

Package ‘TRSbook’

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Type Package

Title Companion to the Book ``The R Software''

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Description Functions and datasets for readers of the book
``The R Software: Fundamentals of Programming and Statistical
Analysis'' by Lafaye de Micheaux, Drouilhet and Liquet
(2013) <doi:10.1007/978-1-4614-9020-3>.

License GPL (>= 2)

LazyLoad yes

Depends xtable, RColorBrewer, gdata, IndependenceTests

NeedsCompilation yes

Author Pierre Lafaye De Micheaux [aut, cre],
Remy Drouilhet [aut],
Benoit Liquet [aut]

Maintainer Pierre Lafaye De Micheaux <lafaye@unsw.edu.au>

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TRSbook-package	Package illustrating the book: <i>The R Software</i>
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Description

This package enables one to use some functions used in the book:*The R Software, Fundamentals of Programming and Statistical Analysis, Springer, 2014*. One can also find the datasets used in the book.

Details

Package:	TheRSoftware
Type:	Package
Version:	1.0
Date:	2014-02-04
License:	GPL(>=2.0)
LazyLoad:	yes

Author(s)

Lafaye de Micheaux Pierre <lafaye@unsw.edu.au>, Remy Drouilhet <Remy.Drouilhet@upmf-grenoble.fr>, Liquet Benoit <b.liquet@uq.edu.au>

References

Book: The R Software, Fundamentals of Programming and Statistical Analysis, Springer, 2014

arrowaxis	<i>Adding arrows on statistical plots.</i>
-----------	--

Description

This function add an arrow on the extremities of the axes of a plot

Usage

```
arrowaxis(x = TRUE, y = TRUE)
```

Arguments

x	Logical. Default value TRUE indicates an arrow on the x-axis
y	Logical. Default value TRUE indicates an arrow on the y-axis

Value

No return value, called for side effects. The function adds an axis with arrows to the current plot.

Author(s)

Lafaye de Micheaux Pierre <lafaye@unsw.edu.au>, Remy Drouilhet <Remy.Drouilhet@upmf-grenoble.fr>, Liqueur Benoit <b.liquet@uq.edu.au>

References

Chapter 11 (Descriptive Statistics) from the book: The R Software, Fundamentals of Programming and Statistical Analysis

Examples

```
curve(cos(x),xlim=c(-10,10))  
arrowaxis()
```

barchart	<i>Bar charts</i>
----------	-------------------

Description

Pretty bar charts

Usage

```
barchart(x, col, my.title, pareto = FALSE, freq.cumul = FALSE, family = "Courier")
```

Arguments

x	qualitative variable
col	vector of characters for the color of each modality
my.title	character. Title of the plot
pareto	logical. TRUE for a Pareto diagram. Default os FALSE
freq.cumul	logical. TRUE to add a curve of cumulative frequencies. By default freq.cumul is FALSE
family	font family for the title. Default is "Courier". Another choice can be, e.g., "HersheyScript"

Value

A plot

Author(s)

Lafaye de Micheaux Pierre <lafaye@unsw.edu.au>, Remy Drouilhet <Remy.Drouilhet@upmf-grenoble.fr>, Liquet Benoit <b.liquet@uq.edu.au>

References

Chapter 11 (Descriptive Statistics) from the book: The R Software, Fundamentals of Programming and Statistical Analysis

See Also

[barplot](#)

Examples

```
data(NUTRIELDERLY)
attach(NUTRIELDERLY)
fat <- as.factor(fat)
col <- c("yellow", "yellow2", "sandybrown", "orange",
        "darkolivegreen", "green", "olivedrab2", "green4")
barchart(fat, col, pareto=TRUE)
detach(NUTRIELDERLY)
```

bin2dec

Decimal representation of a binary number

Description

To compute the decimal representation of a number written in a binary format

Usage

```
bin2dec(x)
```

Arguments

x Numeric. Number in binary format written only with 0s and 1s. See Example below.

Value

Decimal representation of the number **x**

Author(s)

Lafaye de Micheaux Pierre <lafaye@unsw.edu.au>, Remy Drouilhet <Remy.Drouilhet@upmf-grenoble.fr>, Liqueur Benoit <b.liquet@uq.edu.au>

References

Chapter 5 (Data Manipulation, Functions) from the book: The R Software, Fundamentals of Programming and Statistical Analysis

Examples

```
bin2dec(1010.101)
```

BIRTH.WEIGHT

Weight at Birth

Description

This study focused on risks associated with low weight at birth; the data were collected at the Baystate Medical Centre, Massachusetts, in 1986. Physicians have been interested in low weight at birth for several years, because underweight babies have high rates of infant mortality and infant anomalies. The behaviour of the mother-to-be during pregnancy (diet, smoking habits) can have a significant impact on the chances of having a full-term pregnancy, and thus of giving birth to a child of normal weight. The data file includes information on 189 women (identification number: ID) who came to the centre for consultation. Weight at birth is categorized as low if the child weighs less than 2,500 g.

