

Package ‘seasonal’

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SystemRequirements Binary executables of X-13ARIMA-SEATS (installation notes: see README or vignette)

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Description seasonal is an easy-to-use and (almost) full-featured R-interface to X-13ARIMA-SEATS, the newest seasonal adjustment software developed by the United States Census Bureau. For installation notes, see the README file or the vignette. seasonal includes an optional visual inspection function that uses the manipulate package of RStudio (available at www.rstudio.com).

Enhances manipulate

License GPL-3

BugReports <https://github.com/christophsax/seasonal>

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 seasonal-package

seasonal: R interface to X-13ARIMA-SEATS

Description

seasonal is an easy-to-use and (almost) full-featured R-interface to X-13ARIMA-SEATS, the newest seasonal adjustment software developed by the United States Census Bureau. X-13ARIMA-SEATS combines and extends the capabilities of the older X-12ARIMA (developed by the Census Bureau) and TRAMO-SEATS (developed by the Bank of Spain).

The best way to start is to have a look at the vignette, where installation and usage is described.

```
vignette("seas")
```

Author(s)

Christoph Sax <christoph.sax@gmail.com>

See Also

[seas](#) for the core function and more information on package usage.

 checkX13

Check the installation of X-13ARIMA-SEATS

Description

Check the installation of the binary executables of X-13ARIMA-SEATS. For installation details, consider Section 2 of the package vignette: `vignette("seas")`

Usage

```
checkX13(fail = FALSE, full = TRUE)
```

Arguments

<code>fail</code>	logical, whether an error should interrupt the process. If FALSE, a message is returned.
<code>full</code>	logical, whether a full test should be performed. Runs <code>Testairline.spc</code> (which is shipped with X-13ARIMA-SEATS) to test the working of the binaries. Returns a message.

Examples

```
## Not run:
old.path <- Sys.getenv("X13_PATH")
Sys.setenv(X13_PATH = "") # its broken now
checkX13()

Sys.setenv(X13_PATH = old.path) # fix it (provided it worked in the first place)
checkX13()

## End(Not run)
```

 cpi

Consumer Price Index of Switzerland

Description

Monthly consumer price index of Switzerland. Base year is 1993.

Format

Each time series is an object of class "ts".

Source

Swiss Federal Statistical Office http://www.bfs.admin.ch/bfs/portal/de/index/themen/05/02/blank/key/basis_aktuell.html (cc-d-05.02.12)

easter	<i>Dates of Easter and Chinese New Year</i>
--------	---

Description

Dates of Easter and Chinese New Year

Format

Objects of class "Date".

Source

http://www.census.gov/srd/www/genhol/genhol_downloads.html

<http://www.chinesenewyears.info/chinese-new-year-calendar.php>

exp	<i>Exports and Imports of China</i>
-----	-------------------------------------

Description

Monthly exports and imports of China (July 1983 to December 2013).

Format

Each time series is an object of class "ts".

Details

In 100 mio. U.S. Dollar.

Source

China Customs

final	<i>Time Series of a Seasonal Adjustment Model</i>
-------	---

Description

Functions to extract the main time series from a "seas" object. For universal import of X-13ARIMA-SEATS tables, use the [series](#) function.

Usage

```
final(object)

original(object)

trend(object)

irregular(object)

## S3 method for class 'seas'
residuals(object, ...)
```

Arguments

object	an object of class "seas".
...	not used. For compatibility with the generic.

Details

These functions support R default NA handling. If `na.action = na.exclude` is specified in the call to `seas`, the time series will also contain NAs.

Value

returns a "ts" object, depending on the function.

References

Vignette with a more detailed description: <http://cran.r-project.org/web/packages/seasonal/vignettes/seas.pdf>

Wiki page with a comprehensive list of R examples from the X-13ARIMA-SEATS manual: <https://github.com/christoph sax/seasonal/wiki/Examples-of-X-13ARIMA-SEATS-in-R>

Official X-13ARIMA-SEATS manual: <http://www.census.gov/ts/x13as/docX13AS.pdf>

See Also

[seas](#) for the main function of seasonal.

[series](#), for universal X-13 output extraction.

Examples

```
## Not run:

m <- seas(AirPassengers)

final(m)
original(m)
irregular(m)
trend(m)

# NA handling
AirPassengersNA <- window(AirPassengers, end = 1962, extend = TRUE)
final(seas(AirPassengersNA, na.action = na.omit)) # no NA in final series
final(seas(AirPassengersNA, na.action = na.exclude)) # NA in final series
final(seas(AirPassengersNA, na.action = na.x13)) # NA filled by x13
# final(seas(AirPassengersNA, na.action = na.fail)) # fails

## End(Not run)
```

genhol

Generate Holiday Regression Variables

Description

A replacement for the genhol software by the U.S. Census Bureau, a utility that uses the same procedure as X-12-ARIMA to create regressors for the U. S. holidays of Easter, Labor Day, and Thanksgiving. **This is a replacement written in R, the U.S. Census Bureau software is not needed.**

Usage

```
genhol(x, start = 0, end = 0, frequency = 12, center = "none")
```

Arguments

x	a vector of class "Date", containing the occurrences of the holiday. It can be generated with as.Date .
start	integer, shifts the start point of the holiday. Use negative values if start is before the specified date.
end	integer, shifts end point of the holiday. Use negative values if end is before the specified date.
frequency	integer, frequency of the resulting series
center	character string. Either "calendar", "mean" or "none" (default). Centering avoids a bias in the resultign series. Use "calendar" for Easter or Chinese New Year, "mean" for Ramadan. See references: Notes on centering holiday.

