

# Package ‘NCmisc’

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**Title** Miscellaneous general purpose functions

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**Description** A set of handy functions. Includes: versatile one line progress bar, one line function timer with detailed output, time delay function, text histogram, object preview, CRAN package search, simpler package installer, Linux command install check, a flexible Mode function, top function, simulation of correlated data, and more

**License** GPL (>= 2)

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NCmisc-package

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*Miscellaneous one line functions*


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## Description

A set of handy functions. Includes: versatile one line progress bar, one line function timer with detailed output, time delay function, text histogram, object preview, CRAN package search, simpler package installer, Linux command install check, a flexible Mode function, top function, simulation of correlated data, and more

## Details

Package: NCMisc  
Type: Package  
Version: 1.1.3  
Date: 2014-09-02  
License: GPL (>= 2)

A package of general purpose functions that might save time or help tidy up code. Some of these functions are similar to existing functions but are simpler to use or have more features (e.g. `timeit` and `loop.tracker` reduce an initialisation, 'during' and close three-line call structure, to a single function call. Also, some of these functions are useful for building packages and pipelines, for instance: `Header()`, to provide strong visual deliniation between procedures in console output, by an ascii bordered heading; `loop.tracker()` to track the progress of loops (called with only 1 line of code), with the option to periodically backup a key object during the loop; `estimate.memory()` to determine whether the object may exceed some threshold before creating it, `timeit()`, a one line wrapper for `proftools` which gives a detailed breakdown of time taken, and time within each function called during a procedure; and `check.linux.install()` to verify installation status of terminal commands before using `system()`, `top()` to examine current memory and CPU usage [using the system 'top' command]. `prv()` is useful for debugging as it allows a detailed preview of objects, and is as easy as placing print statements within loops/functions but gives more information, and gives compact output for large objects. For testing `sim.cor()` provides a simple way to simulate a correlated data matrix, as often this is more realistic than completely random data. Otherwise `summarise.r.datasets` gives a list of all available datasets and their structure and dimensionality.

List of key functions:

- *check.linux.install* Check whether a given system command is installed (e.g, bash)
- *cor.with* simulate a variable with a specified correlation to an existing variable
- *Dim* same as `dim()` function but works for more objects, including vectors
- *estimate.memory* Estimate the memory required for an object
- *exists.not.function* same as `exists()` function but ignores functions
- *extend.pc* Extend an interval by percentage
- *fakeLines* Create randomized lines of text for testing
- *force.percentage* Force argument to be a decimal percentage
- *force.scalar* Force argument to be a scalar
- *get.distinct.cols* Return up to 22 distinct colours
- *getRepositories* Return list of available repositories
- *headl* A good way to preview large lists
- *Header* Print heading text with a border
- *list.to.env* Inserts new variables in current environment from a named list
- *loess.scatter* Draw a scatterplot with a fit line
- *loop.tracker* Creates a progress bar within a loop with only 1 line

- *Mode* Find the mode(s) of a vector
- *must.use.package* Do everything possible to load an R package
- *narm* Return an object with missing values removed
- *out.of* Simplify outputting fractions/percentages
- *packages.loaded* quietly test whether packages are loaded without using require
- *pad.left* Print a vector with appropriate padding so each has equal char length
- *pctile* Find data thresholds corresponding to percentiles
- *preview* same as prv, but enter arguments as strings
- *prv.large* tidy representation for large matrices/data.frames
- *prv* compact preview of objects (more complete than 'print')
- *Rfile.index* Create an index file for an R function file
- *rmv.spc* Remove leading and trailing spaces (or other character)
- *search.cran* Search all CRAN packages for those containing keyword(s)
- *sim.cor* simulate a correlated dataset
- *simple.date* generate a string with compact summary of date/time
- *spc* Print a character a specified number of times
- *standardize* Convert a numeric vector to Z-scores
- *Substitute* multivariable version of substitute (base)
- *summarise.r.datasets* show and summarise all available example datasets
- *textogram* Make an ascii histogram in the console
- *timeit* Times an expression, with breakdown of time spent in functions
- *toheader* Return a string with each first letter of each word in upper case
- *top* report on CPU and memory usage, overall or by process
- *Unlist* Unlist a list, starting only from a set depth
- *wait* Wait for a period of time

### Author(s)

Nicholas Cooper

Maintainer: Nicholas Cooper <nick.cooper@cimr.cam.ac.uk>

### See Also

[reader](#) ~~

## Examples

```
#text histogram suited to working from a console without GUI graphics
textogram(rnorm(10000),range=c(-3,3))
# wait 0.2 seconds
wait(0.2,silent=FALSE)
# see whether a system command is installed
check.linux.install("sed")
# a nice progress bar
max <- 100; for (cc in 1:max) { loop.tracker(cc,max); wait(0.004,"s") }
# nice header
Header(c("SPACE","The final frontier"))
# memory reqd for proposed or actual object
estimate.memory(matrix(rnorm(100),nrow=10))
# a mode function (there isnt one included as part of base)
Mode(c(1,2,3,3,4,4,4))
# search for packages containing text, eg, misc
search.cran("misc",repos="http://cran.ma.imperial.ac.uk/")
# breakdown of processing time using profutils
# not run: timeit(wait(2,"s"),total.time=TRUE)
# simulate a correlated dataset
corDat <- sim.cor(200,5)
cor(corDat) # show correlation matrix
prv(corDat) # show compact preview of matrix
# Dim() versus dim()
Dim(1:10); dim(1:10)
# check whether package is loaded (when not required or dependency)
packages.loaded("bigmemory")
```

---

check.linux.install	<i>Check whether a given system command is installed (e.g, bash)</i>
---------------------	--

---

## Description

Tests whether a command is installed and callable by system(). Will return a warning if run on windows

## Usage

```
check.linux.install(cmd = c("plink", "perl", "sed"), linux.mode = FALSE)
```

## Arguments

cmd	character vector of commands to test
linux.mode	logical, alternate way of command testing that only works on linux and mac OS X, to turn this on, set to TRUE.

## Value

returns true or false for each command in 'cmd'

**Author(s)**

Nicholas Cooper <nick.cooper@cimr.cam.ac.uk>

**Examples**

```
check.linux.install("R") # should be standard
check.linux.install(c("perl", "sed", "fake-cmd"))
```

---

cor.with	<i>Simulate a correlated variable</i>
----------	---------------------------------------

---

**Description**

Simulate a variable correlated at level 'r' with vector x (of the same length). Can either 'preserve' the mean and standard-deviation, leave standardized, or select new mean 'mn' and standard deviation 'st'.

