Package 'deseasonalize'

February 19, 2015

Type Package

Title Optimal deseasonalization for geophysical time series using AR fitting

Version 1.35

Date 2013-04-10

Author A. I. McLeod and Hyukjun Gweon

Maintainer A. I. McLeod <aimcleod@uwo.ca>

Depends R (>= 2.10),lattice, FitAR

Description Deseasonalize daily or monthly time series.

LazyLoad yes

LazyData yes

Classification/ACM G.4, I.5

Classification/MSC 62H30

License GPL (>= 2)

NeedsCompilation no

Repository CRAN

Date/Publication 2013-04-10 20:18:34

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deseasonalize-package *Optimal deseasonalization for geophysical time series using AR fitting*

Description

Deseasonalize daily or monthly time series. An harmonic regression is fit to the data to estimate the seasonal means and standard deviations. The number of terms in the harmonic regression may be determined using the BIC or generalized AIC.

Details

Package:	deseasonalize
Type:	Package
Version:	1.35
Date:	2013-04-10
License:	GPL (>= 2.10)
LazyLoad:	yes
LazyData:	yes

The only function is ds.

For how to use the function ds, see the examples provided with the datasets Saugeen, and SaugeenDay.

A dynamic time series plot for the Saugeen daily riverflow is available in the subdirectory /inst/doc.

Author(s)

A. I. McLeod and Hyukjun Gweon <aimcleod@uwo.ca>

References

K. W. Hipel and A. I. McLeod (1994). Time Series Modelling of Water Resources and Environmental Systems. Elsevier.

McLeod, A.I. and Zhang, Y. (2008b). Improved Subset Autoregression: With R Package. Journal of Statistical Software.

ds *deseasonalize a time series*

Description

Deseasonalization method for monthly and annual

Usage

```
ds(z, Fm = 6, Fs = 6, type = c("daily", "monthly"), searchQ=TRUE, lag.max=20, ic=c("BIC","AIC"), stand
```

Arguments

z	vector or time series
Fm	Number of frequency components for the mean
Fs	Number of frequency components for the standard deviation
type	"daily" or "monthly"
searchQ	TRUE, search for best BIC/AIC model using harmonic reqressions of maximum orders Fm and Fs for seasonal means and standard deviations. If FALSE, just use input values.
lag.max	maximum order for the fitted autoregression
ic	"BIC" or "AIC" model selection
standardizeQ	TRUE, then subtract seasonal mean and divide by seasonal standard deviation. Otherwise, if FALSE, just subtract seasonal mean.

Details

See McLeod (2012) and Hipel and McLeod (1994) for further details and illustrative examples.

Value

When searchQ is TRUE, a list with two components is produced. The first component 'dspar' is the matrix whose rows are c(Fm, Fs, p, IC), where Fm and Fs are the number of Fourier components used for the mean and sd, p=AR order selected and IC is the value of the information criterion The second component is the deseasonalized time series. When searchQ is FALSE, just the deasonalized time series is returned.

Author(s)

A. I. McLeod (aimcleod@uwo.ca)

References

K. W. Hipel and A. I. McLeod (1994). Time Series Modelling of Water Resources and Environmental Systems. Elsevier.

Examples

```
#Example 1. Simple example.
out <- ds(nottem, Fm=2, Fs=2, type="monthly")
summary(out)
#
#Example 2. longer example
## Not run:
out <- ds(nottem, type="monthly")
#from the table below we see that 2 Fourier components are used for the seasonal means
```

```
# and 0 components for the seasonal standard deviations.
out$dispar
#check that the series is deasonalized using the cumulative periodogram test
cpgram(out$z)

## End(Not run)
#
#Example 3
#As a check, compute deaseasonalized time series using full transformation.
#Then monthly means should be close to 0 and monthly sd close to 1.0.
#But not exact due to harmonic regression errors.
z <- ds(nottem, Fm=6, Fs=6, type="monthly", searchQ=FALSE)$z
apply(matrix(z, ncol=12, byrow=TRUE), MARGIN=2, mean )
apply(matrix(z, ncol=12, byrow=TRUE), MARGIN=2, sd )
```

`getds` *get deseasonalized time series*

Description

This is a utility function. Most users should use the `ds`.

