Package ‘deseasonalize’

February 19, 2015

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<td>Optimal deseasonalization for geophysical time series using AR fitting</td>
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<td>2013-04-10</td>
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<tr>
<td>Author</td>
<td>A. I. McLeod and Hyukjun Gweon</td>
</tr>
<tr>
<td>Maintainer</td>
<td>A. I. McLeod <a href="mailto:aimcleod@uwo.ca">aimcleod@uwo.ca</a></td>
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<td>LazyData</td>
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### 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

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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


Usage

\[ds(z, Fm = 6, Fs = 6, type = c("daily", "monthly"), searchQ=TRUE, lag.max=20, ic=c("BIC","AIC"), standardizeQ=TRUE)\]

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 regressions 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 deseasonalized time series is returned.

Author(s)

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

References


Examples

```r
#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 )

defined_text

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 deseasonalized 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


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


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

Examples
str(SaugeenDay)

summary.deseasonize 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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