Package ‘miscFuncs’

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Title Miscellaneous Useful Functions Including LaTeX Tables, Kalman Filtering and Development Tools
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Description Implementing various things including functions for LaTeX tables, the Kalman filter, web scraping, development tools, relative risk and odds ratio.
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Description

A function to print a welcome message on loading package

Usage

.onAttach(libname, pkgname)

Arguments

libname        libname argument
pkgname        pkgname argument

Value

...

bin

Description

A function to convert decimal to binary

Usage

bin(n)
**colour_legend**

**Arguments**

n a non-negative integer

**Value**

the binary representation stored in a vector.

---

**cor_taylor**

**cor_taylor function**

**Description**

A function to compute Taylor’s correlation coefficient ;-)  

**Usage**

cor_taylor(X)

**Arguments**

 X a numeric matrix with number of rows bigger than the number of columns

**Value**

Taylor’s correlation coefficient, a number between 0 and 1 expressing the amount of dependence between multiple variables.
The function `EKFadvance` is currently under development. It performs one iteration of the EKF.

**Usage**

```r
EKFadvance(
  obs,
  oldmean,
  oldvar,
  phi,
  phi.arglist,
  psi,
  psi.arglist,
  W,
  V,
  loglik = FALSE,
  na.rm = FALSE
)
```

**Arguments**

- `obs`: observations
- `oldmean`: old mean
- `oldvar`: old variance
- `phi`: Function computing a Taylor Series approximation of the system equation. Can include higher (ie 2nd order and above) terms.
- `phi.arglist`: arguments for function phi
- `psi`: Function computing a Taylor Series approximation of the observation equation. Can include higher (ie 2nd order and above) terms.
- `psi.arglist`: arguments for function psi
- `W`: system noise matrix
- `V`: observation noise matrix
- `loglik`: whether or not to compute the pseudo-likelihood
- `na.rm`: logical, whether or not to handle NAs. Default is FALSE. Set to TRUE if there are any missing values in the observed data.

**Value**

A list containing the new mean and variance, and if specified, the likelihood.
**generic**  

**generic function**  

**Description**  
A function to generate roxygen templates for generic functions and associated methods.

**Usage**  
generic(gen, methods = NULL, sp = 3, oname = "obj")

**Arguments**  
- `gen`: character string giving the name of an S3 generic.  
- `methods`: character vector: a list of methods for which to provide templates  
- `sp`: the amount of space to put in between functions  
- `oname`: name of the generic object  

**Value**  
roxygen text printed to the console.

---

**getstrbetween**  

**getstrbetween function**  

**Description**  
A function used in web scraping. Used to simplify the searching of HTML strings for information.

**Usage**  
getstrbetween(linedata, start, startmark, endmark, include = FALSE)

**Arguments**  
- `linedata`: a string  
- `start`: integer, where to start looking in linedata  
- `startmark`: character string, a pattern identifying the start mark  
- `endmark`: character string, a pattern identifying the end mark  
- `include`: include the start and end marks?  

**Value**  
the first string after start and between the start and end marks
getwikicoords function

Description

A function to return the lat/lon coordinates of towns in the UK from Wikipedia. Does not always work. Sometimes the county has to be specified too.

Usage

getwikicoords(place, county = NULL, rmslash = TRUE)

Arguments

place character, the name of the town
county character, the county it is in
rmslash remove slash from place name. Not normally used.

Value

The lat/lon coordinates from Wikipedia

KFAdvance function

Description

A function to compute one step of the Kalman filter. Embed in a loop to run the filter on a set of data.

Usage

KFAdvance(
  obs,  
  oldmean, 
  oldvar, 
  A, 
  B, 
  C, 
  D, 
  E, 
  F, 
  W, 
  V,  
  marglik = FALSE,
Arguments

- **obs** \( Y_t \)
- **oldmean** \( \mu_{t-1} \)
- **oldvar** \( \Sigma_{t-1} \)
- **A** matrix A
- **B** column vector B
- **C** matrix C
- **D** matrix D
- **E** column vector E
- **F** matrix F
- **W** state noise covariance
- **V** observation noise covariance
- **marglik** logical, whether to return the marginal likelihood contribution from this observation
- **log** whether or not to return the log of the likelihood contribution.
- **na.rm** na.rm logical, whether or not to handle NAs. Default is FALSE. Set to TRUE if there are any missing values in the observed data.

