# Package: ArDec (via r-universe)

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**Version** 2.1-1

**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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**Repository** https://susanabarbosa.r-universe.dev

**RemoteUrl** https://github.com/cran/ArDec

**RemoteRef** HEAD

**RemoteSha** 182d48c21b1fcba51364497089f68ea87578a9a6

## Contents

ardec *Time series autoregressive decomposition*

## 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 (2pi/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

West, M. (1997), Time series decomposition. Biometrika, 84, 489-494.

West, M. and Harrisson, P.J. (1997), Bayesian Forecasting and Dynamic Models, Springer-Verlag.

## Examples

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

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

decomposition=ardec(tempEng,coef)
```

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`ardec.lm` *Fit an autoregressive model as a linear regression*

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## 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

West, M. (1995), Bayesian inference in cyclical component dynamic linear models.Journal of the American Statistical Association, 90, 1301-1312.

## See Also

ar, lm

## Examples

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

`ardec.periodic` *Extraction of individual periodic components from a monthly time series*

## Description

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

## Usage

```
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 anual component |
| `modulus` | damping factor for the annual component |
| `component` | extracted component |

## Author(s)

S. M. Barbosa

## Examples

```
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

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

## Examples

```
data(tempEng)
```

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