Package 'jcp'

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Type Package

Title Joint Change Point Detection

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Description Procedures for joint detection of changes in both expectation and variance in univariate sequences. Performs a statistical test of the null hypothesis of the absence of change points. In case of rejection performs an algorithm for change point detection. References - Bivariate change point detection (2019+), Michael Messer.

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RoxygenNote 6.1.1

NeedsCompilation no

Repository CRAN

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R topics documented:

`jcp` *jcp*

Description

Joint change point detection - expectation and variance - via bivariate moving sum statistics

Usage

```
jcp(x, H = NA, q = NA, alpha = 0.05, sim = 1000,
  region = "square")
```

Arguments

x	numeric vector. Input sequence of random variables.
H	NA or numeric vector. Window set. If NA (dafault), then H is automatically set. If not NA, then H must an increasing vector of positive integers with maximum =< length(x)/2.
q	NA or numeric value. Rejection threshold. If NA (default), then the rejection boundary is derived in simulations (from Gaussian process limit) according to sim and alpha. If not NA, then q is considered predefined and must be set a postive real number.
alpha	numeric value. Significance level. Must be in (0,1), default = 0.05. In case of predefined q, alpha is set to NA.
sim	numereric value. Number of simulations of limit process for approximation of q. Must be positive integer, default = 1000. In case of predefined q, sim is set to NA.
region	character string. Defines rejection region, default = "square". Must be chosen either "square", "circle" or "ellipse".

Value

invisible

changepoints	detected change points (increasingly ordered)
mean_sd	matrix of estimated means and standard deviations
M	test statistic
q	rejection threshold
H	window set
sim	number of simulations of the limit process (approximation of q)
alpha	significance level
region	rejection region
method	derivation of threshold q, either asymptotic or predefined
x	input sequence
EVrho	list containing the auxiliary processes E, V and correlation rho, for each element of H one list entry
CP_meta	matrix containing meta information of estimation. Estimated change points (increasingly ordered), responsible window h, components E, V and rho of joint statistic at estimated change points (regarding responsible window)
SFA	detected change points of single filter algorithms

Author(s)

Michael Messer

References

Bivariate change point detection (2019+), Michael Messer

See Also

plot.jcp, summary.jcp

Examples

```
# Normal distributed sequence with 3 change points at
# c1=250 (change in expectation),
# c2=500 (change in variance) and
# c3=750 (change in expectation and variance)
set.seed(0)
m      <- c(8,10,10,3);   s  <- c(4,4,10,5)
x      <- rnorm(1000, mean=rep(m,each=250), sd=rep(s,each=250))
result <- jcp(x)
summary(result)
plot(result)

# Set additional parameters (window set)
result2 <- jcp(x,H=c(80,160,240))
summary(result2)
plot(result2)
```

---

plot.jcp *plot.jcp*

Description

Plot method for class 'jcp'

Usage

```
## S3 method for class 'jcp'
plot(x, cex = 1, cex.main = 1, ...)
```

Arguments

x	object of class jcp
cex	numeric, global sizes in plot
cex.main	numeric, size of titles
...	additional arguments

Author(s)

Michael Messer

References

Bivariate change point detection (2019+), Michael Messer

See Also

jcp, summary.jcp

Examples

```
# Normal distributed sequence with 3 change points at
# c1=250 (change in expectation),
# c2=500 (change in variance) and
# c3=750 (change in expectation and variance)
set.seed(0)
m      <- c(8,10,10,3);   s  <- c(4,4,10,5)
x      <- rnorm(1000, mean=rep(m,each=250), sd=rep(s,each=250))
result <- jcp(x)
summary(result)
plot(result)

# Set additional parameters (window set)
result2 <- jcp(x,H=c(80,160,240))
summary(result2)
plot(result2)
```

---

summary.jcp *summary.jcp*

Description

Summary method for class 'jcp'

Usage

```
## S3 method for class 'jcp'
summary(object, ...)
```

Arguments

object	object of class jcp
...	additional arguments

Author(s)

Michael Messer

References

Bivariate change point detection (2019+), Michael Messer

See Also

jcp, plot.jcp

Examples

```
#' # Normal distributed sequence with 3 change points at
# c1=250 (change in expectation),
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plot(result)
summary(result)

# Set additional parameters (window set)
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plot(result2)
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