Package 'tsModel'

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Title Time Series Modeling for Air Pollution and Health

Depends R (>= 4.0.0)

Imports splines, stats

Suggests testthat

Version 0.6-1

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Description Tools for specifying time series regression models.

License GPL (>= 2)

Encoding UTF-8

RoxygenNote 7.1.2

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.

Details

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)

harmonic *Create a sine/cosine basis*

Description

Create a matrix of sine and cosine basis vectors

Usage

```
harmonic(x, nfreq, period, intercept = FALSE)
```

Arguments

x	a numeric vector
nfreq	number of sine/cosine pairs to include
period	the period
intercept	should basis matrix include a column of 1s?

Lag *Create Lagged Variables*

Description

Create a matrix of lagged variables

Usage

```
Lag(v, k, group = NULL)
```

Arguments

v	a numeric vector
k	an integer vector giving lag numbers
group	a factor or a list of factors defining groups of observations

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)
```

runMean *Compute Running Means*

Description

Compute the running mean of a vector

Usage

```
runMean(v, lags = 0, group = NULL, filter = NULL)
```

Arguments

v	a numeric vector
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

Examples

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

## 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 = 1e+05
)
```

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.

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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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