Package ‘changepointTests’

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Type Package
Title Change Point Tests for Joint Distributions and Copulas
Version 0.1.5
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Description Change point tests for joint distributions and copulas using pseudo-observations with multipliers or bootstrap. The processes used here have been defined in Bucher, Kojadinovic, Rohmer & Segers <doi:10.1016/j.jmva.2014.07.012> and Nasri & Remillard <doi:10.1016/j.jmva.2019.03.002>.
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**pseudos**  
*Pseudo-observations*

**Description**

Pseudo-observations used in Nasri, Remillard, Bahraoui (2021). The values represent conditional cdfs of Gaussian HMM models applied to log-returns of Nasdaq and Dow Jones Industrial indexes from 2007 and 2008. If the models are correct, the pseudo-observations should be almost iid with uniform distribution.

**Usage**

data(pseudos)

**Format**

Pseudo-observations from Gaussian HMM models with 3 regimes for log-returns of the to Nasdaq index and Dow Jones Industrial indexes from 2007 and 2008.

- 1st column: pseudo-observations of a Gaussian HMM model with 3 regimes applied to the Nasdaq log-returns.
- 2nd column: pseudo-observations of a Gaussian HMM model with 3 regimes applied to the Dow Jones Industrial log-returns.

**test.change.point**  
*Function to perform changepoint tests with multiplier bootstrap using the usual sequential process*

**Description**


**Usage**

test.change.point(  
  x,  
  N = 1000,  
  n_cores = 2,  
  boot.method = "multipliers",  
  est = FALSE  
)
Arguments

- **x**: (n x d) matrix of data (observations or pseudo-observations, including residuals), d>=1
- **N**: number of multipliers samples to compute the P-value
- **n_cores**: number of cores for parallel computing (default = 2)
- **boot.method**: bootstrapping method: 'multipliers' (default, fastest) or 'bootstrap'
- **est**: if TRUE, tau is estimated (default = FALSE)

Value

- **CVM**: Cramer-von Mises statistic
- **KS**: Kolmogorov-Smirnov statistic
- **pvalueCVM**: P-value for the Cramer-von Mises statistic
- **pvalueKS**: P-value for the Kolmogorov-Smirnov statistic
- **tauCVM**: Estimated changepoint using the Cramer-von Mises statistic
- **tauKS**: Estimated changepoint using the Kolmogorov-Smirnov statistic

Author(s)

Bouchra R Nasri and Bruno N Remillard, August 6, 2020

References


Examples

```r
x = matrix(rnorm(600), ncol=3)
out = test.change.point(x)
```

Description

This function compute the Cramer-von Mises and Kolmogorov-Smirnov test statistics based on the new sequential process of Bucher et al (2014), using multipliers and parallel computing. Two methods of bootstrapping are used: non-sequential (fastest) and sequential. Both methods yields basically the same P-values.
Usage

test.change.point.copula.BKRS(
  x,
  N = 1000,
  n_cores = 2,
  method = "nonseq",
  est = FALSE
)

Arguments

x (n x d) matrix of data (observations or pseudo-observations, including residuals),
d >=2
N number of multipliers samples to compute the P-value
n_cores number of cores for parallel computing (default = 2)
method 'nonseq' (default) or 'seq'
est if TRUE, tau is estimated (default = FALSE)

Value

CVM Cramer-von Mises statistic
KS Kolmogorov-Smirnov statistic
pvalueCVM Pvalue for the Cramer-von Mises statistic
pvalueKS Pvalue for the Kolmogorov-Smirnov statistic
tauCVM Estimated changepoint using the Cramer-von Mises statistic
tauKS Estimated changepoint using the Kolmogorov-Smirnov statistic

Author(s)

Bouchra R Nasri and Bruno N Remillard, August 6, 2020

References


Examples

x<-matrix(rnorm(100),ncol=2)
out = test.change.point.copula.BKRS(x)
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