Package 'Rcatch22'

October 4, 2021

Type Package

Title Calculation of 22 CAnonical Time-Series CHaracteristics

Version 0.1.13

Date 2021-09-27

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Description Calculate 22 summary statistics coded in C on time-series vectors to enable pattern detection, classification, and regression applications in the feature space as proposed by Lubba et al. (2019) <doi:10.1007/s10618-019-00647-x>.

BugReports https://github.com/hendersontrent/Rcatch22/issues/

License GPL-3

Encoding UTF-8

LazyData true

Depends R (>= 3.5.0)

Imports stats, Rcpp (>= 0.12.15)

LinkingTo Rcpp

Suggests knitr, markdown, rmarkdown

RoxygenNote 7.1.1

VignetteBuilder knitr

NeedsCompilation yes

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Repository CRAN

Date/Publication 2021-10-04 04:20:06 UTC

R topics documented:

`catch22_all` *Automatically run every time-series feature calculation included in the catch22 set*

Description

Automatically run every time-series feature calculation included in the catch22 set

Usage

```
catch22_all(data, catch24 = FALSE)
```

Arguments

`data`	a numerical time-series input vector
`catch24`	a Boolean of whether to include mean and standard deviation as features

Value

object of class DataFrame that contains the summary statistics for each feature

Author(s)

Trent Henderson & Carl H. Lubba

Examples

```
data <- 1 + 0.5 * 1:1000 + arima.sim(list(ma = 0.5), n = 1000)
outs <- catch22_all(data)
```

CO_Embed2_Dist_tau_d_expfit_meandiff

Function to calculate a statistical feature

Description

Function to calculate a statistical feature

Usage

```
CO_Embed2_Dist_tau_d_expfit_meandiff(x)
```

Arguments

x	a numerical time-series input vector

Value

scalar value that denotes the calculated time-series statistic

Author(s)

Carl H. Lubba

Examples

```
x <- 1 + 0.5 * 1:1000 + arima.sim(list(ma = 0.5), n = 1000)
outs <- CO_Embed2_Dist_tau_d_expfit_meandiff(x)
```

CO_f1ecac *Function to calculate a statistical feature*

Description

Function to calculate a statistical feature

Usage

```
CO_f1ecac(x)
```

Arguments

x	a numerical time-series input vector

Value

scalar value that denotes the calculated time-series statistic

Author(s)

Carl H. Lubba

Examples

```
x <- 1 + 0.5 * 1:1000 + arima.sim(list(ma = 0.5), n = 1000)
outs <- CO_f1ecac(x)
```

CO_FirstMin_ac *Function to calculate a statistical feature*

Description

Function to calculate a statistical feature

Usage

```
CO_FirstMin_ac(x)
```

Arguments

x	a numerical time-series input vector

Value

scalar value that denotes the calculated time-series statistic

Author(s)

Carl H. Lubba

Examples

```
x <- 1 + 0.5 * 1:1000 + arima.sim(list(ma = 0.5), n = 1000)
outs <- CO_FirstMin_ac(x)
```

CO_HistogramAMI_even_2_5

Function to calculate a statistical feature

Description

Function to calculate a statistical feature

Usage

```
CO_HistogramAMI_even_2_5(x)
```

Arguments

x	a numerical time-series input vector

Value

scalar value that denotes the calculated time-series statistic

Author(s)

Carl H. Lubba

Examples

```
x <- 1 + 0.5 * 1:1000 + arima.sim(list(ma = 0.5), n = 1000)
outs <- CO_HistogramAMI_even_2_5(x)
```

CO_trev_1_num *Function to calculate a statistical feature*

Description

Function to calculate a statistical feature

Usage

```
CO_trev_1_num(x)
```

Arguments

x	a numerical time-series input vector

Value

scalar value that denotes the calculated time-series statistic

Author(s)

Carl H. Lubba

Examples

```
x <- 1 + 0.5 * 1:1000 + arima.sim(list(ma = 0.5), n = 1000)
outs <- CO_trev_1_num(x)
```

DN_HistogramMode_10 *Function to calculate a statistical feature*

Description

Function to calculate a statistical feature

Usage

```
DN_HistogramMode_10(x)
```

Arguments

x	a numerical time-series input vector

Value

scalar value that denotes the calculated time-series statistic

Author(s)

Carl H. Lubba

Examples

```
x <- 1 + 0.5 * 1:1000 + arima.sim(list(ma = 0.5), n = 1000)
outs <- DN_HistogramMode_10(x)
```

DN_HistogramMode_5 *Function to calculate a statistical feature*

Description

Function to calculate a statistical feature

Usage

```
DN_HistogramMode_5(x)
```

Arguments

x	a numerical time-series input vector

Value

scalar value that denotes the calculated time-series statistic

Author(s)