Usage

```
getds(z, s, Fm = 6, Fs = 6, ic = c("BIC", "AIC"), lag.max = 20, standardizeQ=TRUE)
```

Arguments

`z`	original series
`s`	seasonal period either s=12 or s=365.25
`Fm`	Number of Fourier components for seasonal mean. If Fm=0, then only the overall mean of series is used.
`Fs`	Number of harmonics for seasonal standard deviations.If Fs=0, only overall standard deviation is used.
`ic`	"BIC" or "AIC"
`lag.max`	Number of lags used to fit AR
`standardizeQ`	If TRUE, divide by seasonal standard deviation. Otherwise, only use seasonal mean correction.

Details

The series is deseasonalized by subtracting the seasonal means and dividing by the seasonal standard deviations. If Fm=0, the overall mean is used and if Fs=0, the overall standard deviation is used. If standardizeQ is FALSE, the series is not divided by the standard deviation and only the mean or seasonal mean correction is done. In addition, the best AR model is determined for the deaseasonalized series according to the BIC or AIC criterion. This criterion may be used to select the best deseasonalization.

Value

list with two components: 'dspar' and 'z'. dspar: vector of length 4 containing Fm, Fs, p, IC-value. z: deseasonalized series

Author(s)

A. I. McLeod

References

K. W. Hipel and A. I. McLeod (1994). Time Series Modelling of Water Resources and Environmental Systems. Elsevier.

See Also

ds

Examples

```
z <- getds(log(Saugeen), s=12, Fm = 5, Fs = 4, ic = "AIC", lag.max = 20)$z
acf(z)
```

---

print.deseasonalize *Print Method for "deseasonalize" Object*

Description

A terse summary is given.

Usage

```
## S3 method for class 'deseasonalize'
print(x, ...)
```

Arguments

x	object of class "deseasonalize"
...	optional arguments

Value

A terse summary is displayed

Author(s)

A.I. McLeod

See Also

summary.deseasonalize

Examples

```
ds(nottem, Fm=6, Fs=6, type="monthly", searchQ=FALSE)
```

Saugeen *Saugeen river, Walkerton, monthly from Jan 1915 to December 1976*

Description

Flows in cms

Usage

```
data(Saugeen)
```

Format

The format is: Time-Series [1:744] from 1915 to 1977: 16 30.3 35.4 41.9 14.7 ...

Details

Hipel and McLeod (1976, p.476) found the optimal deseasonalization for this data with an ARMA(1,1) was with Fm=5 and Fs=4.

Source

Environment Canada

References

K. W. Hipel and A. I. McLeod (1994). Time Series Modelling of Water Resources and Environmental Systems. Elsevier.

Examples

```
#time series plot
plot(Saugeen)
#
```

SaugeenDay *Daily flow Saugeen River, 1915/01/01-1979/12/31*

Description

Mean daily flow in cubic meters per second (cumecs) of the Saugeen River at Walkerton, Jan 1, 1915 to Dec 31, 1979

Usage

```
data(SaugeenDay)
```

Format

The format is: num [1:23741, 1] 11.5 10.8 13.7 13.7 14.4 17 17 17.8 17.8 17 ... - attr(*, "dimnames")=List of 2 ..$: chr [1:23741] "1915-01-01" "1915-01-02" "1915-01-03" "1915-01-04" ... ..$: chr "flow"

Source

Environment Canada

References

K. W. Hipel and A. I. McLeod (1994). Time Series Modelling of Water Resources and Environmental Systems. Elsevier.

Examples

```
str(SaugeenDay)
```

summary.deseasonalize *Summary Method for "deseasonalize" Object*

Description

summary for "deseasonalize" object.

Usage

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

Arguments

object	"deseasonalize" object
...	optional arguments

Value

A printed summary is given

Author(s)

A.I. McLeod

See Also

print.deseasonalize, ds

Examples

```
#Example 1: to save time only try 2 components
out <- ds(nottem, Fm=2, Fs=2, type="monthly")
summary(out)

#Example 2
## Not run:
out <- ds(nottem, Fm=6, Fs=6, type="monthly")
summary(out)

## End(Not run)
```

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