Details

The model is: (note that Y and theta are COLUMN VECTORS)

\[
\theta_t = A \theta_{t-1} + B + C W
\]
\[
Y_t = D \theta_t + E + F V
\]

\( W \) and \( V \) are the covariance matrices of the state and observation noise. Prior is normal, \( N(\mu_{t-1},\Sigma_{t-1}) \)

Result is the posterior, \( N(\mu_t,\Sigma_t) \), together with the likelihood contribution \( \text{Prob}(Y_t|Y_{t-1}) \)

Value

list containing the new mean and variance, and if specified, the likelihood
KFadvanceAR2

KFadvanceAR2 function

Description

A function to compute one step of the Kalman filter with second order AR state evolution. Embed in a loop to run the filter on a set of data.

Usage

KFadvanceAR2(
    obs,
    oldmean,
    oldermean,
    oldvar,
    oldervar,
    A,
    A1,
    B,
    C,
    D,
    E,
    F,
    W,
    V,
    marglik = FALSE,
    log = TRUE,
    na.rm = FALSE
)

Arguments

<table>
<thead>
<tr>
<th>Argument</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>obs</td>
<td>$Y_t$</td>
</tr>
<tr>
<td>oldmean</td>
<td>$\mu_{t-1}$</td>
</tr>
<tr>
<td>oldermean</td>
<td>$\mu_{t2}$</td>
</tr>
<tr>
<td>oldvar</td>
<td>$\Sigma_{t-1}$</td>
</tr>
<tr>
<td>oldervar</td>
<td>$\Sigma_{t-2}$</td>
</tr>
<tr>
<td>A</td>
<td>A matrix $A$</td>
</tr>
<tr>
<td>A1</td>
<td>A matrix $A_1$</td>
</tr>
<tr>
<td>B</td>
<td>column vector $B$</td>
</tr>
<tr>
<td>C</td>
<td>matrix $C$</td>
</tr>
<tr>
<td>D</td>
<td>matrix $D$</td>
</tr>
<tr>
<td>E</td>
<td>column vector $E$</td>
</tr>
<tr>
<td>F</td>
<td>matrix $F$</td>
</tr>
</tbody>
</table>
KFtemplates

\( w \) state noise covariance
\( V \) observation noise covariance
\( \text{marglik} \) logical, whether to return the marginal likelihood contribution from this observation
\( \log \) whether or not to return the log of the likelihood contribution.
\( \text{na.rm} \) na.rm logical, whether or not to handle NAs. Default is FALSE. Set to TRUE if there are any missing values in the observed data.

Details

The model is: (note that Y and theta are COLUMN VECTORS)

\[
\theta_t = A*\theta_{t-1} + A1*\theta_{t-2} + B + C*W \quad \text{(state equation)}
\]

\[
Y_t = D*\theta_t + E + F*V \quad \text{(observation equation)}
\]

W and V are the covariance matrices of the state and observation noise. Priors are normal, \( N(\mu_{t-1},\Sigma_{t-1}) \) and \( N(\mu_{t-2},\Sigma_{t-2}) \)

Result is the posterior, \( N(\mu_t,\Sigma_t) \), together with the likelihood contribution Prob\( (Y_t | Y_{t-1}) \)

Value

list containing the new mean and variance, and if specified, the likelihood

\[
\text{KFtemplates} \quad \text{KFtemplates function}
\]

Description

A function to print KFfit and KFparest templates to the console. See vignette("miscFuncs") for more information

Usage

\( \text{KFtemplates()} \)

Value

Just prints to the console. This can be copied and pasted into a text editor for further manipulation.
latexformat

latexformat function

Description
A function to format text or numeric variables using scientific notation for LaTeX documents.

Usage
latexformat(x, digits = 3, scientific = -3, ...)

Arguments
- x: a numeric, or character
- digits: see ?format
- scientific: see ?format
- ...: other arguments to pass to the function format

Value
...

latextable

latextable function

Description
A very useful function to create a LaTeX table from a matrix. Rounds numeric entries and also replaces small numbers with standard index form equivalents.

Usage
latextable(
  x,
  digits = 3,
  scientific = -3,
  colnames = NULL,
  rownames = NULL,
  caption = NULL,
  narep = " ",
  laststr = " ",
  intable = TRUE,
  ...
)
**method**

**Arguments**

- **x**: a matrix, or object that can be coerced to a matrix. x can include mixed character and numeric entries.
- **digits**: see help file for format
- **scientific**: see help file for format
- **colnames**: optional column names set to NULL (default) to automatically use column names of x. NOTE! if rownames is not NULL present, colnames must include an entry for the rownames i.e. it should be a vector of length the number of columns of x plus 1.
- **rownames**: optional row names set to NULL (default) to automatically use row names of x
- **caption**: optional caption, not normally used
- **narep**: string giving replacement for NA entries in the matrix
- **laststr**: string to write at end, eg note the double backslash!!
- **intable**: output in a table environment?
- **...**: additional arguments passed to format

**Details**

To get a backslash to appear, use a double backslash

Just copy and paste the results into your LaTeX document.