**Usage**

```
cor.with(x, r = 0.5, preserve = FALSE, mn = NA, st = NA)
```

**Arguments**

x	existing variable, to which you want to simulate a new correlated variable
r	the 'expected' correlation you want to target (randomness will mean that the actual correlation will vary around this value)
preserve	logical, whether to preserve the same mean and standard deviation(SD) as x, for the new variable
mn	optional, set the mean for the new simulated variable [must also set st if using this]
st	optional, set the SD for the new simulated variable [must also set mn if using this]

**Value**

return the new variable with an expected correlation of 'r' with x

**Author(s)**

Nicholas Cooper

**References**

[http://www.uvm.edu/~dhowell/StatPages/More\\_Stuff/CorrGen.html](http://www.uvm.edu/~dhowell/StatPages/More_Stuff/CorrGen.html)

**See Also**[sim.cor](#)**Examples**

```

X <- rnorm(10,100,14)
cor.with(X,r=.5) # create a variable correlated .5 with X
cor(X,cor.with(X)) # check the actual correlation
# some variability in the actual correlation, so run 1000 times:
print(mean(replicate(1000,{cor(X,cor.with(X))})))
cor.with(X,preserve=TRUE) # preserve original mean and standard deviation
X[c(4,10)] <- NA # works fine with NAs, but new var will have same missing
cor.with(X,mn=50,st=2) # specify new mean and standard deviation

```

Dim

*A more general dimension function***Description**

A more general 'dim' function. For arrays simply calls the dim() function, but for other data types, tries to provide an equivalent, for instance will call length(x) for vectors, and will recursively report dims for lists, and will attempt something sensible for other datatypes.

**Usage**

```
Dim(x, cat.lists = TRUE)
```

**Arguments**

x	the object to find the dimension for
cat.lists	logical, for lists, TRUE will concatenate the dimesions to a single string, or FALSE will return the sizes as a list of the same structure as the original.

**Value**

dimension(s) of the object

**See Also**[prv](#), [preview](#)**Examples**

```

# create variables of different types to show output styles #
Dim(193)
Dim(1:10)
testvar <- matrix(rnorm(100),nrow=25)
Dim(matrix(rnorm(100),nrow=25))
Dim(list(first="test",second=testvar,third=100:110))
Dim(list(first="test",second=testvar,third=100:110),FALSE)

```

---

estimate.memory

*Estimate the memory required for an object.*


---

## Description

Can enter an existing object or just the dimensions or total length of a proposed object. The estimate is based on the object being of numeric type. Integers use half the space of numeric, raw() use 1/8th of the space. Factors and characters can vary, although factors will always use less than numeric, and character variables may easily use up to twice as much depending on the length [nchar()] of each element.

## Usage

```
estimate.memory(dat, integer = FALSE, raw = FALSE, unit = c("gb", "mb",
  "kb", "b"), add.unit = FALSE)
```

## Arguments

dat	either a vector/matrix/dataframe object, or else up to 10 dimensions of such an object, or a potential object, i.e; c(nrow,ncol). If entering an object directly, you can leave out the 'integer' and 'raw' arguments as these will be detected from the object type. Any set of dimensions >10 will be assumed to be a vector, so if you have such an object, better to submit the total product [base::prod()].
integer	if the object or potential object is integer or logical type, set this argument to TRUE, if this is TRUE, the parameter 'RAW' will be ignored; integer and logical types use 1/2 of the memory of numeric types
raw	if the object or potential object is of 'raw' type, set this argument to TRUE, note that if 'integer' is TRUE, this parameter 'RAW' will be ignored; raw types use 1/8 of the memory of numeric types
unit	the storage units to use for the result, ie, "gb", "mb", "kb", "b" for gigabytes, megabytes, kilobytes, or bytes respectively.
add.unit	logical, whether to append the unit being used to the result, making the result character type instead of numeric.

## Value

returns the minimum memory requirement to store an object of the specified size, as a numeric scalar, in gigabytes (default) or else using the units specified by 'unit', and if add.unit = TRUE, then the result will be character type instead of numeric, with the units appended.

## Author(s)

Nicholas Cooper <nick.cooper@cimr.cam.ac.uk>



## Examples

```
myMatrix <- matrix(rnorm(100),nrow=10)
myVec <- sample(1:1000)
estimate.memory(myMatrix,unit="bytes") # enter a matrix object
estimate.memory(myVec,unit="kb" ,add.unit=TRUE) # enter a vector object
estimate.memory(c(10,10,10,10,10),unit="kb") # 5 dimensional array
estimate.memory(c(10^6,10^4), add.unit=TRUE) # large matrix
estimate.memory(5.4*10^8, add.unit=TRUE) # entering argument as # total cells, rather than dims
estimate.memory(5.4*10^8, integer=TRUE, add.unit=TRUE)
estimate.memory(5.4*10^8, raw=TRUE, add.unit=TRUE)
estimate.memory(5.4*10^8, TRUE, TRUE, add.unit=TRUE) # integer overrides raw
```

---

exists.not.function	<i>Does object exist ignoring functions</i>
---------------------	---

---

## Description

The exists() function can tell you whether an object exists at all, or whether an object exists with a certain type, but it can be useful to know whether an object exists as genuine data (and not a function) which can be important when a variable or object is accidentally or intentionally given the same name as a function. This function usually returns a logical value as to the existence of the object (ignoring functions) but can also be set to return the non-function type if the object exists.

## Usage

```
exists.not.function(x, ret.type = FALSE)
```

## Arguments

x	the object name to search for
ret.type	logical, if TRUE then will return the objects' type (if it exists) rather than TRUE or FALSE. If the object doesn't exist the empty string will be returned as the type.

## Value

logical, whether non-function object exists, or else the type if ret.type=TRUE

## Author(s)

Nicholas Cooper

## Examples

```
x <- "test"
# the standard exists function, for all modes, correct mode, and other modes:
exists("x")
exists("x",mode="character")
exists("x",mode="numeric")
# standard case for a non-function variable
exists.not.function("x",TRUE)
# compare results for a non-existent variable
exists("aVarNotSeen")
exists.not.function("aVarNotSeen")
# compare results for variable that is a function
exists("mean")
exists.not.function("mean")
# define a variable with same name as a function
mean <- 1.4
# exists.not.function returns the type of the variable ignoring the function of the same name
exists.not.function("mean",TRUE)
exists("mean",mode="function")
exists("mean",mode="numeric")
```

---

extend.pc

*Extend an interval by percentage*

---

## Description

For various reasons, such as applying windows, setting custom range limits for plots, it may be desirable to extend an interval by a certain percentage.

## Usage

```
extend.pc(X, pc = 0.5, pos = TRUE, neg = TRUE, swap = FALSE)
```

## Arguments

X	a numeric range, should be length 2. If a longer numeric, will be coerced with <code>range()</code>
pc	percentage by which to extend X, can be entered in either percentage style: $0 < pc < 1$ ; or $1 < pc < 100$
swap	logical, if TRUE, flip the extension directions if $X[2] < X[1]$ , ie, not in numerical order
pos	logical, if TRUE, make an extension in the positive direction
neg	logical, if TRUE, make an extension in the negative direction

**Examples**

```

extend.pc(c(2,10),0.25) # extend X symmetrically
extend.pc(c(2:10),0.25) # extend the range of X
# the following 3 examples extend X by 1% only in the positive direction
extend.pc(c(25000,55000),.01,neg=FALSE) # standard positive extension
extend.pc(c(55000,25000),.01,neg=FALSE) # ranges in reverse order, not swapped
extend.pc(c(55000,25000),.01,neg=FALSE,swap=TRUE) # ranges in reverse order, swapped

```

---

fakeLines

---

*Create fake text for testing purposes*


---

**Description**

Returns randomized input as if reading lines from a file, like 'readLines()' Can be used to test i/o functions, robustness.

