

# Package ‘Rcatch22’

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**Type** Package

**Title** Calculation of 22 Canonical Time-Series Characteristics

**Version** 0.2.1

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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](https://doi.org/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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## R topics documented:

catch22_all	2
CO_Embed2_Dist_tau_d_expfit_meandiff	3
CO_f1ecac	4
CO_FirstMin_ac	4
CO_HistogramAMI_even_2_5	5
CO_trev_1_num	6
DN_HistogramMode_10	6
DN_HistogramMode_5	7
DN_Mean	8
DN_OutlierInclude_n_001_mdrmd	8
DN_OutlierInclude_p_001_mdrmd	9
DN_Spread_Std	10
FC_LocalSimple_mean1_ttauresrat	10
FC_LocalSimple_mean3_stderr	11
feature_list	12
IN_AutoMutualInfoStats_40_gaussian_fmml	12
MD_hrv_classic_pnn40	13
PD_PeriodicityWang_th0_01	13
SB_BinaryStats_diff_longstretch0	14
SB_BinaryStats_mean_longstretch1	15
SB_MotifThree_quantile_hh	15
SB_TransitionMatrix_3ac_sumdiagcov	16
SC_FluctAnal_2_dfa_50_1_2_logi_prop_r1	17
SC_FluctAnal_2_rsrangefit_50_1_logi_prop_r1	17
SP_Summaries_welch_rect_area_5_1	18
SP_Summaries_welch_rect_centroid	19
<b>Index</b>	<b>20</b>

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catch22_all	<i>Automatically run every time-series feature calculation included in the catch22 set</i>
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### 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 <- 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

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

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

```
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



**Value**

scalar value that denotes the calculated time-series statistic

**Author(s)**

Carl H. Lubba

**Examples**

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

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

---

`FC_LocalSimple_mean1_ttauresrat`*Function to calculate a statistical feature*

---

**Description**

Function to calculate a statistical feature

**Usage**

```
FC_LocalSimple_mean1_ttauresrat(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 <- FC_LocalSimple_mean1_ttauresrat(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 <- stats::rnorm(100)
outs <- FC_LocalSimple_mean3_stderr(x)
```

---

feature_list	<i>All features available in Rcatch22 in tidy format</i>
--------------	--

---

**Description**

The variables include:

**Usage**

```
feature_list
```

**Format**

A vector with 1 variable:

**feature** Name of the feature

---

IN_AutoMutualInfoStats_40_gaussian_fmmi	<i>Function to calculate a statistical feature</i>
---	--

---

**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)
```

---

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

```
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 <- 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**

```
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

**Value**

scalar value that denotes the calculated time-series statistic

**Author(s)**

Carl H. Lubba

**Examples**

```
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**

```
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 <- 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**

```
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 <- 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**

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

# Index

## \* datasets

- feature\_list, [12](#)
  
- catch22\_all, [2](#)
- CO\_Embed2\_Dist\_tau\_d\_expfit\_meandiff,  
[3](#)
- CO\_f1ecac, [4](#)
- CO\_FirstMin\_ac, [4](#)
- CO\_HistogramAMI\_even\_2\_5, [5](#)
- CO\_trev\_1\_num, [6](#)
  
- DN\_HistogramMode\_10, [6](#)
- DN\_HistogramMode\_5, [7](#)
- DN\_Mean, [8](#)
- DN\_OutlierInclude\_n\_001\_mdrmd, [8](#)
- DN\_OutlierInclude\_p\_001\_mdrmd, [9](#)
- DN\_Spread\_Std, [10](#)
  
- FC\_LocalSimple\_mean1\_ttauresrat, [10](#)
- FC\_LocalSimple\_mean3\_stderr, [11](#)
- feature\_list, [12](#)
  
- IN\_AutoMutualInfoStats\_40\_gaussian\_fmml,  
[12](#)
  
- MD\_hrv\_classic\_pnn40, [13](#)
  
- PD\_PeriodicityWang\_th0\_01, [13](#)
  
- SB\_BinaryStats\_diff\_longstretch0, [14](#)
- SB\_BinaryStats\_mean\_longstretch1, [15](#)
- SB\_MotifThree\_quantile\_hh, [15](#)
- SB\_TransitionMatrix\_3ac\_sumdiagcov, [16](#)
- SC\_FluctAnal\_2\_dfa\_50\_1\_2\_logi\_prop\_r1,  
[17](#)
- SC\_FluctAnal\_2\_rsrangefit\_50\_1\_logi\_prop\_r1,  
[17](#)
  
- SP\_Summaries\_welch\_rect\_area\_5\_1, [18](#)
- SP\_Summaries\_welch\_rect\_centroid, [19](#)