Package ‘Rcatch22’

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Type Package

Title Calculation of 22 CAnonical Time-Series CHaracteristics

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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 rlang, stats, Rcpp (>= 0.12.15)

LinkingTo Rcpp

Suggests knitr, markdown, rmarkdown, testthat (>= 3.0.0)

RoxygenNote 7.1.1

VignetteBuilder knitr

Config/testthat/edition 3

NeedsCompilation yes

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Repository CRAN

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### Description

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

### Usage

```r
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 <- stats::rnorm(100)
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 <- stats::rnorm(100)
outs <- CO_Embed2_Dist_tau_d_expfit_meandiff(x)
CO_f1ecac

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 <- stats::rnorm(100)
outs <- CO_f1ecac(x)

CO_FirstMin_ac

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
CO_HistogramAMI_even_2_5

Author(s)
Carl H. Lubba

Examples

x <- stats::rnorm(100)
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 <- stats::rnorm(100)
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**

\[ \text{CO_trev}_1\_\text{num}(x) \]

**Arguments**

\[ x \]

a numerical time-series input vector

**Value**

scalar value that denotes the calculated time-series statistic

**Author(s)**

Carl H. Lubba

**Examples**

\[ x \leftarrow \text{stats::rnorm}(100) \]
\[ \text{outs} \leftarrow \text{CO_trev}_1\_\text{num}(x) \]

---

**DN_HistogramMode_10**

*Function to calculate a statistical feature*

**Description**

Function to calculate a statistical feature

**Usage**

\[ \text{DN_HistogramMode}_10(x) \]

**Arguments**

\[ x \]

a numerical time-series input vector

**Value**

scalar value that denotes the calculated time-series statistic
Author(s)

Carl H. Lubba

Examples

```r
x <- stats::rnorm(100)
outs <- DN_HistogramMode_10(x)
```

**Description**

Function to calculate a statistical feature

**Usage**

```r
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**

```r
x <- stats::rnorm(100)
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**

```r
x <- stats::rnorm(100)
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
**DN_OutlierInclude_p_001_mdrmd**

*Function to calculate a statistical feature*

---

**Value**

scalar value that denotes the calculated time-series statistic

**Author(s)**

Carl H. Lubba

**Examples**

```r
x <- stats::rnorm(100)
outs <- DN_OutlierInclude_n_001_mdrmd(x)
```

---

**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**

```r
x <- stats::rnorm(100)
outs <- DN_OutlierInclude_p_001_mdrmd(x)
```
**DN_Spread_Std**  
*Function to calculate a statistical feature*

**Description**

Function to calculate a statistical feature

**Usage**

\[
\text{DN\_Spread\_Std}(x)
\]

**Arguments**

- \(x\)  
  a numerical time-series input vector

**Value**

scalar value that denotes the calculated time-series statistic

**Author(s)**

Trent Henderson

**Examples**

```r
x <- stats::rnorm(100)
outs <- DN_Spread_Std(x)
```

---

**FC_LocalSimple_mean1_tauresrat**  
*Function to calculate a statistical feature*

**Description**

Function to calculate a statistical feature

**Usage**

\[
\text{FC\_LocalSimple\_mean1\_tauresrat}(x)
\]

**Arguments**

- \(x\)  
  a numerical time-series input vector
**Value**

scalar value that denotes the calculated time-series statistic

**Author(s)**

Carl H. Lubba

**Examples**

```r
x <- stats::rnorm(100)
outs <- FC_LocalSimple_mean3_stderr(x)
```

**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**

```r
x <- stats::rnorm(100)
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 <- stats::rnorm(100)
outs <- IN_AutoMutualInfoStats_40_gaussian_fmmi(x)
Function to calculate a statistical feature

**MD_hrv_classic_pnn40**

### Description
Function to calculate a statistical feature

### Usage
```r
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
```r
x <- stats::rnorm(100)
outs <- MD_hrv_classic_pnn40(x)
```

Function to calculate a statistical feature

**PD_PeriodicityWang_th0_01**

### Description
Function to calculate a statistical feature

### Usage
```r
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**

```r
x <- stats::rnorm(100)
outs <- PD_PeriodicityWang_th0_01(x)
```

---

**SB_BinaryStats_diff_longstretch0**

*Function to calculate a statistical feature*

**Description**

Function to calculate a statistical feature

**Usage**

```r
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**

```r
x <- stats::rnorm(100)
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**

```r
x <- stats::rnorm(100)
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

**Examples**

```r
x <- stats::rnorm(100)
outs <- SB_MotifThree_quantile_hh(x)
```
Value

scalar value that denotes the calculated time-series statistic

Author(s)

Carl H. Lubba

Examples

```r
x <- stats::rnorm(100)
outs <- SB_MotifThree_quantile_hh(x)
```

---

**SB_TransitionMatrix_3ac_sumdiagcov**

*Function to calculate a statistical feature*

Description

Function to calculate a statistical feature

Usage

```r
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

```r
x <- stats::rnorm(100)
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**

```r
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**

```r
x <- stats::rnorm(100)
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**

```r
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

```r
x <- stats::rnorm(100)
outs <- SP_Summaries_welch_rect_area_5_1(x)
```

Description

Function to calculate a statistical feature

Usage

```r
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

```r
x <- stats::rnorm(100)
outs <- SP_Summaries_welch_rect_area_5_1(x)
```
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 <- stats::rnorm(100)
outs <- SP_Summaries_welch_rect_centroid(x)
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