Details

The resulting time series can be used as a user defined variable in [seas](#). Usually, you want the holiday effect to be removed from the final series, so you need to specify `regression.usertype = "holiday"`. (The default is to include user defined variables in the final series.)

Value

an object of class "ts" that can be used as a user defined variable in [seas](#).

References

United States Census Bureau, Notes on centering holiday regressors: http://www.census.gov/srd/www/genhol/genhol_center.html

See Also

[seas](#) for the main function of seasonal.

Examples

```
## Not run:

data(holiday) # dates of Chinese New Year and Easter

### use of genhol

# 10 day before Easter day to one day after, quarterly data:
genhol(easter, start = -10, end = 1, frequency = 4)
genhol(easter, frequency = 2) # easter is allways in the first half-year

# centering for overall mean or monthly calendar means
genhol(easter, center = "mean")
genhol(easter, center = "calendar")

### replicating X-13's built-in Easter adjustment

# built-in
m1 <- seas(x = AirPassengers,
  regression.variables = c("td1coef", "easter[1]", "ao1951.May"),
  arima.model = "(0 1 1)(0 1 1)", regression.aictest = NULL,
  outlier = NULL, transform.function = "log", x11 = list())
summary(m1)

# user defined variable
ea1 <- genhol(easter, start = -1, end = -1, center = "calendar")

# regression.usertype = "holiday" ensures that the effect is removed from
# the final series.
m2 <- seas(x = AirPassengers,
  regression.variables = c("td1coef", "ao1951.May"),
  xreg = ea1, regression.usertype = "holiday",
```

```

        arima.model = "(0 1 1)(0 1 1)", regression.aictest = NULL,
        outlier = NULL, transform.function = "log", x11 = list())
summary(m2)

all.equal(final(m2), final(m1), tolerance = 1e-06)

# with genhol, its possible to do slightly better, by adjusting the length
# of easter

ea2 <- genhol(easter, start = -2, end = +1, center = "calendar")
m3 <- seas(x = AirPassengers,
          regression.variables = c("td1coef", "ao1951.May"),
          xreg = ea2, regression.usertype = "holiday",
          arima.model = "(0 1 1)(0 1 1)", regression.aictest = NULL,
          outlier = NULL, transform.function = "log", x11 = list())
summary(m3)

### Chinese New Year

data(cntrade) # exports and imports of China
data(holiday) # dates of Chinese New Year and Easter

# de facto holiday length: http://en.wikipedia.org/wiki/Chinese\_New\_Year
cny.ts <- genhol(cny, start = 0, end = 6, center = "calendar")

m1 <- seas(x = imp, xreg = cny.ts, regression.usertype = "holiday", x11 = list(),
          regression.variables = c("td1coef", "ls1985.Jan", "ls2008.Nov"),
          arima.model = "(0 1 2)(0 1 1)", regression.aictest = NULL,
          outlier = NULL, transform.function = "log")
summary(m1)

# compare to identical no-CNY model:
m2 <- seas(x = imp, x11 = list(),
          regression.variables = c("td1coef", "ls1985.Jan", "ls2008.Nov"),
          arima.model = "(0 1 2)(0 1 1)", regression.aictest = NULL,
          outlier = NULL, transform.function = "log")
summary(m2)

ts.plot(final(m1), final(m2), col = c("red", "black"))

## End(Not run)

```

identify.seas

Manually Identify Outliers (Experimental)

Description

Select or deselect outliers by point and click. To quit and return the call, press ESC. Click several times to loop through different outlier types.

Usage

```
## S3 method for class 'seas'  
identify(x, type = c("ao", "tc", "ls"), ...)
```

Arguments

x an object of class "seas".
type character vector, types of outlier to loop through.
... unused, for compatibility with the generic function.

Value

an object of class "seas", containing the static call of the selected model.

Examples

```
## Not run:  
m <- seas(AirPassengers)  
identify(m)  
  
## End(Not run)
```

inspect

Interactively Inspect a Seasonal Adjustment Model (RStudio only)

Description

Interactively inspect a "seas" object. `inspect` uses the `manipulate` package and can only be used with RStudio. The goal of `inspect` is to summarize all relevant options, plots and statistics that should be usually considered.

Usage

```
inspect(x, fun = NULL)
```

Arguments

x an object of class "seas"
fun a function or a list of functions (see details)

Details

The `inspect` function opens an interactive window that allows for the manipulation of a number of arguments. It offers several views to analyze the series graphically. With each change, the adjustment process and the visualizations are recalculated. Summary statistics are shown in the R console.