Carl H. Lubba

Examples

```
x <- 1 + 0.5 * 1:1000 + arima.sim(list(ma = 0.5), n = 1000)
outs <- DN_HistogramMode_5(x)
```

DN_Mean *Function to calculate a statistical feature*

Description

Function to calculate a statistical feature

Usage

```
DN_Mean(x)
```

Arguments

x	a numerical time-series input vector

Value

scalar value that denotes the calculated time-series statistic

Author(s)

Trent Henderson

Examples

```
x <- 1 + 0.5 * 1:1000 + arima.sim(list(ma = 0.5), n = 1000)
outs <- DN_Mean(x)
```

DN_OutlierInclude_n_001_mdrmd *Function to calculate a statistical feature*

Description

Function to calculate a statistical feature

Usage

```
DN_OutlierInclude_n_001_mdrmd(x)
```

Arguments

x	a numerical time-series input vector

Value

scalar value that denotes the calculated time-series statistic

Author(s)

Carl H. Lubba

Examples

```
x <- 1 + 0.5 * 1:1000 + arima.sim(list(ma = 0.5), n = 1000)
outs <- DN_OutlierInclude_n_001_mdrmd(x)
```

`DN_OutlierInclude_p_001_mdrmd`
Function to calculate a statistical feature

Description

Function to calculate a statistical feature

Usage

```
DN_OutlierInclude_p_001_mdrmd(x)
```

Arguments

`x`	a numerical time-series input vector

Value

scalar value that denotes the calculated time-series statistic

Author(s)

Carl H. Lubba

Examples

```
x <- 1 + 0.5 * 1:1000 + arima.sim(list(ma = 0.5), n = 1000)
outs <- DN_OutlierInclude_p_001_mdrmd(x)
```

DN_Spread_Std *Function to calculate a statistical feature*

Description

Function to calculate a statistical feature

Usage

```
DN_Spread_Std(x)
```

Arguments

x	a numerical time-series input vector

Value

scalar value that denotes the calculated time-series statistic

Author(s)

Trent Henderson

Examples

```
x <- 1 + 0.5 * 1:1000 + arima.sim(list(ma = 0.5), n = 1000)
outs <- DN_Spread_Std(x)
```

FC_LocalSimple_mean1_tauresrat *Function to calculate a statistical feature*

Description

Function to calculate a statistical feature

Usage

```
FC_LocalSimple_mean1_tauresrat(x)
```

Arguments

x	a numerical time-series input vector

Value

scalar value that denotes the calculated time-series statistic

Author(s)

Carl H. Lubba

Examples

```
x <- 1 + 0.5 * 1:1000 + arima.sim(list(ma = 0.5), n = 1000)
outs <- FC_LocalSimple_mean1_tauresrat(x)
```

FC_LocalSimple_mean3_stderr

Function to calculate a statistical feature

Description

Function to calculate a statistical feature

Usage

```
FC_LocalSimple_mean3_stderr(x)
```

Arguments

x	a numerical time-series input vector

Value

scalar value that denotes the calculated time-series statistic

Author(s)

Carl H. Lubba

Examples

```
x <- 1 + 0.5 * 1:1000 + arima.sim(list(ma = 0.5), n = 1000)
outs <- FC_LocalSimple_mean3_stderr(x)
```

feature_list *All features available in Rcatch22 in tidy format*

Description

The variables include:

Usage

```
feature_list
```

Format

A vector with 1 variable:

feature Name of the feature

IN_AutoMutualInfoStats_40_gaussian_fmmi *Function to calculate a statistical feature*

Description

Function to calculate a statistical feature

Usage

```
IN_AutoMutualInfoStats_40_gaussian_fmmi(x)
```

Arguments

x	a numerical time-series input vector

Value

scalar value that denotes the calculated time-series statistic

Author(s)

Carl H. Lubba

Examples

```
x <- 1 + 0.5 * 1:1000 + arima.sim(list(ma = 0.5), n = 1000)
outs <- IN_AutoMutualInfoStats_40_gaussian_fmmi(x)
```

MD_hrv_classic_pnn40 *Function to calculate a statistical feature*

Description

Function to calculate a statistical feature

Usage

```
MD_hrv_classic_pnn40(x)
```

Arguments

x	a numerical time-series input vector

Value

scalar value that denotes the calculated time-series statistic

Author(s)

Carl H. Lubba

Examples

```
x <- 1 + 0.5 * 1:1000 + arima.sim(list(ma = 0.5), n = 1000)
outs <- MD_hrv_classic_pnn40(x)
```

PD_PeriodicityWang_th0_01 *Function to calculate a statistical feature*

Description

Function to calculate a statistical feature

Usage

```
PD_PeriodicityWang_th0_01(x)
```

Arguments

x	a numerical time-series input vector

Value

scalar value that denotes the calculated time-series statistic

Author(s)

