Package ‘mscp’

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Type Package

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

Version 1.0

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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

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NeedsCompilation no

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Repository CRAN

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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

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

Arguments

- **x**: numeric vector. Input sequence of random variables.
- **delta**: integer >=2. Default = 20. Minimal window considered.
- **g**: integer >=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 >=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

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

## 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)
u <- 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(T, 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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