**Usage**

```

fakeLines(max.lines = 10, max.chars = 100, pc.space = 0.35, delim = " ",
          can.null = TRUE)

```

**Arguments**

max.lines	maximum number of fake lines to read
max.chars	maximum number of characters per line
pc.space	percentage of randomly generated characters that should be a delimiter
delim	what should the simulated delimiter be, e.g, a space, comma etc. If you wish not to include such either set the delimiter as "", or set pc.space=0.
can.null	whether with probability 1/max.lines to return NULL instead of any lines of text, which simulates an empty file, which for testing purposes you may want to be able to handle

**Value**

a vector of character entries up 'max.chars' long, or sometimes only NULL if can.null=TRUE

**Author(s)**

Nicholas Cooper

**Examples**

```

fakeLines() # should produce between zero and ten lines of random text, 35% of which are spaces

```

---

file.split

---

*Split a text file into multiple parts*


---

### Description

Wrapper for the bash command 'split' that can separate a text file into multiple roughly equal sized parts. This function removes the need to remember syntax and suffixes of the bash command

### Usage

```
file.split(fn, size = 50000, same.dir = FALSE, verbose = TRUE,
  suf = "part")
```

### Arguments

fn	character, file name of the text file to split, if the file is an incompatible format the linux command should return an error message to the console
size	integer, the maximum number of lines for the split parts of the file produced
same.dir	logical, whether the resulting files should be moved to the same directory as the original file, or simply left in the working directory [getwd()]
verbose	logical, whether to report the resulting file names to the console
suf	character, suffix for the split files, default is 'part', the original file extension will be appended after this suffix

### Value

returns the list of file names produced (including path)

### Author(s)

Nicholas Cooper

### Examples

```
orig.dir <- getwd(); setwd(tempdir()); # move to temporary dir
file.name <- "myfile.txt"
writeLines(fakeLines(max.lines=1000),con=file.name)
new.files <- file.split(file.name,size=50)
unlink(new.files); unlink(file.name)
setwd(orig.dir) # reset working dir to original
```

---

force.percentage	<i>Force argument to be a percentage with length one</i>
------------------	--

---

### Description

Sometimes it is nice to be able to take a percentage as an argument and not have to specify whether it should be entered as a number between 0 and 100, e.g, 50 = 50 than 1 and less than 100 will be divided by 100. Anything outside 0,100 will be set to 0,100 respectively.

### Usage

```
force.percentage(x, default = 0.5)
```

### Arguments

x	the object to ensure is a oercentage
default	the value to revert to if the format of x is illegal

### Value

the object x if already legal, first element if a vector, the min or max value if x is outside the specified bounds, or the value of default otherwise

### See Also

[force.scalar](#)

### Examples

```
# create variables of different types to show output styles #
force.percentage(45)
force.percentage(450)
force.percentage(.45)
force.percentage(-45)
force.percentage("twenty")
force.percentage(NA,default=0.25)
```

---

force.scalar	<i>Force argument to be a numeric type with length one</i>
--------------	--

---

### Description

Sometimes arguments must be numeric, scalar and within a certain range. Rather than using many if statements, this will do everything possible to coerce input to a scalar, failing that will replace with a default value. Can also provide a maximum and minimum range that the result must lie within.

**Usage**

```
force.scalar(x, default = 1, min = -10^10, max = 10^10)
```

**Arguments**

x	the object to ensure is a scalar
default	the value to revert to if the format of x is illegal
min	a lower bound for the output, anything below this is set to min
max	an upper bound for the output, anything above this is set to max

**Value**

the object x if already legal, first element if a vector, the min or max value if x is outside the specified bounds, or the value of default otherwise

**See Also**

[force.percentage](#)

**Examples**

```
force.scalar(1.5)
force.scalar(NULL,default=.5)
force.scalar(NA,default=.4,min=5,max=10) # default is outside range!
force.scalar(rnorm(1000))
force.scalar(101,max=50)
force.scalar(list(0.4,1,2,3,4,"test"))
force.scalar(data.frame(test=c(1,2,3),name=c("test","me","few")))
force.scalar(Inf)
```

---

get.distinct.cols	<i>Return up to 22 distinct colours.</i>
-------------------	--

---

**Description**

Useful if you want to colour 22 autosomes, etc, because most R colour palettes only provide 12 or fewer colours, or else provide, a gradient which is not distinguishable for discrete categories. Manually curated so the most similar colours aren't side by side.

**Usage**

```
get.distinct.cols(n = 22)
```

**Arguments**

n	number of unique colours to return
---	------------------------------------

**Value**

returns vector of n colours

**Author(s)**

Nicholas Cooper <nick.cooper@cimr.cam.ac.uk>

**Examples**

```
get.distinct.cols(10)
plot(1:22,pch=19,col=get.distinct.cols(22))
```

---

getRepositories	<i>Detect all available R repositories.</i>
-----------------	---

---

**Description**

In addition to the default CRAN repository, there are other repositories such as R-Forge, Omegahat, and bioConductor (which is split in to software, annotation, experiments and extras). This function allows you to retrieve which are available. This function complements (and takes code from) `utils::setRepositories()`, which will just set, not return which are available, but see there for more information about how this works. Detecting the available repositories can be useful to precede a call to `setRepositories`, and allows you to utilise these repositories without calling `setRepositories` (which is hard to reverse). This function can be used to expand the search space of the function `search.cran()` to include bioconductor packages.

**Usage**

```
getRepositories(ind = NULL, table = FALSE)
```

**Arguments**

<code>ind</code>	index, same as for 'setRepositories', if NULL this function returns all available repositories, or if an index, returns a subset.
<code>table</code>	logical, if TRUE, return a table of information, else just return the URLs, which are the required input for the 'repos' argument for relevant functions, e.g, <code>available.packages()</code> or <code>search.cran()</code>

**Value**

list of repositories with URLs, note that it is the URL that works best for use for passing a value for 'repos' to various functions.

**Author(s)**

Nicholas Cooper <nick.cooper@cimr.cam.ac.uk>

**Examples**

```

repos <- "http://cran.ma.imperial.ac.uk/" # OR: repos <- getOption("repos")
getRepositories(table=TRUE) # shows all available
getRepositories(2:5,FALSE) # returns index for all bioconductor repositories (on my system at least)
search.cran("genoset",repos=getRepositories(1)) # does not find this bioconductor package on CRAN
search.cran("genoset",repos=getRepositories()) # should now, because all repositories are used

```

---

Header

---

*Print heading text with a border.*


---

**Description**

Makes highly visible headings, can separately horizontal, vertical and corner characters

**Usage**

```
Header(txt, h = "=", v = h, corner = h, align = "center")
```

**Arguments**

txt	The text to display in the centre
h	the ascii character to use on the horizontal sections of the border, and used for v,corner too if not specified separately
v	the character to use on vertical sections of the border
corner	the character to use on corner sections of the border
align	alignment of the writing, when there are multiple lines, e.g, "right", "left", "centre"/"center"

**Value**

returns nothing, simply prints the heading to the console

**Author(s)**

Nicholas Cooper <nick.cooper@cimr.cam.ac.uk>

**Examples**

```

Header("Section 1")
Header("Section 1",h="-",v="|",corner="*")
Header(c("SPACE","The final frontier"))
Header(c("MY SCRIPT","Part 1"),align="left",h=".")