Carl H. Lubba

Examples

```
x <- 1 + 0.5 * 1:1000 + arima.sim(list(ma = 0.5), n = 1000)
outs <- PD_PeriodicityWang_th0_01(x)
```

`SB_BinaryStats_diff_longstretch0`
Function to calculate a statistical feature

Description

Function to calculate a statistical feature

Usage

```
SB_BinaryStats_diff_longstretch0(x)
```

Arguments

x	a numerical time-series input vector

Value

scalar value that denotes the calculated time-series statistic

Author(s)

Carl H. Lubba

Examples

```
x <- 1 + 0.5 * 1:1000 + arima.sim(list(ma = 0.5), n = 1000)
outs <- SB_BinaryStats_diff_longstretch0(x)
```

SB_BinaryStats_mean_longstretch1

Function to calculate a statistical feature

Description

Function to calculate a statistical feature

Usage

```
SB_BinaryStats_mean_longstretch1(x)
```

Arguments

x	a numerical time-series input vector

Value

scalar value that denotes the calculated time-series statistic

Author(s)

Carl H. Lubba

Examples

```
x <- 1 + 0.5 * 1:1000 + arima.sim(list(ma = 0.5), n = 1000)
outs <- SB_BinaryStats_mean_longstretch1(x)
```

SB_MotifThree_quantile_hh

Function to calculate a statistical feature

Description

Function to calculate a statistical feature

Usage

```
SB_MotifThree_quantile_hh(x)
```

Arguments

x	a numerical time-series input vector

Value

scalar value that denotes the calculated time-series statistic

Author(s)

Carl H. Lubba

Examples

```
x <- 1 + 0.5 * 1:1000 + arima.sim(list(ma = 0.5), n = 1000)
outs <- SB_MotifThree_quantile_hh(x)
```

`SB_TransitionMatrix_3ac_sumdiagcov`
Function to calculate a statistical feature

Description

Function to calculate a statistical feature

Usage

```
SB_TransitionMatrix_3ac_sumdiagcov(x)
```

Arguments

`x`	a numerical time-series input vector

Value

scalar value that denotes the calculated time-series statistic

Author(s)

Carl H. Lubba

Examples

```
x <- 1 + 0.5 * 1:1000 + arima.sim(list(ma = 0.5), n = 1000)
outs <- SB_TransitionMatrix_3ac_sumdiagcov(x)
```

SC_FluctAnal_2_dfa_50_1_2_logi_prop_r1

Function to calculate a statistical feature

Description

Function to calculate a statistical feature

Usage

```
SC_FluctAnal_2_dfa_50_1_2_logi_prop_r1(x)
```

Arguments

x	a numerical time-series input vector

Value

scalar value that denotes the calculated time-series statistic

Author(s)

Carl H. Lubba

Examples

```
x <- 1 + 0.5 * 1:1000 + arima.sim(list(ma = 0.5), n = 1000)
outs <- SC_FluctAnal_2_dfa_50_1_2_logi_prop_r1(x)
```

SC_FluctAnal_2_rsrangefit_50_1_logi_prop_r1

Function to calculate a statistical feature

Description

Function to calculate a statistical feature

Usage

```
SC_FluctAnal_2_rsrangefit_50_1_logi_prop_r1(x)
```

Arguments

x	a numerical time-series input vector

Value

scalar value that denotes the calculated time-series statistic

Author(s)

Carl H. Lubba

Examples

```
x <- 1 + 0.5 * 1:1000 + arima.sim(list(ma = 0.5), n = 1000)
outs <- SC_FluctAnal_2_rsrangefit_50_1_logi_prop_r1(x)
```

SP_Summaries_welch_rect_area_5_1

Function to calculate a statistical feature

Description

Function to calculate a statistical feature

Usage

```
SP_Summaries_welch_rect_area_5_1(x)
```

Arguments

x	a numerical time-series input vector

Value

scalar value that denotes the calculated time-series statistic

Author(s)

Carl H. Lubba

Examples

```
x <- 1 + 0.5 * 1:1000 + arima.sim(list(ma = 0.5), n = 1000)
outs <- SP_Summaries_welch_rect_area_5_1(x)
```

SP_Summaries_welch_rect_centroid *Function to calculate a statistical feature*

Description

Function to calculate a statistical feature

Usage

```
SP_Summaries_welch_rect_centroid(x)
```

Arguments

x	a numerical time-series input vector

Value

scalar value that denotes the calculated time-series statistic

Author(s)

Carl H. Lubba

Examples

```
x <- 1 + 0.5 * 1:1000 + arima.sim(list(ma = 0.5), n = 1000)
outs <- SP_Summaries_welch_rect_centroid(x)
```

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