With the `Show static call` option, a replicable static call is also shown in the console. Note that this option will double the time for recalculation, as the static function also tests the static call each time (this is a beta feature of `seasonal`, which allows intensive testing; it may be disabled in future versions).

The views in `inspect` may be customized via the `fun` argument. One or several plot functions may be supplied. The plot functions should have a "seas" object as their only argument. Several functions must be wrapped in a list (see examples).

References

R Studio IDE: <http://www.rstudio.com/ide/>

See Also

[seas](#) for the main function of `seasonal`.

Examples

```
## Not run:

m <- seas(AirPassengers)

inspect(m)

### customizing inspect

# a single function
fc <- function(m){
  ts.plot(series(m, "fct", verbose = FALSE))
}
inspect(m, fc)

# more than one function collected in a list
myfun <- list()
myfun[['Spectrum X-13']] <- function(m){
  plot(series(m, "spectrum.specorig", verbose = FALSE)[,-1], t = "l")
}
myfun[['Spectrum R']] <- function(m){
  spectrum(diff(log(AirPassengers)), method = "ar")
}
inspect(m, myfun)

# and a bonus example
spaghetti <- function(m, back = 10){
```

```
ser <- original(m)
tx <- time(ser)[(length(ser) - back):length(ser)]
z <- NULL
for (txi in tx){
  assign(as.character(m$call$x), window(ser, end = txi))
  z <- cbind(z, final(eval(m$call)))
}
ts.plot(window(z, start = time(ser)[(length(ser) - back - 15)]),
        col = rainbow(back + 1))
}
inspect(m, spaghetti)

## End(Not run)
```

na.x13

Handle Missing Values by X-13

Description

Utility function to substitute NA values by -99999. Useful as a value for the `na.action` argument in [seas](#).

Usage

```
na.x13(x)
```

Arguments

x an object of class "ts"

Value

a time series, with NA values substituted by -99999.

Examples

```
## Not run:
#' AirPassengersNA <- AirPassengers
AirPassengersNA[20] <- NA
na.x13(AirPassengersNA)

seas(AirPassengersNA, na.action = na.x13)

## End(Not run)
```

`out`*Import X-13ARIMA-SEATS Text Output*

Description

The `out` function shows the full content of the `.out`, the `.log` or the `.err` file form X-13ARIMA-SEATS.

Usage

```
out(x, line = 1, n = 100, search = NULL, file = c("out", "log", "err"))
```

Arguments

<code>x</code>	an object of class "seas".
<code>line</code>	starting line of the content.
<code>n</code>	number of lines to show on a page.
<code>search</code>	regular expression chracter string. If specified, the content is searched for the first occurence (see examples).
<code>file</code>	"out", "log" or "err", which text file to show.

Details

To keep the size of "seas" objects small, seas does not save the content of the `.out` by default. Instead, the `out` function re-evaluates the model.

Value

an object of class "out", essentially a character vector with attributes. The print method for "out" objects is adapted to the large size of the `.out` output. It allows for pagination and search (see examples).

References

Vignette with a more detailed description: <http://cran.r-project.org/web/packages/seasonal/vignettes/seas.pdf>

Wiki page with a comprehensive list of R examples from the X-13ARIMA-SEATS manual: <https://github.com/christoph sax/seasonal/wiki/Examples-of-X-13ARIMA-SEATS-in-R>

Official X-13ARIMA-SEATS manual: <http://www.census.gov/ts/x13as/docX13AS.pdf>

See Also

[seas](#) for the main function of seasonal.

Examples

```
## Not run:
m <- seas(AirPassengers)

# exit from the viewer with [q]
out(m)
out(m, search = "regARIMA model residuals")
out(m, search = "Normality Statistics for regARIMA")

# on some platforms, this may be more useful
edit(out(m))

m <- seas(AirPassengers, slidingspans = list())
out(m, search = "Sliding spans analysis", n = 300)

# showing the log file
out(m, file = "log")

# showing the error file
out(m, file = "err")

## End(Not run)
```

outlier

Outlier Time series

Description

Returns an object of class "ts" that contains the names of the outliers.

Usage

```
outlier(x, full = FALSE)
```

Arguments

x	an object of class "seas".
full	logical, should the full label of the outlier be shown? If FALSE, only the type of the outlier is shown.

Value

character string time series with outliers.

Examples

```
## Not run:
x <- seas(AirPassengers)
outlier(x)

## End(Not run)
```

plot.seas

Seasonal Adjustment Plots

Description

Functions to graphically analyze a "seas" object.

Usage

```
## S3 method for class 'seas'
plot(x, outliers = TRUE, trend = FALSE,
     main = "unadjusted and seasonally adjusted series", ...)

residplot(x, outliers = TRUE, ...)

## S3 method for class 'seas'
monthplot(x, choice = c("seasonal", "irregular"), ...)
```

Arguments

x	an object of class "seas", usually, a result of a call to seas .
outliers	logical, should the outliers be drawn.
trend	logical, should the trend be drawn.
choice	character string, "seasonal" (default) or "irregular".
main	character string, title of the graph.
series	X-13 name of the series to plot, see the manual for a description.
...	further arguments passed to the plotting functions.