```



---

headl	<i>A good way to preview large lists.</i>
-------	---

---

## Description

An alternative to `head(list)` which allows limiting of large list components in the console display

## Usage

```
headl(x, n = 6, skip = 20, skip2 = 10, ind = "", ind2 = "  ")
```

## Arguments

x	a list to preview
n	The number of values to display for the deepest nodes of the list
skip	number of first level elements to display before skipping the remainder
skip2	number of subsequent level elements to display before skipping the remainder
ind	indent character for first level elements
ind2	indent character for subsequent level elements

## Value

prints truncated preview of a large list

## Author(s)

Nicholas Cooper <nick.cooper@cimr.cam.ac.uk>

## Examples

```
sub1 <- list(list(1:100),list(2:101),list(101:200),list(201:300),list(301:400))
big.list <- list(sub1,sub1,sub1,sub1,sub1,sub1)
headl(sub1)
headl(big.list,skip=2)
```

---

list.to.env	Create variables from a list
-------------	------------------------------

---

### Description

Places named objects in a list into the working environment as individual variables. Can be particularly helpful when you want to call a function that produces a list of multiple return variables; this gives a way to access them all at once in the environment from which the function was called.

### Usage

```
list.to.env(list)
```

### Arguments

list	list, with named objects, each element will become a named variable in the current environment
------	--

### Value

New variables will be added to the current environment. Any already existing with the same name will be overwritten.

### Examples

```
list.to.env(list(myChar="a string", myNum=1234, myList=list("list within a list",c(1,2,3))))
print(myChar)
print(myNum)
print(myList)
two.arg.return <- function(X) { return(list(Y=X+1,Z=X*10)) }
result <- two.arg.return(11) # function returns list with 2 variables
list.to.env(result)
print(Y); print(Z)
```

---

loess.scatter	Draw a scatterplot with a fit line
---------------	------------------------------------

---

### Description

Drawing a fit line usually requires some manual steps requiring several lines of code, such as ensuring the data is sorted by x, and for some functions doesn't contain missing values. This function takes care of these steps and automatically adds a loess fitline, or non-linear fitline. The type of scatter defaults to 'plot', but other scatter plot functions can be specified, such as graphics::smoothScatter(), for example. If 'file' is specified, will automatically plot to a pdf of that name.

**Usage**

```
loess.scatter(x, y, file = NULL, loess = TRUE, span = 0.75,
  scatter = plot, ..., ylim = NULL, return.vectors = FALSE,
  fit.col = "red", fit.lwd = 2, fit.lty = "solid", fit.leg = TRUE,
  fit.r2 = TRUE)
```

**Arguments**

<code>x</code>	data for the horizontal axis (independent variable)
<code>y</code>	data for the vertical axis (dependent variable)
<code>file</code>	file name for pdf export, leave as NULL if simply plotting to the GUI. File extension will be added automatically if missing
<code>loess</code>	logical, if TRUE, fit using loess(), else use a polynomial fit
<code>span</code>	numeric scalar, argument passed to the 'span' parameter of loess(), see ?loess for details
<code>scatter</code>	function, by default is graphics::plot(), but any scatter-plot function of the form F(x,y,...) can be used, for example graphics::smoothScatter().
<code>ylim</code>	numeric range for y axis, argument passed to plot(), see ?plot.
<code>return.vectors</code>	logical, if TRUE, do not plot anything, just return the x and y coordinates of the fit line as a list of vectors, x and y.
<code>fit.col</code>	colour of the fit line
<code>fit.lwd</code>	width of the fit line
<code>fit.lty</code>	type of the fit line
<code>fit.leg</code>	whether to include an automatic legend for the fit line (will alter the y-limits to fit)
<code>fit.r2</code>	logical, whether to display r squared of the fit in the fit legend
<code>...</code>	further arguments to the plot function specified by 'scatter', e.g. 'main', 'xlab', etc

**Value**

if `file` is a character argument, plots data `x,y` to a file, else will generate a plot to the current plotting environment/GUI. The display of the `x,y` points defaults to 'plot', but alternate scatter plot functions can be specified, such as `graphics::smoothScatter()` which used density smoothing, for example. Also, another option is to set `return.vectors=TRUE`, and then the coordinates of the fit line will be returned, and no plot will be produced.

**Examples**

```
library(NCmisc)
require(KernSmooth)
DD <- sim.cor(1000,4) # create a simulated, correlated dataset
loess.scatter(DD[,3],DD[,4],loess=FALSE,bty="n",pch=".",cex=2)
loess.scatter(DD[,3],DD[,4],scatter=smoothScatter)
xy <- loess.scatter(DD[,3],DD[,4],return.vectors=TRUE)
prv(xy) # preview the vectors produced
```

---

loop.tracker	<i>Creates a progress bar within a loop</i>
--------------	---

---

### Description

Only requires a single line within a loop to run, in contrast with the built-in tracker which requires a line to initialise, and a line to close. Also has option to backup objects during long loops. Ideal for a loop with a counter such as a for loop. Tracks progress as either percentage of time remaining or by intermittently displaying the estimated number of minutes to go

### Usage

```
loop.tracker(cc, max, st.time = NULL, sav.obj = NULL, sav.fn = NA,
  sav.freq = 10, unit = c("m", "s", "h")[1])
```

### Arguments

cc	integer, current value of the loop counter
max	integer, final value of the loop counter
st.time	'start time' when using 'time to go' mode, taken from a call to proc.time()
sav.obj	optionally an object to backup during the course of a very long loop, to restore in the event of a crash.
sav.fn	the file name to save 'sav.obj'
sav.freq	how often to update 'sav.obj' to file, in terms of percentage of run-time
unit	time units h/m/s if using 'time to go' mode

### Value

returns nothing, simply prints progress to the console

### Author(s)

Nicholas Cooper <nick.cooper@cimr.cam.ac.uk>

### Examples

```
# simple example with a for-loop
max <- 100; for (cc in 1:max) { loop.tracker(cc,max); wait(0.004,"s") }
#example using the time to go with a while loop
cc <- 0; max <- 10; start <- proc.time()
while(cc < max) { cc <- cc + 1; wait(0.05,"s"); loop.tracker(cc,max,start,unit="s") }
# example with saving an object, and restoring after a crash
X <- matrix(rnorm(5000),nrow=50); max <- nrow(X); sums <- numeric(max)
for (cc in 1:max) {
  sums[cc] <- sum(X[cc,])
  wait(.05) # just so this trivial loop doesnt finish so quickly
  loop.tracker(cc,max, sav.obj=sums, sav.fn="temp.rda", sav.freq=5);
```

```

    if(cc==29) { warning("faked a crash at iteration 29!"); rm(sums); break }
  }
  cat("\nloaded latest backup from iteration 28:",paste(load("temp.rda")), "\n")
  print(sav.obj); unlink("temp.rda")

```

---

memory.summary	<i>Summary of RAM footprint for all R objects in the current session. Not my function, but taken from an R-Help response by Elizabeth Purdom, at Berkeley. Simply applies the function 'object.size' to the objects in ls(). Also very similar to an example in the 'Help' for the utils::object.size() function.</i>
----------------	---

---

## Description

Summary of RAM footprint for all R objects in the current session. Not my function, but taken from an R-Help response by Elizabeth Purdom, at Berkeley. Simply applies the function 'object.size' to the objects in ls(). Also very similar to an example in the 'Help' for the utils::object.size() function.

