Package ‘ArDec’

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**Type**  Package

**Title**  Time series autoregressive-based decomposition

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**Description**  Package ArDec implements autoregressive-based decomposition of a time series based on the constructive approach in West (1997). Particular cases include the extraction of trend and seasonal components.

**License**  GPL (>= 2)

**NeedsCompilation**  no

**Repository**  CRAN

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**Description**

Decomposition of a time series into latent subseries from a fitted autoregressive model
Usage

ardec(x, coef, ...)

Arguments

x  time series
coef  autoregressive parameters of AR(p) model
...  additional arguments for specific methods

Details

If an observed time series can be adequately described by an (eventually high order) autoregressive AR(p) process, a constructive result (West, 1997) yields a time series decomposition in terms of latent components following either AR(1) or AR(2) processes depending on the eigenvalues of the state evolution matrix.

Complex eigenvalues $r \exp(iw)$ correspond to pseudo-periodic oscillations as a damped sine wave with fixed period $(2\pi/w)$ and damping factor $r$. Real eigenvalues correspond to a first order autoregressive process with parameter $r$.

Value

A list with components:

period  periods of latent components
modulus  damping factors of latent components
comps  matrix of latent components

Author(s)

S. M. Barbosa

References


Examples

data(tempEng)
coef=ardec.lm(tempEng)$coefficients

# warning: running the next command can be time consuming!

decomposition=ardec(tempEng,coef)
**ardec.lm**

*Fit an autoregressive model as a linear regression*

**Description**

Function ardec.lm fits an autoregressive model of order p, AR(p) to a time series through a linear least squares regression.

**Usage**

```r
ardec.lm(x)
```

**Arguments**

- `x` time series

**Value**

For ardec.lm, an object of class "lm".

**Author(s)**

S. M. Barbosa

**References**


**See Also**

- `ar`, `lm`

**Examples**

```r
data(tempEng)
model=ardec.lm(tempEng)
```
Description

Function ardec.periodic extracts a periodic component from the autoregressive decomposition of a monthly time series.

Usage

```r
ardec.periodic(x, per, tol = 0.95)
```

Arguments

- `x`: time series
- `per`: period of the component to be extracted
- `tol`: tolerance for the period of the component

Value

A list with components:

- `period`: period for the annual component
- `modulus`: damping factor for the annual component
- `component`: extracted component

Author(s)

S. M. Barbosa

Examples

```r
data(tempEng)
ardec.periodic(tempEng, per = 12)
```
ardec.trend

Estimation of the trend component from a monthly time series

Description

Function ardec.trend extracts the trend component from the autoregressive decomposition of a monthly time series.

Usage

ardec.trend(x)

Arguments

x time series

Value

A list with components:

modulus damping factor for the annual component
trend trend component

Author(s)

S. M. Barbosa

Examples

data(co2)
ardec.trend(co2)
tempEng

Time series of monthly temperature values

Description
Monthly temperature in Central England from 1723-1970

Usage
data(tempEng)

Format
Time-Series [1:2976] from 1723 to 1971

Source

Examples
data(tempEng)
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