Package ‘changepointTests’

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Type Package
Title Change Point Tests for Joint Distributions and Copulas
Version 0.1.1
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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, Kojiadi-novic, 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.

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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   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(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.
test.change.point.copula.BKRS

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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