Details

plot calls the plot method for class "seas". It plots the adjusted and unadjusted series, as well as the outliers. Optionally draws the trend series.

residplot plots the residuals and the outliers.

monthplot calls the monthplot method for class "seas". It plot the seasonal and SI component periodwise. Like the default method 'monthplot' can be used for all frequencies.

Value

All plot functions return a plot as their side effect.

References

Vignette with a more detailed description: <http://cran.r-project.org/web/packages/seasonal/vignettes/seas.pdf>

Wiki page with a comprehensive list of R examples from the X-13ARIMA-SEATS manual: <https://github.com/christoph sax/seasonal/wiki/Examples-of-X-13ARIMA-SEATS-in-R>

Official X-13ARIMA-SEATS manual: <http://www.census.gov/ts/x13as/docX13AS.pdf>

See Also

[seas](#), for the main function.

[qs](#), for diagnostical statistics.

Examples

```
## Not run:

m <- seas(AirPassengers)

plot(m)
plot(m, outliers = FALSE)
plot(m, trend = TRUE)

residplot(m)
residplot(m, outliers = FALSE)

monthplot(m)

# use standard R functions to analyze "seas" models
pacf(resid(m))
spectrum(diff(resid(m)))
plot(density(resid(m)))
qqnorm(resid(m))

## End(Not run)
```

Description

Functions to access some specific diagnostical statics in a "seas" object. For universal import of X-13ARIMA-SEATS tables, use the [series](#) function. For accessing the .out file of X-13ARIMA-SEATS, use the [out](#) function. For diagnostical plots, see [plot.seas](#).

Usage

```
qs(x)

spc(x)

fivebestmdl(x)

arimamodel(x)
```

Arguments

x object of class "seas"

Value

qs returns the QS statistics for seasonality of input and output series and the corresponding p-values.

spc returns the content of the .spc file, i.e. the specification as it is sent to X-13ARIMA-SEATS. Analyzing the spc output is useful for debugging.

fivebestmdl returns the five best models as chosen by the BIC criterion. It needs the automdl spec to be activated (default). If it is not activated, the function tries to re-evaluate the model with the automdl spec activated.

arimamodel retrurns the structure of a the ARIMA model, a numerical vector of the form (p d q)(P D Q), containing the non-seasonal and seasonal part of the ARIMA model.

References

Vignette with a more detailed description: <http://cran.r-project.org/web/packages/seasonal/vignettes/seas.pdf>

Wiki page with a comprehensive list of R examples from the X-13ARIMA-SEATS manual: <https://github.com/christoph sax/seasonal/wiki/Examples-of-X-13ARIMA-SEATS-in-R>

Official X-13ARIMA-SEATS manual: <http://www.census.gov/ts/x13as/docX13AS.pdf>

See Also

[seas](#) for the main function.

[series](#), for universal X-13 output extraction.

[plot.seas](#), for diagnostical plots.

[out](#), for accessing the full output of X-13ARIMA-SEATS.

Examples

```
## Not run:

m <- seas(AirPassengers)

qs(m)
spc(m)
```



```

fivebestmdl(m)
arimamodel(m)

# if no automdl spec is present, the model is re-evaluated
m2 <- seas(AirPassengers, arima.model = "(0 1 1)(0 1 1)")
spc(m2)          # arima overwrites the automdl spec
fivebestmdl(m2) # re-evaluation with automdl

# universal output extraction (see ?series)
series(m, "identify.pacf")

# accessing the .out file (see ?out)
out(m)
out(m, search = "Ljung-Box")

## End(Not run)

```

seas

Seasonal Adjustment with X-13ARIMA-SEATS

Description

Core function of the seasonal package. By default, seas calls the automatic procedures of X-13ARIMA-SEATS to perform a seasonal adjustment that works well in most circumstances. Via the ... argument, it is possible to invoke almost all options that are available in X-13ARIMA-SEATS (see details). The default options are specified as explicit arguments and are discussed in the arguments section.

Usage

```

seas(x, xreg = NULL, xtrans = NULL, seats.noadmiss = "yes",
     transform.function = "auto", regression.aicctest = c("td", "easter"),
     outlier = list(), automdl = list(), na.action = na.omit, out = FALSE,
     dir = NULL, ...)

```

Arguments

x	object of class "ts": time series to seasonally adjust.
xreg	(optional) object of class "ts": one or several user defined exogenous variables for regARIMA modelling, can be used both with regression or x11regression.
xtrans	(optional) object of class "ts": one or two user defined exogenous variables for the transform spec. Can be specified together with xreg.
seats.noadmiss	spec 'seats' with argument noadmiss = "yes" (default). Seasonal adjustment by SEATS, if SEATS decomposition is invalid, an alternative model is used (a warning is given).

