Package: mkac (via r-universe)

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Type Package

Title Mann-Kendall correlation and Theil-Sen slope for possibly autocorrelated time series

Version 1.1

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Description A re-do of part of the fume package to be (hopefully) feasible for larger data sets.

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RoxygenNote 7.2.3

Suggests forecast

Imports ggplot2, stats, tibble, magrittr, dplyr

Encoding UTF-8

Repository https://nxskok.r-universe.dev

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Contents

detrend . . . 2
kendall_S . . . 2
kendall_Z . . . 3
kendall_Z_adjusted . . . 4
sample_size_ratio . . . 5
sum_df . . . 5
theil_sen_slope . . . 6
ts_plot . . . 7
var_kendall_S . . . 7

Index **9**

detrend *Detrend a time series by subtracting Theil-Sen slope*

Description

Detrend a time series by subtracting Theil-Sen slope

Usage

```
detrend(x)
```

Arguments

x	numeric, a time series return time series detrended

Author(s)

Ken Butler, <butler@utsc.utoronto.ca>

Examples

```
y=c(2,3,5,6)
detrend(y)
```

kendall_S *Calculate S statistic for Kendall correlation with time (+1 for concordance, -1 for discordance)*

Description

Calculate S statistic for Kendall correlation with time (+1 for concordance, -1 for discordance)

Usage

```
kendall_S(x)
```

Arguments

x	numeric, a time series

Value

number of concordances minus number of discordances

Author(s)

Ken Butler, <butler@utsc.utoronto.ca>

Examples

```
kendall_S(c(2,3,5,4))
```

---

kendall_Z *Kendall test statistic for testing time trend (no autocorrelation)*

Description

Kendall test statistic for testing time trend (no autocorrelation)

Usage

```
kendall_Z(x)
```

Arguments

x	numeric, a time series

Value

test statistic

Author(s)

Ken Butler, <butler@utsc.utoronto.ca>

Examples

```
kendall_Z(c(2,3,5,4))
```

`kendall_Z_adjusted` *Mann-Kendall correlation test, unadjusted and adjusted for autocorrelation, with P-values*

Description

Mann-Kendall correlation test, unadjusted and adjusted for autocorrelation, with P-values

Usage

```
kendall_Z_adjusted(x, ...)
```

Arguments

`x`	numeric, a time series
`...`	optional arguments to "acf", eg. lag.max (see sample_size_ratio)

Value

list: unadjusted and adjusted Z statistics, effective sample size ratio, unadjusted and adjusted P-values

Author(s)

Ken Butler, <butler@utsc.utoronto.ca>

Examples

```
set.seed(457299)
x=rnorm(100) # uncorrelated (no adjustment needed)
x=x+0.02*(1:100) # with trend
kendall_Z_adjusted(x)

# ar(1) data
set.seed(457298)
xx=stats::arima.sim(list(ar=0.8),100) # autocorrelated, needs adjusting
kendall_Z_adjusted(xx)
# P-value adjusted is much less significant
```

`sample_size_ratio` *ratio of actual to effective sample sizes for possibly autocorrelated time series*

Description

ratio of actual to effective sample sizes for possibly autocorrelated time series

Usage

```
sample_size_ratio(x, ...)
```

Arguments

`x`	numeric, a time series
`...`	optional parameters for acf()

Value

sample size ratio (a number)

Author(s)

Ken Butler, <butler@utsc.utoronto.ca>

Examples

```
set.seed(457298)
xx=stats::arima.sim(list(ar=0.8),100) # posoitively autocorrelated, sample size ratio > 1
sample_size_ratio(xx)
```

`sum_df` *display calculations for sum in adjustment for autocorrelation (mainly for debugging)*

Description

display calculations for sum in adjustment for autocorrelation (mainly for debugging)

Usage

```
sum_df(x, ...)
```

Arguments

x	numeric, a time series
...	optional arguments for acf

Value

data frame showing terms in sum

Author(s)

Ken Butler, <butler@utsc.utoronto.ca>

Examples

```
set.seed(457298)
xx=stats::arima.sim(list(ar=0.8),100) # posoitively autocorrelated, sample size ratio > 1
sum_df(xx)
```

---

theil_sen_slope *Theil-Sen slope with time*

Description

Theil-Sen slope with time

Usage

```
theil_sen_slope(y, x = 1:length(y))
```

Arguments

y	numeric, a time series
x	numeric, the time points of the time series (optional, defaults to 1, 2, ...)

Value

the Theil-Sen slope, a number

Author(s)

Ken Butler, <butler@utsc.utoronto.ca>

Examples

```
theil_sen_slope(c(2,3,5,10))
theil_sen_slope(y = c(2,3,5,10), x = 1:4)
theil_sen_slope(y = c(2,3,5,10), x = c(1, 2, 3, 5))
```

ts_plot *plot time series with smooth trend*

Description

plot time series with smooth trend

Usage

```
ts_plot(x, time = 1:length(x))
```

Arguments

x	numeric, a time series
time	numeric, the time points of the time series (default '1:n' where 'n' is length of series)

Value

a ggplot plot

Author(s)

Ken Butler, <butler@utsc.utoronto.ca>

Examples

```
set.seed(457299)
x=rnorm(100) # uncorrelated
x=x+0.02*(1:100) # with trend
ts_plot(x)
```

var_kendall_S *Variance of Kendall correlation S statistic under null hypothesis of no trend and assuming independence*

Description

Variance of Kendall correlation S statistic under null hypothesis of no trend and assuming independence

Usage

```
var_kendall_S(x)
```

Arguments

x	numeric, a time series (only its length is used)

Value

the variance (a number)

Author(s)

Ken Butler, <butler@utsc.utoronto.ca>

Examples

```
var_kendall_S(rnorm(100))
```

Index

detrend, 2

kendall_S, 2
kendall_Z, 3
kendall_Z_adjusted, 4

sample_size_ratio, 5
sum_df, 5

theil_sen_slope, 6
ts_plot, 7

var_kendall_S, 7