Package 'SUSY'

November 24, 2022

Version 0.1.0

Title Surrogate Synchrony

Suggests gtools

Description Computes synchrony as windowed cross-correlation based on two-dimensional time series in a text file you can upload. 'SUSY' works as described in Tschacher & Meier (2020) <doi:10.1080/10503307.2019.1612114>.

License GPL-2

URL https://wtschacher.github.io/SUSY/

BugReports https://github.com/wtschacher/SUSY/issues

NeedsCompilation no

Author Wolfgang Tschacher [aut, cre],
David Tschacher [ctb],
Jan Gorecki [ctb]

Maintainer Wolfgang Tschacher <wolfgang.tschacher@upd.unibe.ch>

Repository CRAN

Date/Publication 2022-11-24 09:00:13 UTC

R topics documented:

`as.data.frame.susy` *susy to data.frame conversion method*

Description

Turns susy class object into a `data.frame`.

Usage

```
  ## S3 method for class 'susy'
as.data.frame(x, row.names=NULL, optional=FALSE, corr.no.abs=TRUE, ...)
```

Arguments

`x`	A susy object.
`row.names`	Ignored, only for consistency to generic `as.data.frame` method.
`optional`	Ignored, only for consistency to generic `as.data.frame` method.
`corr.no.abs`	Logical, defaults to `TRUE` display correlation without the absolute value.
`...`	Ignored.

Value

Returns `data.frame`.

See Also

susy

Examples

```
n = 1000
data = data.frame(
  var1 = runif(n, 300, 330),
  var2 = runif(n, 300, 330)
)
res = susy(data, segment=30L, Hz=15L)
as.data.frame(res)
```

`plot.susy` *susy plot method*

Description

Generate plot(s) for a `susy` object.

Usage

```
  ## S3 method for class 'susy'
plot(x, type=c(4, 5), ...)
```

Arguments

`x`	A `susy` object.
`type`	Numeric, specifies the types of plot, defaults to `c(4, 5)`. 1. *GMcrosscorrs* 2. *synchrony by segments* 3. *GM-Z* 4. *time series plot* 5. *Z not abs*
`...`	Ignored.

Details

Method can generate multiple types of plots by providing numeric vector to `type` argument. Note it will generate plots for each pair (cross computation) in `x`, so the final number of plots is `length(x) * length(type)`.

Value

Returns `NULL` invisibly. Generate plot(s) as a side effect.

See Also

`susy`

Examples

```
n = 1000
data = data.frame(
  var1 = runif(n, 300, 330),
  var2 = runif(n, 300, 330),
  var3 = runif(n, 300, 330)
)
res = susy(data, segment=30L, Hz=15L, permutation=TRUE)
plot(res, type=c(3,5))
```

`print.susy` *susy print method*

Description

Prints information about an susy object.

Usage

```
  ## S3 method for class 'susy'
print(x, corr.no.abs=TRUE, legacy=FALSE, ...)
```

Arguments

x	A susy object.
corr.no.abs	Logical, defaults to TRUE display correlation without the absolute value.
legacy	Logical, defaults to FALSE, when TRUE print will produce an output that matches the output of legacy SUSY implementation.
...	Extra arguments passed to print.data.frame method.

Value

Returns x invisibly. Display output to console as a side effect.

See Also

susy

Examples

```
n = 1000
data = data.frame(
  var1 = runif(n, 300, 330),
  var2 = runif(n, 300, 330)
)
res = susy(data, segment=30L, Hz=15L)
res
print(res, corr.no.abs=FALSE)
print(res, digits=4)
print(res, legacy=TRUE)
```

susy *Surrogate Synchrony*

Description

Cross-correlations of two time series are computed up to a specific lag in seconds `maxlag`. Cross-correlation is done within segment of the time series. The size of segments `segment` can be chosen in seconds. Aggregation is then performed by transforming correlations to Fisher's Z, computing mean Z in each segment, then across all segments of the time series. Segment shuffling is used to create surrogate time series, on which the same computations are run. This provides effect sizes `ES`. SUSY provides these different synchrony measures for each twin time series: `mean Z` and `ES of mean Z`; `mean absolute_Z` and `ES of mean absolute_Z`.

Usage

```
susy(x, segment, Hz, maxlag=3L, permutation=FALSE,
  restrict.surrogates=FALSE, surrogates.total=500)
```

Arguments

`x`	A data.frame of numeric columns.
`segment`	Integer, size in seconds. Must not be smaller than `2 * maxlag`, must not be larger than half the the time series (`nrow(x)/2`).
`Hz`	Integer, frames per second (sampling rate).
`maxlag`	Integer, maximum lag for `ccf` in seconds. Default `3` seconds.
`permutation`	Logical, default `FALSE` requires `x` to have even number of columns which are processed in pairs (1-2, 3-4, etc.). When `permutation` is `TRUE` then function computes all pairs combinations between columns provided in `x` (`n*(n-1)/2` pairs).
`restrict.surrogates`	Logical, default `FALSE`. Restrict the number of surrogates or not.
`surrogates.total`	Numeric, the number of generated surrogates, default `500`. Ignored when `restrict.surrogates` is `FALSE` (default).

Details

Segments are non-overlapping, and the number of segments that fit into the time series may have a remainder (usually a few seconds at the end of the time series), which is not considered.

Value

Object of class `susy` is returned. Each cross correlation pair is an element in resulting object.

See Also

`plot.susy`, `as.data.frame.susy`, `print.susy`

Examples

```
n = 1000
data = data.frame(
  var1 = runif(n, 300, 330),
  var2 = runif(n, 300, 330),
  var3 = runif(n, 300, 330)
)

## use only first two columns
res = susy(data[, 1:2], segment=30L, Hz=15L)
length(res)
names(res)

## use all columns and permutation
res = susy(data, segment=30L, Hz=15L, permutation=TRUE)
length(res)
names(res)

## print susy
res
print(res, legacy=TRUE)

## plot susy
plot(res)
plot(res, type=1:2)
```

Index