<code>transform.function</code>	spec transform with argument <code>function = "auto"</code> (default). Automatic log transformation detection. Set equal to <code>"none"</code> , <code>"log"</code> or any value that is allowed by X-13 to turn off.
<code>regression.aictest</code>	spec regression with argument <code>aictest = c("td", "easter")</code> (default). AIC test for trading days and Easter effects. Set equal to <code>NULL</code> to turn off.
<code>outlier</code>	spec outlier without arguments (default). Automatic outlier detection. Set equal to <code>NULL</code> to turn off.
<code>automdl</code>	spec <code>automdl</code> without arguments (default). Automatic model search with the <code>automdl</code> spec. Set equal to <code>NULL</code> to turn off.
<code>na.action</code>	a function which indicates what should happen when the data contain NAs. <code>na.omit</code> (default), <code>na.exclude</code> or <code>na.fail</code> . If <code>na.action = na.x13</code> , NA handling is done by X-13, i.e. NA values are substituted by -99999.
<code>out</code>	logical, should the X-13ARIMA-SEATS standard output be saved in the "seas" object? (this increases object size substantially, it is recommended to re-evaluate the model using the <code>out</code> function instead.)
<code>dir</code>	character string with a user defined file path. If specified, the X-13ARIMA-SEATS output files are copied to this folder. Useful for debugging.
<code>...</code>	additional spec-arguments options sent to X-13ARIMA-SEATS (see details).

Details

It is possible to use the (almost) complete syntax of X-13ARIMA-SEAT via the `...` argument. The syntax of X-13ARIMA-SEATS uses *specs* and *arguments*, and each spec optionally contains some arguments. In `seas`, an additional spec-argument can be added by separating spec and argument by a dot (`.`) (see examples). Similarly, the `series` function can be used to read (almost) every output from X-13ARIMA-SEATS.

For a more extensive description, consider the vignette or the wiki page, which contains replications of almost all examples from the official X-13ARIMA-SEATS manual.

Value

returns an object of class "seas", essentially a list with the following elements:

<code>err</code>	warning messages from X-13ARIMA-SEATS
<code>series</code>	a list containing the output tables of X-13. To be accessed by the <code>series</code> function.
<code>data</code>	seasonally adjusted data, the raw data, the trend component, the irregular component and the seasonal component (deprecated).
<code>model</code>	list with the model specification, similar to "spc". It typically contains "regression", which contains the regressors and parameter estimates, and "arima", which contains the ARIMA specification and the parameter estimates.
<code>estimates</code>	detailed information on the estimation
<code>lkstats</code>	summary statistics

transform.function	character string, applied transformation
fivebestmdl	five best models according to BIC criterion
qs	QS statistics
x	input series
spec	object of class "spec", a list containing everything that is sent to X-13ARIMA-SEATS. Each spec is on the first level, each argument is on the second level.
call	function call

The final function returns the final adjusted series, the plot method shows a plot with the unadjusted and the adjusted series. summary gives an overview of the regARIMA model.

References

Vignette with a more detailed description: <http://cran.r-project.org/web/packages/seasonal/vignettes/seas.pdf>

Wiki page with a comprehensive list of R examples from the X-13ARIMA-SEATS manual: <https://github.com/christoph sax/seasonal/wiki/Examples-of-X-13ARIMA-SEATS-in-R>

Official X-13ARIMA-SEATS manual: <http://www.census.gov/ts/x13as/docX13AS.pdf>

See Also

[static](#), to return the static call that is needed to replicate an automatic model

[series](#), for universal X-13 table series import.

[out](#), for the import of X-13 text files

[inspect](#), to interactively inspect a seasonal adjustment model.

[plot.seas](#), for diagnostical plots.

[qs](#), for diagnostical statistics.

Examples

```
## Not run:
m <- seas(AirPassengers)
summary(m)

# invoke X-13ARIMA-SEATS options as 'spec.argument' through the ... argument
# (consult the X-13ARIMA-SEATS manual for many more options and the wiki for
# for more examples)
seas(AirPassengers, regression.aictest = c("td")) # no easter testing
seas(AirPassengers, force.type = "denton") # force equality of annual values
seas(AirPassengers, x11 = list()) # use x11, overrides the 'seats' spec

# options can be entered as vectors
seas(AirPassengers, regression.variables = c("td1coef", "easter[1]"))
seas(AirPassengers, arima.model = c(0, 1, 1, 0, 1, 1))
seas(AirPassengers, arima.model = "(0 1 1)(0 1 1)" # equivalent
```

```

# turn off the automatic procedures
seas(AirPassengers, regression.variables = c("td1coef", "easter[1]",
"ao1951.May"), arima.model = "(0 1 1)(0 1 1)", regression.aictest = NULL,
outlier = NULL, transform.function = "log")

# static replication of 'm <- seas(AirPassengers)'
static(m) # this also tests the equivalence of the static call
static(m, test = FALSE) # no testing (much faster)
static(m, coef = TRUE) # also fixes the coefficients

# specific extractor functions
final(m)
original(m)
resid(m)
coef(m)
fivebestmdl(m)
out(m) # the X-13 .out file (see ?out, for details)
spc(m) # the .spc input file to X-13 (for debugging)

# universal extractor function for any X-13ARIMA-SEATS output (see ?series)
series(m, "forecast.forecasts")

# copying the output of X-13 to a user defined directory
seas(AirPassengers, dir = "~/mydir")

# user defined regressors (see ?genhol for more examples)
# a temporary level shift in R base
tls <- ts(0, start = 1949, end = 1965, freq = 12)
window(tls, start = c(1955, 1), end = c(1957, 12)) <- 1
seas(AirPassengers, xreg = tls, outlier = NULL)
# identical to a X-13ARIMA-SEATS specification of the the level shift
seas(AirPassengers, regression.variables = c("tl1955.01-1957.12"),
outlier = NULL)

# NA handling
AirPassengersNA <- window(AirPassengers, end = 1962, extend = TRUE)
final(seas(AirPassengersNA, na.action = na.omit)) # no NA in final series
final(seas(AirPassengersNA, na.action = na.exclude)) # NA in final series
# final(seas(AirPassengersNA, na.action = na.fail)) # fails

# NA handling by X-13 (works with internal NAs)
AirPassengersNA[20] <- NA
final(seas(AirPassengersNA, na.action = na.x13))

# inspect tool
inspect(m)

## End(Not run)

