Package ‘lotri’

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Title A Simple Way to Specify Symmetric, Block Diagonal Matrices
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Description Provides a simple mechanism to specify a symmetric block diagonal matrices (often used for covariance matrices). This is based on the domain specific language implemented in 'nlmixr' but expanded to create matrices in R generally instead of specifying parts of matrices to estimate.
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Description

As lower triangular matrix

Usage

as.lotri(x, ..., default = "")

## S3 method for class 'matrix'
as.lotri(x, ..., default = "")

## Default S3 method:
as.lotri(x, ..., default = "")

Arguments

x
Matrix or other data frame

... Other factors

default Is the default factor when no conditioning is implemented.

Value

Lower triangular matrix

Author(s)

Matthew Fidler

Description

Easily Specify block-diagonal matrices with lower triangular info

Usage

lotri(x, ..., envir = parent.frame())
Arguments

- `x`: list, matrix or expression, see details
- `...`: Other arguments treated as a list that will be concatenated then reapplied to this function.
- `envir`: the environment in which `expr` is to be evaluated. May also be `NULL`, a list, a data frame, a pairlist or an integer as specified to `sys.call`.

Details

This can take an R matrix, a list including matrices or expressions, or expressions

Expressions can take the form

- `name ~ estimate`
- Or the lower triangular matrix when "adding" the names

```
name1 + name2 ~ c(est1, est2, est3)
```

The matrices are concatenated into a block diagonal matrix, like `bdiag`, but allows expressions to specify matrices easier.

Value

named symmetric matrix useful in RxODE simulations (and perhaps elsewhere)

Author(s)

Matthew L Fidler

Examples

```r
## A few ways to specify the same matrix
lotri({et2 + et3 + et4 ~ c(40,
          0.1, 20,
          0.1, 0.1, 30)})

## You do not need to enclose in {}
lotri(et2 + et3 + et4 ~ c(40,
          0.1, 20,
          0.1, 0.1, 30),
          et5 ~ 6)
## But if you do enclose in {}, you can use
## multi-line matrix specifications:
lotri({et2 + et3 + et4 ~ c(40,
          0.1, 20,
          0.1, 0.1, 30),
          et5 ~ 6
})
```

## You can also add lists or actual R matrices as in this example:

```r
lotri({
          et2 + et3 + et4 ~ c(40,
          0.1, 20,
          0.1, 0.1, 30),
          et5 ~ 6
})
```
lotri(list(et2 + et3 + et4 ~ c(40, 0.1, 20, 0.1, 0.1, 30),
    matrix(1, dimnames=list("et5", "et5"))))

## Overall this is a flexible way to specify symmetric block diagonal matrices.

## For RxODE, you may also condition based on different levels of nesting with lotri; Here is an example:

mat <- lotri(lotri(iov.Ka ~ 0.5,
    iov.Cl ~ 0.6),
    lotri(occ.Ka ~ 0.5,
    occ.Cl ~ 0.6) | occ(lower=4, nu=3))

mat

## you may access features of the matrix simply by `$` that is

mat$lower # Shows the lower bound for each condition

mat$lower$occ # shows the lower bound for the occasion variable

## Note that `lower` fills in defaults for parameters. This is true
## for `upper` true; In fact when accessing this the defaults
## are put into the list

mat$upper

## However all other values return NULL if they are not present like

mat$lotri

## And values that are specified once are only returned on one list:

mat$nu

mat$nu$occ
mat$nu$id

## You can also change the default condition with `as.lotri`

mat <- as.lotri(mat, default="id")

mat

== lotriMat ==

Create a matrix from a list of matrices
Description

This creates a named banded symmetric matrix from a list of named symmetric matrices.

Usage

lotriMat(matList, format = NULL, start = 1L)

Arguments

matList  list of symmetric named matrices
format The format of dimension names when a sub-matrix is repeated. The format will be called with the dimension number, so "ETA[%d]" would represent "ETA[1]", "ETA[2]", etc
start The number the counter of each repeated dimension should start.

Value

Named symmetric block diagonal matrix based on concatenating the list of matrices together

Author(s)

Matthew Fidler

Examples

testList <- list(lotri({et2 + et3 + et4 ~ c(40,
  0.1, 20,
  0.1, 0.1, 30)}),
  lotri(et5 ~ 6))

testList

lotriMat(testList)

# Another option is to repeat a matrix a number of times. This can be done with list(matrix, # times to repeat).

# In the example below, the first matrix is repeated 3 times
testList <- list(list(lotri({et2 + et3 + et4 ~ c(40,
  0.1, 20,
  0.1, 0.1, 30)})), 3),
  lotri(et5 ~ 6))

dlMat(testList)

# Notice that the dimension names 'et2', 'et3' and 'et4' are repeated.

# Another option is to name the dimensions. For example it could
lotriSep

Separate a lotri matrix into above and below lotri matrices

Description

This is used for creating nesting simulations in 'RxODE' and may not be useful for external function calls.

Usage

lotriSep(x, above, below, aboveStart = 1L, belowStart = 1L)

Arguments

x
lotri matrix
above
Named integer vector listing variability above the id level. Each element lists the number of population differences in the whole data-set (as integer)
below
Named integer vector listing variability below the id level. Each element lists the number of items below the individual level. For example with 3 occasions per individual you could use `c(occ=3L)`
aboveStart
Add the attribute of where THETA[#] will be added
belowStart
Add the attribute of where ETA[#] will be added

Value

List of two lotri matrices

Author(s)

Matthew Fidler

Examples

omega <- lotri(lotri(eta.Cl ~ 0.1, 
  eta.Ka ~ 0.1) | id(nu=100), 
lotri(eye.Cl ~ 0.05, 
  eye.Ka ~ 0.05) | eye(nu=50), 
lotri iov.Cl ~ 0.01, 
  iov.Ka ~ 0.01) | occ(nu=200),
\textit{lotriSep}

\begin{verbatim}
  lotri(inv.Cl ~ 0.02, 
       inv.Ka ~ 0.02) | inv(nu=10))

  lotriSep(omega, above=c(inv=10L), below=c(eye=2L, occ=4L))
\end{verbatim}
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