Package ‘mscp’

October 13, 2022

Type Package

Title Multiscale Change Point Detection via Gradual Bandwidth Adjustment in Moving Sum Processes

Version 1.0

Date 2021-02-19

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Description Multiscale moving sum procedure for the detection of changes in expectation in univariate sequences. References - Multiscale change point detection via gradual bandwidth adjustment in moving sum processes (2021+), Tijana Levajkovic and Michael Messer.

License GPL-3

RoxygenNote 7.1.1

NeedsCompilation no

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Repository CRAN

Date/Publication 2021-02-24 10:10:02 UTC

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Description

Multiscale change point detection via gradual bandwidth adjustment in moving sum processes. A method for the detection of changes in the expectation in univariate sequences.

Usage

mscp(x, delta = 20, g = 20, kappa = NA, alpha = 0.01, sim = 500)

Arguments

x
numeric vector. Input sequence of random variables.
delta
integer &ge;2. Default = 20. Minimal window considered.
g
integer &ge;1. Default = 20. Spacing between starting points.
kappa
NA or positive real number. Default = NA. Breaking threshold. If NA, then kappa is derived in simulations, using alpha and sim
alpha
numeric in (0,1). Default = 0.01. Significance level, i.e., sets kappa as (1-alpha)-quantile of maximum of Gaussian process limit.
sim
integer &ge;1. Default = 500. Number of simulations for kappa.

Value

invisible list

cp
detected change points (ordered according to detection)
mean_sd
matrix of estimated means and standard deviations
path
list containing matrices, each matrix describing the path of a detected change point. First column: t-value, second column: h-value, third column: D-value (statistic), first row: starting values, last row: end values
S
matrix of possible starting values. First column: t-value, second column: h-value, third column: D-value (statistic), fourth column: step when cut out
x
input sequence
delta
minimal window size
g
spacing between starting points
kappa
threshold

Author(s)

Tijana Levajkovic and Michael Messer
References
Multiscale change point detection via gradual bandwidth adjustment in moving sum processes (2021+), Tijana Levajkovic and Michael Messer

See Also
plot.mscp, summary.mscp

Examples
```r
set.seed(1)
Tt <- 1000
cp <- c(250,500,600,650,750)
mu <- c(2,3,6,9,12,15)
sd <- c(1,1,2,1,2,1)
m <- rep(mu,diff(c(0,cp,Tt)))
s <- rep(sd,diff(c(0,cp,Tt)))
x <- rnorm(Tt,m,s)
result <- mscp(x,kappa=4.77) # kappa set manually
# result <- mscp(x) # kappa derived in simulations
summary(result)
plot(result)
```

Description
Plot method for class 'mscp'

Usage
```r
## S3 method for class 'mscp'
plot(x = x, cex = 1, plot.legend = TRUE, ...)
```

Arguments
- `x`: object of class mscp
- `cex`: numeric, global sizes in plot
- `plot.legend`: logical, if TRUE legends are plotted
- `...`: additional arguments

Value
No return value, called for side effects
**Author(s)**
Tijana Levajkovic and Michael Messer

**References**
Multiscale change point detection via gradual bandwidth adjustment in moving sum processes (2021+), Tijana Levajkovic and Michael Messer

**See Also**
mscp, summary.mscp

**Examples**
```r
set.seed(1)
Tt <- 1000
cp <- c(250,500,600,650,750)
mu <- c(2,3,6,9,12,15)
sd <- c(1,1,2,1,2,1)
m <- rep(mu,diff(c(0,cp,Tt)))
s <- rep(sd,diff(c(0,cp,Tt)))
x <- rnorm(Tt,m,s)
result <- mscp(x,kappa=4.77) # kappa set manually
# result <- mscp(x) # kappa derived in simulations
summary(result)
plot(result)
```

**Description**
Summary method for class ’mscp’

**Usage**
```r
## S3 method for class 'mscp'
summary(object, ...)
```

**Arguments**
- **object** object of class mscp
- **...** additional arguments

**Value**
No return value, called for side effects
Author(s)

Tijana Levajkovic and Michael Messer

References

Multiscale change point detection via gradual bandwidth adjustment in moving sum processes (2021+), Tijana Levajkovic and Michael Messer

See Also

mscp, plot.mscp

Examples

```r
set.seed(1)
Tt <- 1000
cp <- c(250,500,600,650,750)
mu <- c(2,3,6,9,12,15)
sd <- c(1,1,2,1,2,1)
m <- rep(mu,diff(c(0,cp,Tt)))
s <- rep(sd,diff(c(0,cp,Tt)))
x <- rnorm(Tt,m,s)
result <- mscp(x,kappa=4.77) # kappa set manually
# result <- mscp(x) # kappa derived in simulations
summary(result)
plot(result)
```
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