Usage

```
data(BIRTH.WEIGHT)
```

Format

A data frame with 189 observations measured on the following 11 variables.

ID Numeric. Identification.

AGE Numeric. Age of mother.

LWT Numeric. Weight of mother at last menstrual period.

RACE 1=white, 2=black, 3=other. Race of mother.

SMOKE Yes=1, No=0. Smoking during pregnancy.

PTL 0=none, 1=one, 2=two, etc. Number of premature births in medical history.

HT Yes=1, No=0. Medical history of hypertension.

UI Yes=1, No=0. Uterine irritability.

FVT 0=none, 1=one, etc. Number of medical consultations during first trimester

BWT Numeric. Grams.

LOW Yes=1, No=0. Weight at birth less than 2,500g

Author(s)

Lafaye de Micheaux Pierre <lafaye@unsw.edu.au>, Remy Drouilhet <Remy.Drouilhet@upmf-grenoble.fr>, Liqueur Benoit <b.liqueur@uq.edu.au>

Source

<https://www.biostatisticien.eu/springer/>

Examples

```
data(BIRTH.WEIGHT)
str(BIRTH.WEIGHT)
```

BMI.CHILD

Body Mass Index of children

Description

This data set comes from an epidemiologic study analyzed by a team from the Institut de sante publique d'epidemiologie et de developpement (ISPED) de Bordeaux. A sample of 152 children (3 or 4 years old) in their first year of kindergarten in schools in Bordeaux (Gironde, SouthWest France) underwent a physical check-up in 1996-1997.

Usage

```
data(BMI.CHILD)
```

Format

A data frame with 152 observations measured on the 6 following variables:

GENDER a factor with levels F and M

zep a factor with levels Y and N

weight numeric

years numeric

months numeric

height numeric

Author(s)

Lafaye de Micheaux Pierre <lafaye@unsw.edu.au>, Remy Drouilhet <Remy.Drouilhet@upmf-grenoble.fr>, Liquet Benoit <b.liquet@uq.edu.au>

Source

<https://www.biostatisticien.eu/springer/>

Examples

```
data(BMI.CHILD)
str(BMI.CHILD)
```

camembert	<i>Pie chart</i>
-----------	------------------

Description

A variant of the pie function

Usage

```
camembert(x, col = NULL, family="Courier")
```

Arguments

x	qualitative variable
col	vector of characters for the color of each modality
family	font family for the title. Default is "Courier". Another choice can be, e.g., "HersheyScript"

Value

A pie chart

Author(s)

Lafaye de Micheaux Pierre <lafaye@unsw.edu.au>, Remy Drouilhet <Remy.Drouilhet@upmf-grenoble.fr>, Liquet Benoit <b.liquet@uq.edu.au>

References

Chapter 11 (Descriptive Statistics) from the book: The R Software, Fundamentals of Programming and Statistical Analysis

See Also

[pie](#)

Examples

```
data(NUTRIELDERLY)
attach(NUTRIELDERLY)
require("RColorBrewer")
col <- brewer.pal(8,"Pastel2")
camembert(fat,col)
detach(NUTRIELDERLY)
```

cor0.test

Test of the correlation coefficient

Description

Test of the correlation coefficient between two quantitative variables

Usage

```
cor0.test(x, y, rho0 = 0, alternative = c("two.sided", "less", "greater"))
```

Arguments

x	numeric vector
y	numeric vector
rho0	numeric indicating the value of the correlation coefficient under the null. Default is rho0 = 0
alternative	Alternative hypothesis for the test. Either two sided ("two.sided"), one sided to the left ("less") or one sided to the right ("greater"). Default is "two.sided".

