Package ‘ArDec’

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License GPL (>= 2)
Title Time Series Autoregressive-Based Decomposition
Description Autoregressive-based decomposition of a time series based on the approach in West (1997). Particular cases include the extraction of trend and seasonal components.
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ardec  Time series autoregressive decomposition

Description

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

Usage

ardec(x, coef, ...)

1
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

```r
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

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

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

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<td>Monthly temperature in Central England from 1723-1970</td>
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<td>data(tempEng)</td>
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<td>Time-Series [1:2976] from 1723 to 1971</td>
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