Package 'TTAinterfaceTrendAnalysis'

October 12, 2022

Type Package

Title Temporal Trend Analysis Graphical Interface

Version 1.5.8

Date 2021-10-06

Description This interface was created to develop a standard procedure
to analyse temporal trend in the framework of the OSPAR convention.
The analysis process run through 4 successive steps : 1) manipulate your data, 2)
select the parameters you want to analyse, 3) build your regulated
time series, 4) perform diagnosis and analysis and 5) read the results.
Statistical analysis call other package function such as Kendall tests
or cusum() function.

License GPL (>= 2)

Depends R (>= 3.3.0), base, stats, grDevices

Imports pastecs, reshape, e1071, relimp, multcomp, rkt, stlplus, nlme,
tcltk, tcltk2, mvtnorm, zoo, methods

URL https://CRAN.R-project.org/package=TTAinterfaceTrendAnalysis

NeedsCompilation no

Author David DEVREKER [aut, cre],
Alain LEFEBVRE [aut]

Maintainer David DEVREKER <David.Devreker@ifremer.fr>

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R topics documented:

TTAinterface-package   *Interface Package for Temporal Trend Analysis*

Description

A friendly interface to perform Temporal Trend Analyses (MannKendall tests). Just follow the successive step from the data frmatting to the results sorting.

Details

Package:	TTAinterface
Type:	Package
Version:	1.5.7
Date:	2021-05-27
License:	GPL (>=2)

Author(s)

David Devreker, Alain Lefebvre
Maintainer: <david.devreker@ifremer.fr>

References

Devreker, D. and Lefebvre, A. (2014), TTAinterfaceTrendAnalysis: An R GUI for routine temporal trend analysis and diagnostics. *Journal of Oceanography, Research and Data*, 1(7), 1-18.

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about   *About !*

Description

Display logo, version and developpers name and email of the package.

Usage

```
about()
```

Details

Display logo, version and developpers name of the package.

Envir	*A temporary environment to stock data and objects*

Description

The function create an environment where the data, arguments and objects that are used between the differents function of the package will be stock for better exchange processes.

Usage

```
Envir()
```

Details

Objects passed through the environment 'Envir' are called in the other function as Envir$objects

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fixdata	*Fixdata function*

Description

Simply modify your datase through the interface

Usage

```
fixdata()
```

Value

The edited database that is automaticaly read by the interface to replace former values

Note

fixdata() call the function fix() that act on the rawdata base. The fix() function itself call the function edit() from the package utils

See Also

fix edit

FULLoption	*Main function*

Description

This is the core function of the interface. It receive arguments from the interface (see the function <TTAinterface>) and build regularized time series , perform diagnostics and analyses.

Usage

```
FULLoption(param, depth=NULL, sal = NULL, site=NULL, rawdata="NO", select="NO",
resume.reg="NO", test.normality="NO", plotB = "NO", selectBox="ByYears", log.trans="NO",
plotZ="NO", datashow="NO", help.timestep = "NO", auto.timestep = "NO", time.step = NULL,
help.aggreg = "NO", auto.aggreg = "NO", aggreg = NULL, mix = "YES", outliers.re = "NO",
na.replace="NO", start = NULL, end = NULL, months = c(1:12), norm = "NO", npsu = 30,
test.on.remaider = "NO", autocorr = "NO", spectrum="NO", anomaly="NO", a.barplot="NO",
zsmooth="NO", local.trend = "NO", test= "MK")
```

Arguments

param	The name of the parameter you want to analyse it must be the name of the column where are your data. Have to be enter like this : "yourparam".
depth	If existing, the depth interval where your data will be analyse. If values are different from depth max and depth min, missing value are exclude Depth column must be name as 'DEPTH'. Enter the value like this : c(a,b). For analysis at one specific depth you can enter c(a,a).
sal	Same thing as for the depth Salinity column must be name as 'S'.
site	Labels of sampling site as they appears in the database Enter the value like this c("S1", "S2").
rawdata	Peform desciptive statistics on raw database, can be "YES" or "NO" (the default).
select	Peform desciptive statistics on selected parameter and site, can be "YES" or "NO" (the default).
resume.reg	Peform desciptive statistics on regularized time series, can be "YES" or "NO" (the default).
test.normality	Perform a Shapiro-Wilk normality test on selected parameter, can be "YES" or "NO" (the default).
plotB	Display a boxplot of rawdata with outliers identified as cirle, can be "YES" or "NO" (the default).
selectBox	Options for plotB: allow to choose between boxplot by years or by months.
log.trans	This option transform your data in log(x+1) prior to perform analysis.
plotZ	Display a plot of the regularized time series, can be "YES" or "NO" (the default).
datashow	Show a table of the regularized data, can be "YES" or "NO" (the default).