Value

Returns a list:

statistic	Value of the test statistic
p.value	p-value of the test

Author(s)

Lafaye de Micheaux Pierre <lafaye@unsw.edu.au>, Remy Drouilhet <Remy.Drouilhet@upmf-grenoble.fr>, Liqueur Benoit <b.liquet@uq.edu.au>

References

Chapter 13 (Confidence Intervals and Hypothesis Testing) from the book: The R Software, Fundamentals of Programming and Statistical Analysis

See Also

[cor.test](#)

Examples

```
data(BMI.CHILD)
attach(BMI.CHILD)
cor0.test(weight,height)
detach(BMI.CHILD)
```

crosschart

A cross chart

Description

A cross chart displays for each observation a small cross above the associated modality

Usage

```
crosschart(x, my.title, col,family="Courier")
```

Arguments

x	qualitative variable
my.title	character. title of the plot
col	vector of characters for the color of each modality
family	font family for the title. Default is "Courier". Another choice can be, e.g., "HersheyScript"

Value

A cross chart

Author(s)

Lafaye de Micheaux Pierre <lafaye@unsw.edu.au>, Remy Drouilhet <Remy.Drouilhet@upmf-grenoble.fr>, Liqueur Benoit <b.liquet@uq.edu.au>

References

Chapter 11 (Descriptive Statistics) from the book: The R Software, Fundamentals of Programming and Statistical Analysis

Examples

```
data(NUTRIELDERLY)
attach(NUTRIELDERLY)
situation <- as.factor(situation)
levels(situation) <- c("single", "couple", "family", "other")
crosschart(situation, col=c("orange", "darkgreen", "black", "tan"))
detach(NUTRIELDERLY)
```

dec2bin

Binary representation of a decimal number

Description

To compute the binary representation of a number written in a decimal format

Usage

```
dec2bin(x, prec=52)
```

Arguments

x	Numeric. Number in a decimal format.
prec	Integer. Precision desired.

Value

Binary representation of the number x

Author(s)

Lafaye de Micheaux Pierre <lafaye@unsw.edu.au>, Remy Drouilhet <Remy.Drouilhet@upmf-grenoble.fr>, Liquet Benoît <b.liquet@uq.edu.au>

References

Chapter 5 (Data Manipulation, Functions) from the book: The R Software, Fundamentals of Programming and Statistical Analysis

Examples

```
dec2bin(10.625, 3)
```

`flashy.plot`*A flashy scatter plot*

Description

This function tries to make a nicer plot than the one given by the `plot()` function for two quantitative variables

Usage

```
flashy.plot(x,y,my.factor, family = "Courier",xlab="",ylab="")
```

Arguments

<code>x</code>	numeric vector
<code>y</code>	numeric vector
<code>my.factor</code>	factor
<code>family</code>	font family for the title. Default is "Courier". Another choice can be, e.g., "HersheyScript"
<code>xlab</code>	character. x label
<code>ylab</code>	character. y label

Value

A flashy scatter plot

Author(s)

Lafaye de Micheaux Pierre <lafaye@unsw.edu.au>, Remy Drouilhet <Remy.Drouilhet@upmf-grenoble.fr>, Liqueur Benoit <b.liquet@uq.edu.au>

References

Chapter 11 (Descriptive Statistics) from the book: The R Software, Fundamentals of Programming and Statistical Analysis

See Also

[plot](#)

Examples

```
data(NUTRIELDERLY)
attach(NUTRIELDERLY)
gender <- as.factor(gender)
levels(gender) <- c("Male", "Female")
flashy.plot(weight,height,gender,xlab="Height",ylab="Weight")
detach(NUTRIELDERLY)
```

`getaddr`*Retrieve the address in memory of a variable*

Description

Retrieve the address in memory of a numeric variable

Usage

```
getaddr(x)
```

Arguments

<code>x</code>	numeric
----------------	---------

Value

Integer value of the address of `x`

Author(s)

Lafaye de Micheaux Pierre <lafaye@unsw.edu.au>, Remy Drouilhet <Remy.Drouilhet@upmf-grenoble.fr>, Liquet Benoit <b.liquet@uq.edu.au>

References

Chapter 9 (Managing Sessions) from the book: The R Software, Fundamentals of Programming and Statistical Analysis

Examples

```
x <- c(8L,9L)
addr <- getaddr(x) # Gets the address of the first
                  # box of the 64-box block where x
                  # is stored.

addr
writeaddr(addr,6L) # Write the integer 6 at this address.
x
writeaddr(addr+4L,7L) # An integer is coded over 4 bytes,
                     # hence increment the address by 4 to
                     # get to x[2].

x
x <- c(12.8,4.5)
x
addr <- getaddr(x) # Get the address of the first box
                  # of the 128-box block where x is
                  # stored.

writeaddr(addr,6.2)
x
```

```
writeaddr(addr+8L,7.1) # A double is coded over 8 bytes.  
x
```

INFARCTION*Study Case of Myocardial Infarction*

Description

The study for which the following data were collected aimed at examining whether women who use or have used oral contraceptives are at a higher risk of myocardial infarction. The sample includes 149 women who had myocardial infarction (cases) and 300 women who did not (controls). The main exposure factor is usage of oral contraceptives; the data also include age, weight, height, tobacco consumption, hypertension and family history of cardiovascular diseases.