## Usage

```
memory.summary(unit = c("kb", "mb", "gb", "b"))
```

## Arguments

unit	default is to display "kb", but you can also choose "b"=bytes, "mb"= megabyte, or "gb" = gigabytes. Only the first letter is used, and is not case sensitive, so enter units how you like.
------	--

## Value

a list of object names with memory usage in bytes

## Examples

```

memory.summary() # shows memory used by all objects in the current session in kb
memory.summary("mb") # change units to megabytes

```

---

Mode

*Find the mode of a vector.*


---

### Description

The mode is the most common value in a series. This function can return multiple values if there are equally most frequent values, and can also work with non-numeric types.

### Usage

```
Mode(x, multi = FALSE, warn = FALSE)
```

### Arguments

x	The data to take the mode from. Dimensions and NA's are removed if possible, strings, factors, numeric all permitted
multi	Logical, whether to return multiple modes if values have equal frequency
warn	Logical, whether to give warnings when multiple values are found (if multi=FALSE)

### Value

The most frequent value, or sorted set of most frequent values if multi==TRUE and there are more than one. Numeric if x is numeric, else as strings

### Author(s)

Nicholas Cooper <nick.cooper@cimr.cam.ac.uk>

### Examples

```
Mode(c(1,2,3,3,4,4)) # 2 values are most common, as multi=FALSE,
# selects the last value (after sort)
Mode(c(1,2,3,3,4,4),multi=TRUE) # same test with multi=T,
# returns both most frequent
Mode(matrix(1:16,ncol=4),warn=TRUE) # takes mode of the entire
# matrix treating as a vector, but all values occur once
Mode(c("Tom","Dick","Harry"),multi=FALSE,warn=TRUE) # selects last
# sorted value, but warns there are multiple modes
Mode(c("Tom","Dick","Harry"),multi=TRUE,warn=TRUE) # multi==TRUE so
# warning is negated
```

---

must.use.package	<i>Do everything possible to load an R package.</i>
------------------	---

---

## Description

Like 'require()' except it will attempt to install a package if necessary, and will also deal automatically with bioconductor packages too. Useful if you wish to share code with people who may not have the same libraries as you, you can include a call to this function which will simply load the library if present, or else install, then load, if they do not have it.

## Usage

```
must.use.package(pcknms, bioC = FALSE, ask = FALSE, reload = FALSE,
  avail = FALSE, quietly = FALSE)
```

## Arguments

pcknms	list of packages to load/install, shouldn't mix bioconductor/CRAN in one call
bioC	whether the listed packages are from bioconductor
reload	indicates to reload the package even if loaded
avail	when bioC=FALSE, see whether pcknms are in the list of available CRAN packages
ask	whether to get the user's permission to install a required package, or just go ahead and do it
quietly	passed to library/require, display installation text or not

## Value

nothing, simply loads the packages specified if possible

## Author(s)

Nicholas Cooper <nick.cooper@cimr.cam.ac.uk>

## Examples

```
# not run : run if you are ok to install/already have these packages
# must.use.package(c("MASS", "nlme", "lme4"), ask=FALSE)
# must.use.package("limma", bioC=TRUE)
# search() # show packages have loaded, then detach them again:
# sapply(paste("package", c("limma", "MASS", "nlme", "lme4")), sep=":"), detach, character.only=TRUE)
```

---

narm

*Return an object with missing values removed.*


---

### Description

Convenience function, removes NAs from most standard objects. Uses function `na.exclude` for matrices and dataframes. Main difference to `na.exclude` is that it simply performs the transformation, without adding attributes. For unknown types, leaves unchanged with a warning.

### Usage

```
narm(X)
```

### Arguments

X                      The object to remove NAs, any vector, matrix or data.frame

### Value

Vector minus NA's, or the matrix/data.frame minus NA rows. If it's a character vector then values of "NA" will also be excluded in addition to values = NA, so be careful if "NA" is a valid value of your character vector. Note that "NA" values occur when `'paste(...,NA,...)'` is applied to a vector of any type, whereas `'as.character(...,NA,...)'` avoids this.

### Author(s)

Nicholas Cooper <nick.cooper@cimr.cam.ac.uk>

### Examples

```
narm(c(1,2,4,NA,5))
DF <- data.frame(x = c(1, 2, 3), y = c(0, 10, NA))
DF; narm(DF)
# if a list, will only completely remove NA from the lowest levels
# empty places will be left at top levels
print(narm(list(1,2,3,NA,list(1,2,3,NA))))
```

---

out.of

*Easily display fraction and percentages*


---

### Description

For a subset 'n' and total 'N', nicely prints text n/N and/or percentage. Often we want to display proportions and this simple function reduces the required amount of code for fraction and percentage reporting. If insufficient digits are provided small percentage may truncate to zero.



**Usage**

```
out.of(n, N = 100, digits = 2, pc = TRUE, oo = TRUE, use.sci = FALSE)
```

**Arguments**

n	numeric, the count for the subset of N (the numerator)
N	numeric, the total size of the full set (the denominator)
digits,	integer, the number of digits to display in the percentage
pc,	logical, whether to display the percentage of N that n comprises
oo,	logical, whether to display n/N as a fraction
use.sci,	logical, whether to allow scientific notation for small/large percentages.

**Value**

A string showing the fraction n/N and percentage (or just one of these)

**Examples**

```
out.of(345,12144)
out.of(345,12144,pc=FALSE)
out.of(3,10^6,digits=6,oo=FALSE)
out.of(3,10^6,digits=6,oo=FALSE,use.sci=TRUE)
```

---

packages.loaded

*Check whether a set of packages has been loaded*

---

**Description**

Returns TRUE if the whole set of packages entered has been loaded, or FALSE otherwise. This can be useful when developing a package where there is optional functionality depending if another package is in use (but the other package is not part of 'depends' because it is not essential). Because 'require' cannot be used within functions submitted as part of a CRAN package.

**Usage**

```
packages.loaded(pcks = "", ..., cran.check = TRUE,
  repos = getRepositories())
```

**Arguments**

pcks	character, a package name, or vector of names, if left blank will return all loaded
...	further package names as character (same as entering via pcks, but avoids need for c() in pcks)
cran.check	logical, in the case at least one package is not found, whether to search CRAN and see whether the package(s) even exist on CRAN.

repos repository to use if package is not loaded and cran.check=TRUE, if NULL, will attempt to use the repository in getOptions("repos") or will default to the imperial.ac.uk mirror. Otherwise the default is to use all available repositories from getRepositories()

### Value

logical TRUE or FALSE whether the whole list of packages are available

### Author(s)

Nicholas Cooper

### Examples

```
packages.loaded("NCmisc","reader")
packages.loaded(c("bigpca","nonsenseFailTxt")) # both not found, as second not real
packages.loaded(c("bigpca","nonsenseFailTxt"),cran.check=FALSE) # hide warning
packages.loaded() # no argument means all loaded packages are listed
packages.loaded("snpStats",repos=getRepositories(1)) # doesnt find the bioconductor package on CRAN
packages.loaded("snpStats",repos=getRepositories()) # now it can find it by using all repositories
```

---

pad.left

*Print a vector with appropriate padding so each has equal char length.*

---

### Description

Print a vector with appropriate padding so each has equal char length.

