

# Package ‘SlidingWindows’

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**Type** Package

**Title** Methods for Time Series Analysis

**Description** A collection of functions to perform Detrended Fluctuation Analysis (DFA exponent), GUEDES et al. (2019) <doi:10.1016/j.physa.2019.04.132> , Detrended cross-correlation coefficient (RHOD-CCA), GUEDES & ZEBENDE (2019) <doi:10.1016/j.physa.2019.121286>, and Detrended Multiple cross-correlation coefficient (DMC), ZEBENDE & SILVA-FILHO (2018) <doi:10.1016/j.physa.2018.06.119>, both with sliding windows approach.

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**License** GPL-3

**URL** <https://github.com/efguedes/SlidingWindows>

**BugReports** <https://github.com/efguedes/SlidingWindows>

**NeedsCompilation** no

**Encoding** UTF-8

**LazyData** true

**Imports** stats, DCCA, PerformanceAnalytics, nonlinearTseries

**Suggests** xts, zoo, quantmod

**RoxygenNote** 7.1.1

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descriptive_statsistics_SlidingWindows
<i>Descriptive statistics with sliding windows.</i>

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Description

This function generates descriptive statistics of a univariate time serieswith sliding windows approach.

Usage

```
descriptive_statsistics_SlidingWindows(  
  y,  
  w,  
  skewness = c("moment", "sample", "fisher"),  
  kurtosis = c("moment", "sample", "fisher", "excess", "sample_excess")  
)
```

Arguments

y	A vector contaning univariate time series.
w	An integer value indicating the size of the window $w < length(y)$ . If $w = length(y)$ , will be computed the function will not slide.
skewness	A non-numeric value. See PerformanceAnalytics package.
kurtosis	A non-numeric value. See PerformanceAnalytics package.

Details

This function include following measures:  
mean. median, standard deviation, skewness and kurtosis.

Value

A list contaning "w", "mean", "median", "standard deviation", "skewness" and "kurtosis".

## References

Guedes, E.F. Modelo computacional para análise de movimentos e co-movimentos de mercados financeiros, Ph.D. thesis, Programa de Pós-graduação em Modelagem Computacional e Tecnologia Industrial. Centro Universitário Senai Cimatec, 2019.

## Examples

```
y <- rnorm(1000)
descriptive_statistics_SlidingWindows(rnorm(100), 99, skewness="moment", kurtosis="moment")
```

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dfa_SlidingWindows	<i>Detrended Fluctuation Analysis with sliding windows.</i>
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## Description

This function generates scaling exponents (long-range correlations) of a univariate time series with sliding windows approach.

## Usage

```
dfa_SlidingWindows(y, w, k, npoints)
```

## Arguments

y	A vector containing univariate time series.
w	an integer value indicating the size of the window $w < length(y)$ . If $w = length(y)$ , will be computed the function will not slide.
k	an integer value indicating the boundary of the division ( $N/k$ ). The smallest value of $k$ is 4.
npoints	The number of different window sizes that will be used to estimate the Fluctuation function in each zone. See nonlinearTseries package.

## Details

This function include following measures:

alpha\_dfa, se\_alpha\_dfa, r2\_alpha\_dfa.

## Value

A list containing "w", "alpha\_dfa", "se\_alpha\_dfa", "r2\_alpha\_dfa".

## References

GUEDES, E.F.; FERREIRA, P.; DIONISIO, A.; ZEBENDE, G.F. An econophysics approach to study the effect of BREXIT referendum on European Union stock markets. *PHYSICA A*, v.523, p.1175-1182, 2019. doi = "https://doi.org/10.1016/j.physa.2019.04.132".

FERREIRA, P.; DIONISIO, A.; GUEDES, E.F.; ZEBENDE, G.F. A sliding windows approach to analyse the evolution of bank shares in the European Union. *PHYSICA A*, v.490, p.1355-1367, 2018. doi = "https://doi.org/10.1016/j.physa.2017.08.095".

## Examples

```
y <- rnorm(100)
dfa_SlidingWindows(y,w=99,k=10,npoints=15)
```

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dmc_SlidingWindows	<i>Detrended Multiple Cross-Correlation Coefficient with sliding windows.</i>
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## Description

This function generates Detrended Cross-Correlation Coefficient of three time series with sliding windows approach.

## Usage

```
dmc_SlidingWindows(x1, x2, y, w, k, nu)
```

## Arguments

x1	A vector containing univariate time series.
x2	A vector containing univariate time series.
y	A vector containing univariate time series.
w	An integer value indicating the size of the window $w < length(y)$ . If $w = length(y)$ , will be computed the function will not slide.
k	An integer value indicating the boundary of the division ( $N/k$ ). The smallest value of $k$ is 4.
nu	An integer value. See the DCCA package.

## Details

This function include following measures:

w, timescale, dmc, rhodcca\_yx1, rhodcca\_yx2, rhodcca\_x1x2

## Value

A list containing "w", "dmc", "rhodcca\_yx1", "rhodcca\_yx2", "rhodcca\_x1x2".

## References

ZEBENDE, G.F.; SILVA-FILHO, A.M. Detrended Multiple Cross-Correlation Coefficient. PHYSICA A, v.510, p.91-97, 2018. doi = "https://doi.org/10.1016/j.physa.2018.06.119".

## Examples

```
x1 <- rnorm(100)
x2 <- rnorm(100)
y <- rnorm(100)
dmc_SlidingWindows(x1,x2,y,w=99,k=10,nu=0)
```

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rhodcca\_SlidingWindows

*Detrended Cross-Correlation Coefficient with sliding windows.*

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## Description

This function generates Detrended Cross-Correlation Coefficient of two time series with sliding windows approach.

## Usage

```
rhodcca_SlidingWindows(x, y, w, k, nu)
```

## Arguments

x	A vector containing univariate time series.
y	A vector containing univariate time series.
w	An integer value indicating the size of the window $w < length(y)$ . If $w = length(y)$ , will be computed the function will not slide.
k	An integer value indicating the boundary of the division ( $N/k$ ). The smallest value of $k$ is 4.
nu	An integer value. See DCCA package.

## Details

This function include following measures:

w, timescale, rhodcca

## Value

A list containing "w", "timescale", "rhodcca".

## References

GUEDES, E.F.; ZEBENDE, G.F. DCCA cross-correlation coefficient with sliding windows approach. PHYSICA A, v.527, p.121286, 2019. doi = "https://doi.org/10.1016/j.physa.2019.121286".

## Examples

```
x <- rnorm(100)
y <- rnorm(100)
rhodcca_SlidingWindows(x,y,w=99,k=10,nu=0)
```

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SlidingWindows

*Sliding Windows.*

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## Description

This function generates sliding windows approach of a time series.

## Usage

```
SlidingWindows(y, w)
```

## Arguments

y	A vector containing univariate time series.
w	An integer value indicating the size of the window $w < length(y)$ . If $w = length(y)$ , will be computed the function will not slide.

## Details

This function return the matrix with time series sliding windows.

## Value

A list containing "w", "SlidingWindows".

## References

Guedes, E.F. Modelo computacional para análise de movimentos e co-movimentos de mercados financeiros, Ph.D. thesis, Programa de Pós-graduação em Modelagem Computacional e Tecnologia Industrial. Centro Universitário Senai Cimatec, 2019.

## Examples

```
y <- rnorm(100)
SlidingWindows(y,w=99)
```

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