Usage

```
data(INFARCTION)
```

Format

A data frame with 449 observations measured on the following 10 variables:

NUMBER Identification.

infarct 0 = controls; 1 = cases. Myocardial infarction.

co 0 = never; 1 = yes. Usage of oral contraceptives.

tobacco 0 = no; 1 = smoker; 2 = former smoker. Tobacco usage.

age Age in years.

weight Weight in kg.

height Height in cm.

atcd 0 = no; 1 = yes. Family history of cardiovascular diseases.

hta 0 = no; 1 = yes. Hypertension.

Author(s)

Lafaye de Micheaux Pierre <lafaye@unsw.edu.au>, Remy Drouilhet <Remy.Drouilhet@upmf-grenoble.fr>, Liqueur Benoit <b.liqueur@uq.edu.au>

Source

<https://www.biostatisticien.eu/springer/>

Examples

```
data(INFARCTION)  
str(INFARCTION)
```

`INTIMA.MEDIA`*Intima-Media Thickness*

Description

Atherosclerosis is the main cause of death for men above 35 and women above 45 in most developed countries. It is a thickening and hardening of internal artery walls. One of its consequences is myocardial infarction. An artery wall is made of three layers; innermost to outermost, they are called intima, media and adventitia. Intima-media thickness is a marker of atherosclerosis. It was measured by ultra-sonography on a sample of 110 subjects in 1999 in Bordeaux hospitals. Information on the main risk factors was also collected.

Usage

```
data(INTIMA.MEDIA)
```

Format

A data frame with 110 observations measured on the 9 following variables:

`GENDER` 1=male, 2=female. Gender.

`AGE` Age (in years) at date of consultation.

`height` Height in cm.

`weight` Weight in kg.

`tobacco` 0=non smoker, 1=former smoker, 2=smoker. Smoking status.

`packyear` Number of packs per year. Estimation of tobacco consumption for smokers and former smokers.

`SPORT` 0=no, 1=yes. Physical activity.

`measure` Intima-media thickness in cm

`alcohol` 0=non-drinker, 1=occasional drinker, 2=regular drinker. Alcohol consumption.

Author(s)

Lafaye de Micheaux Pierre <lafaye@unsw.edu.au>, Remy Drouilhet <Remy.Drouilhet@upmf-grenoble.fr>, Liqueur Benoit <b.liqueur@uq.edu.au>

Source

<https://www.biostatisticien.eu/springer/>

Examples

```
data(INTIMA.MEDIA)
str(INTIMA.MEDIA)
```

mpinv	<i>Moore Penrose inverse</i>
-------	------------------------------

Description

Computes the Moore Penrose inverse of a matrix

Usage

```
mpinv(M,eps=1e-13)
```

Arguments

M	a matrix
eps	real precision

Value

The Moore-Penrose inverse of M

Author(s)

Lafaye de Micheaux Pierre <lafaye@unsw.edu.au>, Remy Drouilhet <Remy.Drouilhet@upmf-grenoble.fr>, Liquet Benoit <b.liquet@uq.edu.au>

References

Chapter 10 (Basic Mathematics: Matrix Operations, Integration, and Optimization) from the book: The R Software, Fundamentals of Programming and Statistical Analysis

Examples

```
A <- matrix(c(2,3,5,4),nrow=2,ncol=2)
solve(A)
mpinv(A)
B <- matrix(c(4,2,8,4),nrow=2,ncol=2)
# solve(B) # gives an error.
mpinv(B)
```

NUTRIELDERLY

Diet of Elderly People

Description

A sample of 226 elderly people living in Bordeaux (Gironde, South-West France) were interviewed in 2000 for a nutritional study.