help.timestep	Display an advice for time step selection, base on the mean time that separate two successive measurments. Can be "YES" or "NO" (the default).
auto.timestep	Autoexecute the advice without diplay it.
time.step	Choice of the time step for data aggregation during the build of the time series, can be "Fortnight", "Semi-fortnight", "Mensual", "Annual" or "Mono-mensual" for an aggregation of the data of a month of all years (e.g. all January data).
help.aggreg	Display an advice for method of aggregation selection, base on Wilcoxon p.value between rawdata and the different method. Can be "YES" or "NO" (the default).
auto.aggreg	Autoexecute the advice without diplay it.
aggreg	Choice of the method of aggregation during the build of the time series, can be "Mean", "Median", "Max" for maximal value selection or "Quantile" for selection of the quantile 90
mix	Allow to mix the data of all sampling site during analysis. Permanently set to "YES" and removed from the GUI since version 1.5.
outliers.re	Remove the outliers from the rawdata, the outliers list is save in a .csv file. (for outliers visual identification see boxplot section).
na.replace	Replace missing values with median of the corresponding cycle (week, month...) for lags longer than 3 days and linear regression for shorter missed period. Can be "YES" or "NO" (the default).
start	Define the first year of data analysis (by default the first of the database).
end	Define the last year of data analysis (by default the last of the database).
months	Define the months of data analysis (by default the twelve months).
norm	Compute normalised values of nutrients at the salinity npsu for each years, can be "YES" or "NO" (the default).
npsu	Compute normalised values of nutrients at the salinity npsu for each years, 30 by default.
test.on.remaider	Extract the reminders from the data series using the stl package functions to perform statistical analysis.
autocorr	Display the autocorrelation diagramme of the regularized time series using the acf function with arguments : lag.max = ((nrow(TimeSerie))/2), na.action = na.pass. Can be "YES" or "NO" (the default)
spectrum	Display the Fourrier spectrum of the regularized time series using a Smoothed Periodogram (spec.pgram). Can be "YES" or "NO" (the default).
anomaly	Display a color box (function filled.contour) plot by year each time.step (months or weeks) minus the mean of the time.step of all years. Red colors show positive anomalies and blue colors negative anomalies. Can be "YES" or "NO" (the default).
a.barplot	Display an anomaly barplot as a function of the time.step. Red colors show positive anomalies and blue colors negative anomalies. Can be "YES" or "NO" (the default).
zsmooth	Display a detrended plot of the time series using the stl function with arguments s.window="periodic", na.action=na.fail. Can be "YES" or "NO" (the default).

local.trend	Display the interactive cusum plot of the time series (local.trend of the pastecs package) that allow to manually identify the period of change in the tendency using the function identify and perform a Kendall familly test on each idenfified period (see test section). Can be "YES" or "NO" (the default).
test	Perform a test to evaluate the presence and the magnitude of a temporal trend on the time series. Can be "MK" for Seasonal Mann-Kendall test (the default), "SMK" for the same test with detail for each time step, "LOESS" that fit a polynomial surface determined by one or more numerical predictors, using local fitting; a MK is perform on this fitting.

Value

Results are return as .png figures or .txt files Results are also directly readable directly in the right part of the interface.

Savepath can be choose using the option 'Select directory' (see the function selectdirectory more more informations)

Name of saved filed follow the nomenclature : Original.file.name_analysis.name_parameter.txt/.png

or for multiple period analysis (see cusum for more details) : Original.file.name_analysis.name_parameter_starting.year_endi

analysis.names are :

Boxplot for boxplot figure (.png). _Outliers_ for the save of removed outliers (.txt). _TimeSeries_ for the plot of the regularized time series (.png). _Regularised_data_ for the table of regularized time series (.txt). _Autocor_ for the autocorelation diagram (.png). _Spectrum_ for the Fourier spectrum plot (.png) . _ColorPlot_ for the anomaly color.plot (.png). _Anomaly BarPlot_ for the anomaly barplot (.png) _Detrended_ for detrended plot (.png). _Local_Global Trend_ for result of Seasonal Mann Kendall apply to local trend (.txt). _Local_Seasonal Trend_ same as above with detail for each time step (.txt). _Global Trend_ for result of Seasonal Mann Kendall (.txt). _Seasonal Trend_ same as above with detail for each time step (.txt). _LOESSplot_ for loess plot (.png). _NormalNutri_ for analysis of normalized values of nutrients (.png).