### Usage

```
pad.left(X, char = " ", numdigits = NA)
```

### Arguments

X	vector of data to pad to equal length
char	character to pad with, space is default, but zero might be a desirable choice for padding numbers
numdigits	if using numeric data, the number of digits to keep

### Value

returns the vector in character format with equal nchar()

### Author(s)

Nicholas Cooper <nick.cooper@cimr.cam.ac.uk>

**Examples**

```
pad.left(1:10)
phone.numbers <- c("07429719234", "7876345123", "7123543765")
pad.left(phone.numbers, "0")
pad.left(rnorm(10), numdigits=3)
```

---

pctile	<i>Find data thresholds corresponding to percentiles</i>
--------	--

---

**Description**

Finds the top and bottom bounds corresponding to percentile 'pc' of the data 'dat'.

**Usage**

```
pctile(dat, pc = 0.01)
```

**Arguments**

dat	numeric vector of data
pc	the percentile to seek, c(pc, 1-pc)

**Value**

returns the upper and lower threshold

**Author(s)**

Nicholas Cooper <nick.cooper@cimr.cam.ac.uk>

**Examples**

```
pctile(rnorm(100000), .025)
pctile(sample(100), .9)
```

---

```
preview
```

---

*Output variable states within functions during testing/debugging*

---

## Description

A versatile function to compactly display most common R objects. Will return the object name, type, dimension, and a compact representation of object contents, for instance using `prv.large()` to display matrices, so as to not overload the console for large objects. Useful for debugging, can be placed inside loops and functions to track values, dimensions, and data types. Particularly when debugging complex code, the automatic display of the variable name prevents confusion versus using regular print statements. By listing variables to track as `character()`, provides 'cat()' output of compact and informative variable state information, e.g, variable name, value, datatype and dimension. Can also specify array or list elements, or custom labels. `prv()` is the same as `preview()` except it can take objects without using double quotes and has no 'labels' command (and doesn't need one).

## Usage

```
preview(varlist, labels = NULL, counts = NULL, assume.char = FALSE,
        prv.call = FALSE)
```

## Arguments

<code>varlist</code>	character vector, the list of variable(s) to report, which will trigger automatic labelling of the variable name, otherwise if entered as the variable value (ie. without quotes, then will by default be displayed as 'unknown variable')
<code>labels,</code> <code>counts</code>	will label 'unknown variables' (see above) if entered as variables without quotes a list of array index values; so if calling during a counting loop, the value can be reported each iteration, also printing the count index; if the list is named the name will also appear, e.g, <code>variable[count=1]</code> . This list must be the same length as <code>varlist</code> (and <code>labels</code> if not <code>NULL</code> ), and each element <code>[[i]]</code> must contain as many values as the original corresponding <code>varlist[i]</code> has dimensions. The dimensions must result in a 1x1 scalar
<code>assume.char</code>	usually 'varlist' is a character vector of variable names, but in the case that it is actually a character variable, using <code>assume.char=TRUE</code> will ensure that it will be assumed the character variable is the object to preview, rather than a list of variable names. So long as none of the values are found to be variable names in the global environment. <code>preview()</code> can also find variables in local environments, and if this is where the target variable lies, it is best to use <code>assume.char=FALSE</code> , otherwise the search for alternative environments might not happen. Note that in most cases the automatic detection of the input should understand what you want, regardless of the value of <code>assume.char</code> .
<code>prv.call</code>	It is recommended to always leave this argument as <code>FALSE</code> when calling <code>preview()</code> directly. If set to <code>TRUE</code> , it will first search 2 generations back for the parent frame, instead of one, as it will assume that the variable(s) to preview are not directly called by <code>preview()</code> , but through a wrapper for preview, such as <code>prv()</code> .

**See Also**[Dim](#)**Examples**

```
# create variables of different types to show output styles #
testvar1 <- 193
testvar2 <- "Ato1"
testvar3 <- c(1:10)
testvar4 <- matrix(rnorm(100),nrow=25)
testvar5 <- list(first="test",second=testvar4,third=100:110)
preview("testvar1")
preview("testvar4")
preview(paste("testvar",1:5,sep=""))
preview(testvar1,"myvarname")
preview(testvar1)
# examples with loops and multiple dimensions / lists
for (cc in 1:4) {
  for (dd in 1:4) { preview("testvar4",counts=list(cc,dd)) }}

for (dd in 1:3) { preview("testvar5",counts=list(dd=dd)) }
```

prv

---

*Output variable states within functions/loops during testing/debugging*

---

**Description**

Same as preview but no labels command, and input is without quotes and should be plain variable names of existing variables (no indices, args, etc) A versatile function to compactly display most common R objects. Will return the object name, type, dimension, and a compact representation of object contents, for instance using prv.large() to display matrices, so as to not overload the console for large objects. Useful for debugging, can be placed inside loops and functions to track values, dimensions, and data types. Particularly when debugging complex code, the automatic display of the variable name prevents confusion versus using regular print statements. By listing variables to track as character(), provides 'cat()' output of compact and informative variable state information, e.g, variable name, value, datatype and dimension. Can also specify array or list elements, or custom labels. prv() is the same as preview() except it can take objects without using double quotes and has no 'labels' command (and doesn't need one). If expressions are entered rather than variable names, then prv() will attempt to pass the arguments to preview(). prv() assumes that the variable(s) to report originate from the environment calling prv(), and if not found there, then it will search through all accessible environments starting with the global environment, and then will report the first instance found, which in exceptional circumstances (be warned) may not be the instance you intended to retrieve.

**Usage**

```
prv(..., counts = NULL)
```

**Arguments**

...	series of variable(s) to report, separated by commas, which will trigger automatic labelling of the variable name
counts	a list of array index values; so if calling during a counting loop, the value can be reported each iteration, also printing the count index; if the list is named the name will also appear, e.g, variable[count=1]. This list must be the same length as the variable list ... , and each element [[i]] must contain as many values as the original corresponding variable list[i] has dimensions

**See Also**[Dim](#)**Examples**

```
# create variables of different types to show output styles #
testvar1 <- 193
testvar2 <- "Ato1"
testvar3 <- c(1:10)
testvar4 <- matrix(rnorm(100),nrow=25)
testvar5 <- list(first="test",second=testvar4,third=100:110)
preview("testvar1"); prv(testvar1)
prv(testvar1,testvar2,testvar3,testvar4)
prv(matrix(rnorm(100),nrow=25)) # expression sent to preview() with no label
prv(193) # fails as there are no object names involved
```

---

prv.large*Tidy display function for matrix objects*

---

**Description**

This function prints the first and last columns and rows of a matrix, and more, if desired. Allows previewing of a matrix without overloading the console. Most useful when data has row and column names.

**Usage**

```
prv.large(largeMat, rows = 3, cols = 2, digits = 4, rL = "Row#",
  rlab = "rownames", clab = "colnames", rownums = T, ret = FALSE,
  warn = TRUE)
```

**Arguments**

largeMat	a matrix
rows	number of rows to display
cols	number of columns to display
digits	number of digits to display for numeric data

rL	row label to describe the row names/numbers, e.g, row number, ID, etc
rlab	label to describe the data rows
clab	label to describe the data columns
rownums	logical, whether to display rownumbers or ignore them
ret	logical, whether to return the result as a formatted object, or just print to console
warn	logical, whether to warn if the object type is not supported

### Examples

```
mat <- matrix(rnorm(1000),nrow=50)
rownames(mat) <- paste("ID",1:50,sep="")
colnames(mat) <- paste("Var",1:20,sep="")
prv.large(mat)
prv.large(mat,rows=9,cols=4,digits=1,rlab="samples",clab="variables",rownums=FALSE)
```

---

Rfile.index	<i>Create an index file for an R function file</i>
-------------	--

---

### Description

Create a html index for an R function file by looking for functions, add descriptions using comments directly next to the function() command. Note that if too much code other than well-formatted functions is in the file then the result is likely not to be a nicely formatted index.