**Value**

prints the LaTeX table to screen, so it can be copied into reports

**Examples**

```r
latexable(as.data.frame(matrix(1:4,2,2)))
```

**Description**

A function to generate a roxygen template for a method of a generic S3 function. Normally, this would be called from the function generic, see ?generic

**Usage**

```r
method(meth, gen, oname = "obj")
```
Arguments

meth character, the name of the method

gen character the associated generic method

oname name of object

Value

a roxygen template for the method.

print22

Description

A function to print details of the 2 by 2 table for use with the function twotwoinfo.

Usage

print22()

Value

prints the names of the arguments of twotwofunction info to screen in their correct place in the 2 by 2 table

See Also

twotwoinfo

roxbc

Description

A function to build and check packages where documentation has been compiled with roxygen. Probably only works in Linux.

Usage

roxbc(name, checkflags = "--as-cran")

Arguments

name package name

checkflags string giving optional check flags to R CMD check, default is --as-cran
**roxbuild**

**Description**
A function to build packages where documentation has been compiled with roxygen. Probably only works in Linux.

**Usage**
roxbuild(name)

**Arguments**
- name: package name

**Value**
builds and checks the package

---

**roxtext**

**Description**
A function to generate roxygen documentation templates for functions for example,

**Usage**
roxtext(s)

**Arguments**
- s: a string enclosed in quotes

**Details**
would generate a template for this function. Note that functions with default arguments that include quotes will throw up an error at the moment, just delete these bits from the string, and it should work.

**Value**
minimal roxygen template
timeop  

**timeop function**

**Description**

A function to time an operation in R

**Usage**

```r
timeop(expr)
```

**Arguments**

- `expr`: an expression to evaluate

**Value**

The time it took to evaluate the expression in seconds

twotwoinfo  

**twotwoinfo function**

**Description**

A function to compute and display information about 2 by 2 tables for copying into LaTeX documents. Computes odds ratios and relative risks together with confidence intervals for 2 by 2 table and prints to screen in LaTeX format. The function will try to fill in any missing values from the 2 by 2 table. Type `print22()` at the console to see what each argument refers to.

**Usage**

```r
twotwoinfo(
  e1 = NA,
  u1 = NA,
  o1t = NA,
  e2 = NA,
  u2 = NA,
  o2t = NA,
  et = NA,
  ut = NA,
  T = NA,
  lev = 0.95,
  LaTeX = TRUE,
  digits = 3,
  scientific = -3,
  ...
)
```

vdc

Arguments

<table>
<thead>
<tr>
<th>e1</th>
<th>type print22() at the console</th>
</tr>
</thead>
<tbody>
<tr>
<td>u1</td>
<td>type print22() at the console</td>
</tr>
<tr>
<td>o1t</td>
<td>type print22() at the console</td>
</tr>
<tr>
<td>e2</td>
<td>type print22() at the console</td>
</tr>
<tr>
<td>u2</td>
<td>type print22() at the console</td>
</tr>
<tr>
<td>o2t</td>
<td>type print22() at the console</td>
</tr>
<tr>
<td>et</td>
<td>type print22() at the console</td>
</tr>
<tr>
<td>ut</td>
<td>type print22() at the console</td>
</tr>
<tr>
<td>T</td>
<td>type print22() at the console</td>
</tr>
<tr>
<td>lev</td>
<td>significance level for confidence intervals. Default is 0.95</td>
</tr>
<tr>
<td>LaTeX</td>
<td>whether to print the 2 by 2 information as LaTeX text to the screen, including the table, odds ratio, relative risk and confidence intervals</td>
</tr>
<tr>
<td>digits</td>
<td>see ?format</td>
</tr>
<tr>
<td>scientific</td>
<td>see ?format</td>
</tr>
<tr>
<td>...</td>
<td>other arguments passed to function format</td>
</tr>
</tbody>
</table>

Value

Computes odds ratios and relative risks together with confidence intervals for 2 by 2 table and prints to screen in LaTeX format.

See Also

print22

Description

A function to generate a Van der Corput sequence of numbers.

Usage

vdc(n)

Arguments

| n   | the length of the sequence |

Value

Van der Corput sequence of length n
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