# Package 'tsModel'

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**Title** Time Series Modeling for Air Pollution and Health

**Depends** R (>= 3.0.0)

**Imports** splines, stats

**Suggests** gam

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**Description** Tools for specifying time series regression models

**License** GPL (>= 2)

**NeedsCompilation** no

**Repository** CRAN

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## R topics documented:

`balt` *Baltimore City data*

## Description

Mortality, air pollution, and weather data for Baltimore City, Maryland, USA, 1987–2000.

## Usage

```
data(balt)
```

## Format

A data frame with 15342 observations on the following 20 variables.

**cvd** daily counts of deaths from cardiovascular disease

**death** daily counts of deaths from all causes excluding accident

**resp** daily counts of deaths from respiratory disease

**tmpd** daily average temperature (Fahrenheit)

**rmtmpd** daily running mean of temperature for lags 1–3

**dptp** daily average dew point temperature

**rmdptp** daily running mean of dew point temperature for lags 1–3

**time** day/time indicator

**date** date

**agecat** a factor with levels `under65` `65to74` `75p`

**dow** a factor with levels `Sunday` `Monday` `Tuesday` `Wednesday` `Thursday` `Friday` `Saturday`

**pm10tmean** daily detrended PM10

**l1pm10tmean** lag 1 PM10

**l2pm10tmean** lag 2 PM10

**l3pm10tmean** lag 3 PM10

**l4pm10tmean** lag 4 PM10

**l5pm10tmean** lag 5 PM10

**l6pm10tmean** lag 6 PM10

**l7pm10tmean** lag 7 PM10

**Age2Ind** indicator for age category 2 (65 to 74)

**Age3Ind** indicator for age category 3 (75 and above)

## Source

See http://www.ihapss.jhsph.edu/.

ModelTerms *Model terms for time series models*

## Description

Tools for creating model/formula terms in time series models

## Usage

```
Lag(v, k, group = NULL)
runMean(v, lags = 0, group = NULL, filter = NULL)
harmonic(x, nfreq, period, intercept = FALSE)
```

## Arguments

| | |
|---|---|
| v,x | a numeric vector |
| k,lags | an integer vector giving lag numbers |
| group | a factor or a list of factors defining groups of observations |
| filter | a vector specifying a linear filter |
| nfreq | number of sine/cosine pairs to include |
| period | period |
| intercept | should basis matrix include a column of 1s? |

## Value

Lag returns a length(v) by length(k) matrix of lagged variables. runMean returns a numeric vector of length length(v). harmonic returns a matrix of sine/cosine basis functions.

## Author(s)

Roger D. Peng

## Examples

```
## Ten day "time series"
x <- rnorm(10)

## Lag 1 of `x'
Lag(x, 1)

## Lag 0, 1, and 2 of `x'
Lag(x, 0:2)

## Running mean of lag 0, 1, and 2
runMean(x, 0:2)
```

`spatialgibbs` *Fit Hierarchical Model with Spatial Covariance*

## Description

This function fits a Normal hierarchical model with a spatial covariance structure via MCMC.

## Usage

```
spatialgibbs(b, v, x, y, phi = 0.1, scale = 1, maxiter = 1000,
             burn = 500, a0 = 10, b0 = 100000)
```

## Arguments

| | |
|---|---|
| `b` | a vector of regression coefficients |
| `v` | a vector of regression coefficient variances |
| `x` | a vector of x-coordinates |
| `y` | a vector of y-coordinates |
| `phi` | scale parameter for exponential covariance function |
| `scale` | scaling parameter for the prior variance of the national average estimate |
| `maxiter` | maximum number of iterations in the Gibbs sampler |
| `burn` | number of iterations to discard |
| `a0` | parameter for Gamma prior on heterogeneity variance |
| `b0` | parameter for Gamma prior on heterogeneity variance |

## Details

This function is used to produce pooled national average estimates of air pollution risks taking into account potential spatial correlation between the risks. The function uses a Markov chain Monte Carlo sampler to produce the posterior distribution of the national average estimate and the heterogeneity variance. See the reference below for more details.

## Author(s)

Roger D. Peng <rpeng@jhsph.edu>

## References

Peng RD, Dominic F (2008). *Statistical Methods for Environmental Epidemiology in R: A Case Study in Air Pollution and Health*, Springer.

tsdecomp *Time scale decomposition*

## Description

Decompose a vector into frequency components

## Usage

```
tsdecomp(x, breaks)
```

## Arguments

| | |
|---|---|
| x | a numeric vector with no missing data |
| breaks | a numeric constant or a vector of break points into which x should be broken. If breaks is a constant then x will be broken into that number of frequncies. This argument is passed directly to cut to determine the break points. See cut for more details. |

## Value

A matrix with dimension n x m where n is the length of x and m is the number of break categories.

## Author(s)

Original by Aidan McDermott; revised by Roger Peng <rpeng@jhsph.edu>

## References

Dominici FD, McDermott A, Zeger SL, Samet JM (2003). "Airborne particulate matter and mortality: Timescale effects in four US cities", American Journal of Epidemiology, 157 (12), 1055–1065.

## Examples

```
x <- rnorm(101)
freq.x <- tsdecomp(x, c(1, 10, 30, 80))

## decompose x into 3 frequency categories.
## x[,1] represents from 1 to 9 cycles in 101 data points
## x[,2] represents from 10 to 29 cycles in 101 data points
## x[,3] represents from 30 to 50 cycles in 101 data points
## you can only have up to 50 cycles in 101 data points.
```

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