xi.*

Description

This function computes the xi coefficient between two vectors x and y, possibly all coefficients for a matrix. If only one coefficient is computed it can be used to test independence using a Monte Carlo permutation test or through an asymptotic approximation test.

Usage

```
xicor(
  x,
  y = NULL,
  pvalue = FALSE,
  ties = TRUE,
  method = "asymptotic",
  nperm = 1000,
  factor = FALSE
)
```

Arguments

`x` Vector of numeric values in the first coordinate.

`y` Vector of numeric values in the second coordinate.

`pvalue` Whether or not to return the p-value of rejecting independence, if TRUE the function also returns the standard deviation of xi.

`ties` Do we need to handle ties? If ties=TRUE the algorithm assumes that the data has ties and employs the more elaborated theory for calculating s.d. and P-value. Otherwise, it uses the simpler theory. There is no harm in putting ties = TRUE even if there are no ties.

`method` If method = "asymptotic" the function returns P-values computed by the asymptotic theory. If method = "permutation", a permutation test with nperm permutations is employed to estimate the P-value. Usually, there is no need for the permutation test. The asymptotic theory is good enough.

`nperm` In the case of a permutation test, `nperm` is the number of permutations to do.

`factor` Whether to transform integers into factors, the default is to leave them alone.

Value

In the case pvalue=FALSE, function returns the value of the xi coefficient, if the input is a matrix, a matrix of coefficients is returned. In the case pvalue=TRUE is chosen, the function returns a list:

xi The value of the xi coefficient.

sd The standard deviation.

pval The test p-value.

Note

Dataset peas no longer available in psych, using psychTools.

Author(s)

Sourav Chatterjee, Susan Holmes

References

Chatterjee, S. (2020) <arXiv:1909.10140>.

See Also

dcov

Examples

```
##---- Should be DIRECTLY executable !! ----
library(”psychTools”)
data(peas)
# Visualize       the peas data
library(ggplot2)
ggplot(peas,aes(parent,child)) +
geom_count() + scale_radius(range=c(0,5)) +
       xlim(c(13.5,24))+ylim(c(13.5,24))+       coord_fixed() +
       theme(legend.position=”bottom”)
# Compute one of the coefficients
xicor(peas$parent,peas$child,pvalue=TRUE)
xicor(peas$child,peas$parent)
# Compute all the coefficients
xicor(peas)
```

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