See values output of corresponding functions.

Author(s)

David Devreker

See Also

[boxplot](#) [impute](#) [shapiro.test](#) [summary](#) [acf](#) [spectrum](#) [filled.contour](#) [stl](#) [local.trend](#) [mannKen](#) [seasonTrend](#) [seaKen](#) [loess](#)

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interpTs	*Interpolate or substitute missing time series values (code of the former wq package)*

Description

Imterpolates or substitutes missing data in a time series for gaps up to a specified size.

Usage

```
interpTs(x, type = c("linear", "series.median", "series.mean", "cycle.median",
"cycle.mean"), gap = NULL)
```

Arguments

x	object of class "ts" or "mts"
type	method of interpolation or substitution
gap	maximum gap to be replaced

Value

The time series with some or all missing values replaced.

Author(s)

Alan D. Jassby and James E. Cloern

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mannKen	*Mann-Kendall trend test and the Sen slope (code modified from the former wq package)*

Description

Applies Kendall's tau test for the significance of a monotonic time series trend. Also calculates the Sen slope as an estimate of this trend.

Usage

```
mannKen(x, ...)
```

Arguments

x	A numeric vector, matrix or data frame
...	Other arguments to pass to plotting function

Value

A list of the following if x is a vector:

sen.slope Sen	slope
sen.slope.rel	Relative Sen slope
p.value	Significance of slope
S	Kendall's S
varS	Variance of S
miss	Fraction of missing slopes connecting first and last fifths of x or a matrix with corresponding columns if x is a matrix or data frame.

Author(s)

Alan D. Jassby and James E. Cloern

See Also

seaKen seasonTrend

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seaKen	*Seasonal and Regional Kendall trend test (code modified from the former wq package)*

Description

Calculates the Seasonal or Regional Kendall test of trend significance, including an estimate of the Sen slope.

Usage

```
seaKen(x, ...)
```

Arguments

x	A numeric vector, matrix or data frame made up of seasonal time series
...	Other arguments to pass to plotting function

Value

A list of the following if x is a vector: seaKen returns a list with the following members:

sen.slope	Sen slope
sen.slope.pct	Sen slope as percent of mean
p.value	significance of slope
miss	for each season, the fraction missing of slopes connecting first and last 20 percent of the years or a matrix with corresponding columns if x is a matrix or data frame.

Author(s)

Alan D. Jassby and James E. Cloern

See Also

mannKen

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seasonTrend	*Determine seasonal trends (code modified from the former wq package)*

Description

Finds the trend for each season and each variable in a time series.

Usage

```
seasonTrend(x, ...)
```

Arguments

x	Time series vector, or time series matrix with column names
...	Further options to pass to plotting function

Value

A data frame with the following fields:

series	series names
season	season number
sen.slope	Sen slope in original units per year
sen.slope.rel	Sen slope divided by median for that specific season and series
p	p-value for the trend according to the Mann-Kendall test.
missing	Proportion of slopes joining first and last fifths of the data that are missing

Author(s)

Alan D. Jassby and James E. Cloern

See Also

[mannKen](#)

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selectdirectory   *Saved path selection*

Description

Allow to chose the directory where results (.txt and .png files) will be saved.

Usage

```
selectdirectory()
```

Details

It select the main save directory; the package will create appropiate sub-folder as function of se-
lected parameters, statsitics, methods etc. Then you will be able to perform successive analyses
wihtout overwriting the previous results.

SRNDunkerque   *Coastal survey near the Gravelines power plant form 1995 to 2010*

Description

Variation in temperature, salinity and chlorophyll-a concentration (microg/l) monthly measured
between 1995 and 2010 at three different stations distributed onshore to offshore (North See) near
the city of Dunkerque (north of France) for the SRN monitoring program (Ifremer). This database
contain many missing values.

Format

A data.frame (TXT) containing 1561 measurments of temperature, salinity and chlorophyll-a con-
centration

Source

The Ifremer QUADRIGE_2 meta-database

TTAinterface   *Graphic Interface For Temporal Trend Analysis*

Description

A friendly user graphic interface to perform temporal trend analysis. The interface offer multiple
options to select parameters and build time series that the user can follow step by step. Some options
are selected by default to let the hurry user to do really quick analysis. Some diagnosic tools are
also present.

Usage

```
TTAinterface()
```

Value

Results are saved in .txt files or .png figures in the desire directory (see selectdirectory). See 'FUL-
Loption' values fore more details.

Author(s)

David Devreker

See Also

FULLoption fixdata selectdirectory

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