### Usage

```
Rfile.index(fn, below = TRUE, fn.out = "out.htm", skip.indent = TRUE)
```

### Arguments

fn	an R file containing functions in standard R script
below	whether to search for comment text below or above the function() calls
fn.out	optional name for the output file, else will be based on the name of the input file
skip.indent	whether to skip functions that are indented, the assumption being they are functions within functions

### Value

creates an html file with name and description of each function

### Author(s)

Nicholas Cooper <nick.cooper@cimr.cam.ac.uk>

### Examples

```
# not run: rfile <- file.choose() # choose an R script file with functions
# not run: out <- Rfile.index(rfile,fn.out="temp.htm")
# unlink("temp.htm") # run once youve inspected this file in a browser
```

---

rmv.spc

*Remove leading and trailing spaces (or other character).*

---

### Description

Remove leading and trailing spaces (or other character).

### Usage

```
rmv.spc(str, before = TRUE, after = TRUE, char = " ")
```

### Arguments

str	character vector, may containing leading or trailing chars
before	logical, whether to remove leading spaces
after	logical, whether to remove trailing spaces
char	an alternative character to be removed instead of spaces

### Value

returns vectors without the leading/trailing characters

### Author(s)

Nicholas Cooper <nick.cooper@cimr.cam.ac.uk>

### See Also

[spc](#)

### Examples

```
rmv.spc(" mid sentence ")
rmv.spc("0012300",after=FALSE,char="0")
rmv.spc(" change nothing ",after=FALSE,before=FALSE)
```



---

search.cran	<i>Search all CRAN packages for those containing keyword(s).</i>
-------------	--

---

**Description**

Can be useful for trying to find new packages for a particular purpose. No need for these packages to be installed or loaded. Further searching can be done using `utils::RSiteSearch()`

**Usage**

```
search.cran(txt, repos = "", all.repos = FALSE)
```

**Arguments**

txt	text to search for, a character vector, not case-sensitive
repos	repository(s) (CRAN mirror) to use, "" defaults to <code>getOption("repos")</code>
all.repos	logical, if TRUE, then use all available repositories from <code>getRepositories()</code>

**Value**

list of hits for each keyword (txt)

**Author(s)**

Nicholas Cooper <nick.cooper@cimr.cam.ac.uk>

**Examples**

```
repos <- "http://cran.ma.imperial.ac.uk/" # OR: repos <- getOption("repos")
# setRepositories(ind=1:2) # for the session will by default search bioconductor packages too
search.cran("useful",repos)
search.cran(c("hmm", "markov", "hidden"),repos=repos)
search.cran(c("snpStats", "genoset", "limma"),all.repos=TRUE)
```

---

sim.cor	<i>Simulate a dataset with correlated measures</i>
---------	--

---

**Description**

Simulate a dataset with correlated measures (normal simulation with e.g. `rnorm()` usually only gives small randomly distributed correlations between variables). This is a quick and unsophisticated method, but should be able to provide a dataset with slightly more realistic structure than simple `rnorm()` type functions. Varying the last three parameters gives some control on the way the data is generated. It starts with a seed random variable, then creates 'k' random variables with an expected correlation of `r=genr()` with that seed variable. Then after this, one of the variables in the set (including the seed) is randomly selected to run through the same process of generating 'k' new

variables; this is repeated until columns are full up. 'mix.order' then randomizes the column order destroying the relationship between column number and correlation structure, although in some cases, such relationships might be desired as representative of some real life datasets.

### Usage

```
sim.cor(nrow = 100, ncol = 100, genx = rnorm, genr = runif, k = 3,
        mix.order = TRUE)
```

### Arguments

nrow	integer, number of rows to simulate
ncol	integer, number of columns to simulate
genx	the generating function for data, e.g mnorm(), runif(), etc
genr	the generating function for desired correlation, e.g, runif()
k	number of steps generating from the same seed before choosing a new seed
mix.order	whether to randomize the column order after simulating

### Author(s)

Nicholas Cooper

### See Also

[cor.with](#)

### Examples

```
corDat <- sim.cor(200,5)
prv(corDat) # preview of simulated normal data with r uniformly varying
cor(corDat) # correlation matrix
corDat <- sim.cor(500,4,genx=runif,genr=function(x) { 0.5 },mix.order=FALSE)
prv(corDat) # preview of simulated uniform data with r fixed at 0.5
cor(corDat) # correlation matrix
```

---

simple.date

*Simple representation and retrieval of Date/Time*

---

### Description

Retrieve a simple representation of date\_time or just date, for generating day/time specific file names, etc.

### Usage

```
simple.date(sep = "_", long = FALSE, time = TRUE)
```

**Arguments**

sep	character, separator to use for the date/time, eg, underscore or <space> " ".
long	logical, whether to display a longer version of the date and time, or just a simple version
time	logical, whether to include the time, or just the date

**Value**

A string containing the date: MMMDD and optionally time HRam/pm. Or if long=TRUE, a longer representation: DAY MM DD HH.MM.SS YYYY.

**Examples**

```
simple.date()
simple.date(" ",long=TRUE)
simple.date(time=FALSE)
```

---

spc

---

*Print a character a specified number of times.*


---

**Description**

Returns 'char' X<sub>i</sub> number of times for each element i of X. Useful for padding for alignment purposes.

**Usage**

```
spc(X, char = " ")
```

**Arguments**

X	numeric vector of number of repeats
char	The character to repeat (longer will be shortened)

**Value**

returns vectors of strings of char, lengths X

**Author(s)**

Nicholas Cooper <nick.cooper@cimr.cam.ac.uk>

**See Also**

[rmv.spc](#)

**Examples**

```
cat(paste(spc(9),"123\n"))
cat(paste(spc(8),"1234\n"))
spc(c(1:5),".")
```

---

standardize

---

*Convert a numeric vector to Z-scores.*


---

**Description**

Transform a vector to z scores by subtracting its mean and dividing by its standard deviation

**Usage**

```
standardize(X)
```

**Arguments**

X                      numeric vector to standardize

**Value**

vector of the same length in standardised form

**Author(s)**

Nicholas Cooper <nick.cooper@cimr.cam.ac.uk>

**Examples**

```
x1 <- rnorm(10,100,15); x2 <- sample(10)
print(x1) ; standardize(x1)
print(x2) ; standardize(x2)
```

---

Substitute

---

*Convert objects as arguments to object names*


---

**Description**

Equivalent to the base function `substitute()` but can do any length of arguments instead of just one. Converts the objects in parentheses into text arguments as if they had been entered with double quote strings. The objects must exist and be accessible in the environment the function is called from for the function to work (same as for `substitute()`). One application for this is to be able to create functions where object arguments can be entered without quotation marks (simpler), or where you want to use the name of the object as well as the data in the object.

**Usage**

```
Substitute(x = NULL, ...)
```

**Arguments**

**x** compulsory, simply the first object in the list, no difference to any further objects  
**...** any further objects to return string names for.