```

Description

With the exception the composite spec, the series function imports all tables that can be saved in X-13ARIMA-SEATS.

Usage

```
series(x, series, reeval = TRUE, verbose = TRUE)
```

Arguments

x	an object of class "seas".
series	character vector, short or long names of an X-13ARIMA-SEATS table. If a long name is specified, it needs to be combined with the spec name and separated by a dot (it is not unique, otherwise. See list below.). More than one series can be specified (see examples).
reeval	logical, if TRUE, the model is re-evaluated with the corresponding specs enabled.
verbose	logical, if TRUE, a message is returned if a spec is added during reevaluation.

Details

If the save argument is not specified in the model call, series re-evaluates the call with the corresponding specs enabled (also returning a message). Note that re-evaluation doubles the overall computational time. If you want to accelerate the procedure, you have to be explicit about the output in the model call (see examples).

List of all importable tables from X-13ARIMA-SEATS:

spec	long name	short name
check	check.acf	acf
check	check.acfsquared	ac2
check	check.pacf	pcf
estimate	estimate.armacmatrix	acm
estimate	estimate.iterations	itr
estimate	estimate.regcmatrix	rcm
estimate	estimate.regressioneffects	ref
estimate	estimate.residuals	rsd
estimate	estimate.roots	rts
force	force.forcefactor	ffc
force	force.revsachanges	e6a
force	force.rndsachanges	e6r
force	force.saround	rnd
force	force.seasadjtot	saa
forecast	forecast.backcasts	bct
forecast	forecast.forecasts	fct
forecast	forecast.transformed	ftt
forecast	forecast.transformedbcst	btr
forecast	forecast.variances	fvr
history	history.chngestimates	che
history	history.chngrevisions	chr

history	history.fcsterrors	fce
history	history.fcsthistory	fch
history	history.indsaestimates	iae
history	history.indsarevisions	iar
history	history.lkhdhistory	lkh
history	history.outlierhistory	rot
history	history.saestimates	sae
history	history.sarevisions	sar
history	history.seatsmdlhistory	smh
history	history.sfestimates	sfe
history	history.sfilterhistory	sfh
history	history.sfrevisions	sfr
history	history.trendchnigestimates	tce
history	history.trendchngrevisions	ter
history	history.trendestimates	tre
history	history.trendrevisions	trr
identify	identify.acf	iac
identify	identify.pacf	ipc
outlier	outlier.finaltests	fts
outlier	outlier.iterations	oit
regression	regression.aoutlier	ao
regression	regression.holiday	hol
regression	regression.levelshift	ls
regression	regression.outlier	otl
regression	regression.regressionmatrix	rmx
regression	regression.regseasonal	a10
regression	regression.seasonaloutlier	so
regression	regression.temporarychange	tc
regression	regression.tradingday	td
regression	regression.transitory	a13
regression	regression.userdef	usr
seats	seats.adjustfac	s16
seats	seats.adjustmentratio	s18
seats	seats.cycle	cyc
seats	seats.diffseasonaladj	dsa
seats	seats.difftrend	dtr
seats	seats.irregular	s13
seats	seats.longtermtrend	ltt
seats	seats.seasadjconst	sec
seats	seats.seasonal	s10
seats	seats.seasonaladj	s11
seats	seats.seasonaladjfcstdecomp	afd
seats	seats.seasonalfcstdecomp	sfd
seats	seats.seasonalsum	ssm
seats	seats.seriesfcstdecomp	ofd
seats	seats.totaladjustment	sta
seats	seats.transitory	s14
seats	seats.transitoryfcstdecomp	yfd

