Package ‘newIMVC’

April 16, 2024

Type Package
Title A Robust Integrated Mean Variance Correlation
Version 0.1.0
Description Measure the dependence structure between two random variables with a new correlation
coefficient and extend it to hypothesis test, feature screening and false discovery rate control.
License GPL-3
Encoding UTF-8
Imports splines, quantreg, expm, CompQuadForm, GGMridge, limma, stats
RoxygenNote 7.2.3
Suggests knitr, mvtnorm, rmarkdown, testthat (>= 3.0.0)
VignetteBuilder knitr
Config/testthat/edition 3
NeedsCompilation no
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Repository CRAN
Date/Publication 2024-04-16 14:50:13 UTC

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Description
This function is used to calculate the integrated mean variance correlation between two vectors

Usage
IMVC(y, x, K, NN = 3, type)

Arguments
y is a numeric vector
x is a numeric vector
K is the number of quantile levels
NN is the number of B spline basis, default is 3
type is an indicator for measuring linear or nonlinear correlation, "linear" represents linear correlation and "nonlinear" represents linear or nonlinear correlation using B splines

Value
The value of the corresponding sample statistic

Examples
n=200
x=rnorm(n)
y=x^2+rt(n,2)
IMVC(y,x,K=10,type="nonlinear")

Description
This function is used for FDR control with integrated mean variance correlation

Usage
IMVCFDR(y, x, K, NN = 3, numboot, timeboot, true_signal, null_method, alpha)
IMVCS

Integrated Mean Variance Correlation Based Screening

Description

This function is used to select important features using integrated mean variance correlation

Usage

IMVCS(y, x, K, d, NN = 3, type)
Arguments

- **y** is the response vector
- **x** is the covariate matrix
- **K** is the number of quantile levels
- **d** is the size of selected variables
- **NN** is the number of B spline basis, default is 3
- **type** is an indicator for measuring linear or nonlinear correlation, "linear" represents linear correlation and "nonlinear" represents linear or nonlinear correlation using B splines

Value

The labels of first d largest active set of all predictors

Examples

```r
require("mvtnorm")
n=200  
p=500  
pho1=0.8  
mean_x=rep(0,p)  
sigma_x=matrix(NA,nrow = p,ncol = p)  
for (i in 1:p) {  
  for (j in 1:p) {  
    sigma_x[i,j]=pho1^(abs(i-j))  
  }  
}  
x=rmvnorm(n, mean = mean_x, sigma = sigma_x,method = "chol")  
x1=x[,1]  
x2=x[,2]  
x3=x[,12]  
x4=x[,22]  
y=2*x1+0.5*x2+3*x3*ifelse(x3<0,1,0)+2*x4+rnorm(n)  
IMVCS(y,x,K=5,d=round(n/log(n)),type="nonlinear")
```

Description

This function is used to test significance of linear or nonlinear correlation using integrated mean variance correlation

Usage

```r
IMVCT(x, y, K, num_per, NN = 3, type)
```
Arguments

- **x** is the univariate covariate vector
- **y** is the response vector
- **K** is the number of quantile levels
- **num_per** is the number of permutation times
- **NN** is the number of B spline basis, default is 3
- **type** is an indicator for measuring linear or nonlinear correlation, "linear" represents linear correlation and "nonlinear" represents linear or nonlinear correlation using B splines

Value

The p-value of the corresponding hypothesis test

Examples

```r
# linear model
n=100
x=rnorm(n)
y=2*x+rt(n,2)
IMVCT(x,y,K=5,type = "linear")

# nonlinear model
n=100
x=rnorm(n)
y=2*cos(x)+rt(n,2)
IMVCT(x,y,K=5,type = "nonlinear",num_per = 100)
```
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