**Value**

character list of x,... object names

**Author(s)**

Nicholas Cooper

**See Also**

[prv](#), [preview](#)

**Examples**

```
myvar <- list(test=c(1,2,3)); var2 <- "testme"; var3 <- 10:14
print(myvar)
# single variable case, equivalent to base::substitute()
print(substitute(myvar))
print(Substitute(myvar))
# multi variable case, substitute wont work
Substitute(myvar,var2,var3)
# prv() is a wrapper for preview() allowing arguments without parentheses
# which is achieved internally by passing the arguments to Substitute()
preview(c("myvar","var2","var3"))
prv(myvar,var2,var3)
```

---

summarise.r.datasets    *Summarise the dimensions and type of available R example datasets*

---

**Description**

This function will parse the current workspace to see what R datasets are available. Using the toHTML function from the tools package to interpret the data() call, each dataset is examined in turn for type and dimensionality. Can also use a filter for dataset types, to only show, for instance, matrix datasets. Also you can specify whether to only look for base datasets, or to search for datasets in all available packages. Result is a printout to the console of the available datasets and their characteristics.

**Usage**

```
summarise.r.datasets(filter = FALSE, types = c("data.frame", "matrix"),
  all = FALSE, ...)
```

**Arguments**

filter	logical, whether to filter datasets by 'types'
types	if filter=TRUE, which data types to include in the result
all	logical, if all=TRUE, look for datasets in all available packages, else just base
...	if all is false, further arguments to the data() function to search datasets

**Author(s)**

Nicholas Cooper

**Examples**

```
summarise.r.datasets()
summarise.r.datasets(filter=TRUE,"matrix")
```

---

textogram

---

*Make an ascii histogram in the console.*


---

**Description**

Uses a call to `base::hist(...)` and uses the densities to make a text histogram in the console. Particularly useful when working in the terminal without graphics.

**Usage**

```
textogram(X, range = NA, ...)
```

**Arguments**

X	numeric vector of data
range	optional sub-range of X to test; c(low,high)
...	additional arguments passed to <code>base::hist()</code>

**Value**

outputs an ascii histogram to the console

**Author(s)**

Nicholas Cooper <nick.cooper@cimr.cam.ac.uk>

**Examples**

```
textogram(runif(100000))
textogram(rnorm(10000),range=c(-3,3))
```

timeit

*Times an expression, with breakdown of time spent in each function***Description**

A wrapper for the proftools package Rprof() function. It is to Rprof() as system.time() is to proc.time() (base) Useful for identifying which functions are taking the most time. This procedure will return an error unless expr takes more than ~0.1 seconds to evaluate. I could not see any simple way to avoid this limitation. Occassionally other errors are produced for no apparent reason which are due to issues within the proftools package that are out of my control.

**Usage**

```
timeit(expr, suppressResult = F, total.time = TRUE)
```

**Arguments**

expr                    an expression, must take at least 1 second (roughly)  
 suppressResult       logical, if true, will return timing information rather than the result of expr  
 total.time            to sort by total.time, else by self.time

**Value**

returns matrix where rows are function names, and columns are self.time and total.time. total.time is total time spent in that function, including function calls made by that function. self.time doesn't count other functions within a function

**Author(s)**

Nicholas Cooper <nick.cooper@cimr.cam.ac.uk>

**Examples**

```
# this function writes and removes a temporary file
# run only if ok to do this in your temporary directory
#not run# timeit(wait(0.1,"s") ,total.time=TRUE)
#not run# timeit(wait(0.1,"s") ,total.time=FALSE)
```

---

toheader	<i>Return a string with each first letter of each word in upper case.</i>
----------	---

---

**Description**

Return a string with each first letter of each word in upper case.

**Usage**

```
toheader(txt, strict = FALSE)
```

**Arguments**

txt	a character string
strict	whether to force non-leading letters to lowercase

**Value**

Vector minus NA's, or the matrix/data.frame minus NA rows

**Author(s)**

via R Core

**Examples**

```
toheader(c("using AIC for model selection"))
toheader(c("using AIC", "for MODEL selection"), strict=TRUE)
```

---

top	<i>Monitor CPU, RAM and Processes</i>
-----	---------------------------------------

---

**Description**

This function runs the unix 'top' command and returns the overall CPU and RAM usage, and optionally the table of processes and resource use for each. Works only with unix-based systems such as Mac OS X and Linux, where 'top' is installed. Default is to return CPU and RAM overall stats, to get detailed stats instead, set Table=TRUE.

**Usage**

```
top(CPU = !Table, RAM = !Table, Table = FALSE, procs = 20,
    mem.key = NULL, cpu.key = NULL)
```



**Arguments**

CPU	logical, whether to return overall CPU usage information
RAM	logical, whether to return overall RAM usage information
Table	logical, whether to return system information for separate processes. This is returned as table with all of the same columns as a command line 'top' command. If 'Table=TRUE' is set, then the default becomes not to return the overall CPU/RAM usage stats. The dataframe returned will have been sorted by descending memory usage.
procs	integer, if Table=TRUE, then the maximum number of processes to return (default 20)
mem.key	character, default for Linux is 'mem' and for Mac OS X, 'physmem', but if the 'top' command on your system displays memory usage using a different label, then enter it here (case insensitive) to override defaults.
cpu.key	character, default for Linux and Mac OS X is 'cpu', but if the top command on your system displays CPU usage using a different label, then enter it here.

**Value**

a list containing CPU and RAM usage, or with alternate parameters can return stats for each process

**Author(s)**

Nicholas Cooper

**Examples**

```
# not run # top()
# not run # top(Table=TRUE,proc=5)
```

---

Unlist

---

*Unlist a list, starting only from a set depth.*


---

**Description**

Allows unlisting preserving the top levels of a list. Can specify the number of list depth levels to skip before running unlist()

**Usage**

```
Unlist(obj, depth = 1)
```

**Arguments**

obj	the list to unlist
depth	skip to what layer of the list before unlisting; eg. the base unlist() function would correspond to depth=0

**Value**

returns vectors of strings of char, lengths X

**Author(s)**

Nicholas Cooper <nick.cooper@cimr.cam.ac.uk>

**Examples**

```
complex.list <- list(1,1:3,list(2,2:4,list(3,3:4,list(10))),list(4,5:7,list(3)))
Unlist(complex.list,0) # equivalent to unlist()
Unlist(complex.list,1) # unlist within the top level lists
Unlist(complex.list,2) # unlist within the second level lists
Unlist(complex.list,10) # once depth >= list-depth, no difference
unlist(complex.list,recursive=FALSE) # not the same as any of the above
```

---

wait

*Wait for a period of time.*

---

**Description**

Waits a number of hours minutes or seconds (doing nothing). Note that this 'waiting' will use 100

**Usage**

```
wait(dur, unit = "s", silent = TRUE)
```

**Arguments**

dur	waiting time
unit	time units h/m/s, seconds are the default
silent	print text showing that waiting is in progress

**Value**

no return value

**Author(s)**

Nicholas Cooper <nick.cooper@cimr.cam.ac.uk>

**Examples**

```
wait(.25,silent=FALSE) # wait 0.25 seconds
wait(0.005, "m")
wait(0.0001, "Hours", silent=FALSE)
```

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