seats	seats.trend	s12
seats	seats.trendconst	stc
seats	seats.trendfcstdecomp	tfd
series	series.adjoriginal	b1
series	series.calendaradjorig	a18
series	series.outlieradjorig	a19
series	series.seriesmvdj	mv
series	series.span	a1
slidingspans	slidingspans.chngspans	chs
slidingspans	slidingspans.indchngspans	cis
slidingspans	slidingspans.indsaspsans	ais
slidingspans	slidingspans.indsfspans	sis
slidingspans	slidingspans.indychngspans	yis
slidingspans	slidingspans.sfspans	sfs
slidingspans	slidingspans.tdspans	tds
slidingspans	slidingspans.ychngspans	yes
spectrum	spectrum.speccomposite	is0
spectrum	spectrum.specindir	is2
spectrum	spectrum.specindsa	is1
spectrum	spectrum.specirr	sp2
spectrum	spectrum.specorig	sp0
spectrum	spectrum.specresidual	spr
spectrum	spectrum.specsa	sp1
spectrum	spectrum.specseatsextresiduals	ser
spectrum	spectrum.specseatsirr	s2s
spectrum	spectrum.specseatssa	s1s
transform	transform.permprior	a2p
transform	transform.permprioradjusted	a3p
transform	transform.permprioradjustedptd	a4p
transform	transform.prior	a2
transform	transform.prioradjusted	a3
transform	transform.prioradjustedptd	a4d
transform	transform.seriesconstant	a1c
transform	transform.tempprior	a2t
transform	transform.transformed	trn
x11	x11.adjoriginalc	c1
x11	x11.adjoriginald	d1
x11	x11.adjustdiff	fad
x11	x11.adjustfac	d16
x11	x11.adjustmentratio	e18
x11	x11.biasfactor	bef
x11	x11.calendar	d18
x11	x11.calendaradjchanges	e8
x11	x11.combholiday	chl
x11	x11.extreme	c20
x11	x11.extremeb	b20
x11	x11.irregular	d13
x11	x11.irregularadjao	iao

x11	x11.irregularb	b13
x11	x11.irregularc	c13
x11	x11.irrwt	c17
x11	x11.irrwtb	b17
x11	x11.mcdmovavg	f1
x11	x11.modirregular	e3
x11	x11.modoriginal	e1
x11	x11.modseasadj	e2
x11	x11.modsic4	c4
x11	x11.modsid4	d4
x11	x11.origchanges	e5
x11	x11.replacsi	d9
x11	x11.replacsic9	c9
x11	x11.robustsa	e11
x11	x11.sachanges	e6
x11	x11.seasadj	d11
x11	x11.seasadjb11	b11
x11	x11.seasadjb6	b6
x11	x11.seasadjc11	c11
x11	x11.seasadjc6	c6
x11	x11.seasadjconst	sac
x11	x11.seasadjd6	d6
x11	x11.seasonal	d10
x11	x11.seasonaladjregsea	ars
x11	x11.seasonalb10	b10
x11	x11.seasonalb5	b5
x11	x11.seasonalc10	c10
x11	x11.seasonalc5	c5
x11	x11.seasonald5	d5
x11	x11.seasonaldi_	fsd
x11	x11.sib3	b3
x11	x11.sib8	b8
x11	x11.tdadjorig	c19
x11	x11.tdadjorigb	b19
x11	x11.totaladjustment	tad
x11	x11.trend	d12
x11	x11.trendadjls	tal
x11	x11.trendb2	b2
x11	x11.trendb7	b7
x11	x11.trendc2	c2
x11	x11.trendc7	c7
x11	x11.trendchanges	e7
x11	x11.trendconst	tac
x11	x11.trendd2	d2
x11	x11.trendd7	d7
x11	x11.unmodsi	d8
x11	x11.unmodsiox	d8b
x11	x11.yrtotals	e4

x11regression	x11regression.calendar	xca
x11regression	x11regression.calendarb	bxc
x11regression	x11regression.combcalendar	xcc
x11regression	x11regression.combcalendarb	bcc
x11regression	x11regression.combtradingday	c18
x11regression	x11regression.combtradingdayb	b18
x11regression	x11regression.extremeval	c14
x11regression	x11regression.extremevalb	b14
x11regression	x11regression.holiday	xh1
x11regression	x11regression.holidayb	bxh
x11regression	x11regression.outlieriter	xoi
x11regression	x11regression.prior	a4
x11regression	x11regression.tradingday	c16
x11regression	x11regression.tradingdayb	b16
x11regression	x11regression.x11reg	c15
x11regression	x11regression.x11regb	b15
x11regression	x11regression.xregressionmatrix	xrc
x11regression	x11regression.xregressionmatrix	xrm

Value

depending on the table, either an object of class "ts" or "data.frame".

References

Vignette with a more detailed description: <http://cran.r-project.org/web/packages/seasonal/vignettes/seas.pdf>

Wiki page with a comprehensive list of R examples from the X-13ARIMA-SEATS manual: <https://github.com/christoph sax/seasonal/wiki/Examples-of-X-13ARIMA-SEATS-in-R>

Official X-13ARIMA-SEATS manual: <http://www.census.gov/ts/x13as/docX13AS.pdf>

See Also

[seas](#) for the main function.

Examples

```
## Not run:

m <- seas(AirPassengers)
series(m, "fct") # re-evaluate with the forecast spec activated

# more than one series
series(m, c("d7", "d8", "fct"))

m <- seas(AirPassengers, forecast.save = "fct")
series(m, "fct") # no re-evaluation (much faster!)

# using long names
```

```

series(m, "forecast.forecasts")

# history spec
series(m, "history.trendestimates")
series(m, "history.sfestimates")
series(m, "history.saestimates")
series(m, c("history.sfestimates", "history.trendestimates"))

# slidingspans spec
series(m, "slidingspans.sfspans")
series(m, "slidingspans.tdspans")

### Some X-13ARIMA-SEATS functions can be replicated in R:

# X-13ARIMA-SEATS spectrum
plot(series(m, "spectrum.specorig")[,-1], t = "1")
# R equivalent: spectrum from stats
spectrum(diff(log(AirPassengers)), method = "ar")

# X-13ARIMA-SEATS pacf
x13.pacf <- series(m, "identify.pacf")
plot(x13.pacf[,1:2])
lines(x13.pacf[,3])
lines(-x13.pacf[,3])
# R equivalent: pacf from stats
pacf(AirPassengers, lag.max = 35)

### advanced examples
# (for more examples, see the wiki.)

# trading day and easter adjustment w/o seasonal adjustment
summary(m)
re <- series(m, "estimate.regressioneffects")
ce <- re[, 'Trading.Day'] + re[, 'Holiday']
# be aware of the log transformation
AirPassengersWoTd <- exp(log(AirPassengers) - ce)

## End(Not run)

```

slidingspans

Deprecated Functions

Description

Functions are deprecated and will be defunct soon. Use the more universal series function.

Usage

```
slidingspans(x, ...)
```

```

regressioneffects(x)

revisions(x, ...)

## S3 method for class 'revisions'
plot(x, ...)

## S3 method for class 'slidingspans'
plot(x, ...)

```

Arguments

```

x          object of class "seas"
...       further arguments

```

See Also

[series](#), for universal X-13 output extraction.

Examples

```

## Not run:
# history spec (replaces the deprecated 'revisions' function)
series(m, "history.trendestimates")
series(m, "history.sfestimates")
series(m, "history.saestimates")
series(m, c("history.sfestimates", "history.trendestimates"))

# slidingspans spec (replaces the deprecated 'slidingspans' function)
series(m, "slidingspans.sfspans")
series(m, "slidingspans.tdspans")

# regressioneffects
series(m, "estimate.regressioneffects")

## End(Not run)

```

SPECS

List of Available X-13ARIMA-SEATS Outputs

Description

The data is used by several functions as a look-up table. Users should consider the table in [series](#) or in the official manual.

Format

An object of class "data.frame".

Source

United States Census Bureau

References

Official X-13ARIMA-SEATS manual: <http://www.census.gov/ts/x13as/docX13AS.pdf>

static	<i>Static Call of a seas Object</i>
--------	-------------------------------------

Description

A static call is a static replication of a call. Automatic procedures are substituted by the automatically chosen spec-argument options. The call can be copy/pasted to a script and used for further manipulations or future evaluation of the same model.

Usage

```
static(x, coef = FALSE, test = TRUE, verbose = FALSE)
```

Arguments

x	an object of class seas.
coef	logical, if TRUE, the coefficients are treated as fixed, instead of being estimated.
test	logical. By default the static call is executed and compared to the input call. If the final series is not identical, a warning is returned. If FALSE, the option is disabled.
verbose	logical, if TRUE, dropped and kept series are listed.

Details

By default, the static call is tested. It is executed and compared to the input call. If the final series is not identical, a warning is returned.

If coef = TRUE, the coefficients are fixed as well.

Value

Object of class "call". Static call of an object of class seas. Can be copy/pasted into an R script.

References

Vignette with a more detailed description: <http://cran.r-project.org/web/packages/seasonal/vignettes/seas.pdf>

Wiki page with a comprehensive list of R examples from the X-13ARIMA-SEATS manual: <https://github.com/christoph sax/seasonal/wiki/Examples-of-X-13ARIMA-SEATS-in-R>

Official X-13ARIMA-SEATS manual: <http://www.census.gov/ts/x13as/docX13AS.pdf>

See Also

[seas](#) for the main function of seasonal.

Examples

```
## Not run:

m <- seas(AirPassengers)
static(m)
static(m, test = FALSE)

## End(Not run)
```

summary.seas

Summary of a X13-ARIMA-SEATS seasonal adjustment

Description

summary method for class "seas".

Usage

```
## S3 method for class 'seas'
summary(object, ...)

## S3 method for class 'summary.seas'
print(x, digits = max(3, getOption("digits") - 3),
      signif.stars = getOption("show.signif.stars"), ...)
```

Arguments

object	an object of class "seas", usually, a result of a call to seas .
x	an object of class "summary.seas", usually, a result of a call to summary.seas.
digits	the number of significant digits to use when printing.
signif.stars	logical. If TRUE, 'significance stars' are printed for each coefficient.
...	further arguments passed to or from other methods.

Value

summary.seas returns a list containing the summary statistics included in object, and computes the following additional statistics:

coefficients	a named matrix containing coefficients, standard deviations, t-values and p-values
transform	character string with the type of initial transformation

The print method prints the summary output in a similar way as the method for "lm".

Examples

```
## Not run:  
x <- seas(AirPassengers)  
summary(x)  
  
## End(Not run)
```

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