Usage

```
data(NUTRIELDERLY)
```

Format

A data frame with 226 observations measured on the 13 following variables:

gender 2 = female; 1 = male

situation 1 = single; 2 = living with spouse; 3 = living with family; 4 = living with someone else;
Family status.

tea Number of cups. Daily consumption of tea.

coffee Number of cups. Daily consumption of coffee

height Height in cm.

weight Weight in cm.

age Age in years at date of interview.

meat 0 = never; 1 = less than once a week; 2 = Once a week; 3 = 2/3 times a week; 4 = 4/6 times a week; 5 = every day. Consumption of meat.

fish Idem. Consumption of fish.

raw_fruits Idem. Consumption of raw fruits.

cooked_fruits_veg Idem. Consumption of cooked fruits and vegetables.

chocol Idem. Consumption of chocolate.

fat 1 = butter; 2 = margarine; 3 = peanut oil; 4 = sunflower oil; 5 = olive oil; 6 = mix of vegetable oils (e.g., Isio4); 7 = colza oil; 8 = duck or goose fat. Type of fat used for cooking.

Author(s)

Lafaye de Micheaux Pierre <lafaye@unsw.edu.au>, Remy Drouilhet <Remy.Drouilhet@upmf-grenoble.fr>, Liquet Benoit <b.liquet@uq.edu.au>

Source

<https://www.biostatisticien.eu/springer/>

Examples

```
data(NUTRIELDERLY)
str(NUTRIELDERLY)
```

sigma2.test	<i>Test of a variance</i>
-------------	---------------------------

Description

Comparing the theoretical variance with a reference value

Usage

```
sigma2.test(x, alternative = "two.sided", var0 = 1, conf.level = 0.95)
```

Arguments

x	numeric vector
alternative	Alternative hypothesis for the test. Either two sided ("two.sided"), one sided to the left ("less") or one sided to the right ("greater"). Default is "two.sided".
var0	value of reference for the variance
conf.level	confidence level

Value

Returns a list:

statistic	Value of the test statistic
parameter	degrees of freedom
p.value	p-value of the test
conf.int	confidence interval
estimate	sample variance
null.value	value of reference for the variance
alternative	Alternative hypothesis for the test
method	"One-sample Chi-squared test for given variance"
data.name	name of the data set

Author(s)

Lafaye de Micheaux Pierre <lafaye@unsw.edu.au>, Remy Drouilhet <Remy.Drouilhet@upmf-grenoble.fr>, Liquet Benoit <b.liquet@uq.edu.au>

References

Chapter 13 (Confidence Intervals and Hypothesis Testing) from the book: The R Software, Fundamentals of Programming and Statistical Analysis

Examples

```
data(NUTRIELDERLY)
sigma2.test(NUTRIELDERLY$weight, conf.level=0.9)$conf
```

twosample.cor.test	<i>Comparing statistically two correlation coefficients</i>
--------------------	---

Description

Test of the equality of two correlation coefficients

Usage

```
twosample.cor.test(x1, y1, x2, y2, alpha = 0.05, alternative =  
c("two.sided", "less", "greater"))
```

Arguments

x1	x1 is a numeric vector associated to y1
y1	y1 is a numeric vector associated to x1
x2	x2 is a numeric vector associated to y2
y2	y2 is a numeric vector associated to x2
alpha	significance level of the test
alternative	Alternative hypothesis for the test. Either two sided ("two.sided"), one sided to the left ("less") or one sided to the right ("greater"). Default is "two.sided".

Value

Returns a list:

statistic	Value of the test statistic
p.value	p-value of the test

Author(s)

Lafaye de Micheaux Pierre <lafaye@unsw.edu.au>, Remy Drouilhet <Remy.Drouilhet@upmf-grenoble.fr>, Liqueur Benoit <b.liquet@uq.edu.au>

References

Chapter 13 (Confidence Intervals and Hypothesis Testing) from the book: The R Software, Fundamentals of Programming and Statistical Analysis

See Also

[cor0.test](#)


```

                                # get to x[2].
x
x <- c(12.8,4.5)
x
addr <- VectorAddr(x) # Get the address of the first box
                        # of the 128-box block where x is
                        # stored.

update(addr,6.2)
x
update(addr+8L,7.1) # A double is coded over 8 bytes.
x

```

writeaddr

Writing a value at some memory address

Description

Writing a value at some memory address

Usage

```
writeaddr(addr,newval)
```

Arguments

addr	Integer value. Address in memory.
newval	New value to write at this address.

Value

Nothing is returned.

Author(s)

Lafaye de Micheaux Pierre <lafaye@unsw.edu.au>, Remy Drouilhet <Remy.Drouilhet@upmf-grenoble.fr>, Liqueur Benoit <b.liquet@uq.edu.au>

References

Chapter 9 (Managing Sessions) from the book: The R Software, Fundamentals of Programming and Statistical Analysis

Examples

```
x <- c(8L,9L)
addr <- getaddr(x) # Gets the address of the first
                  # box of the 64-box block where x
                  # is stored.

addr
writeaddr(addr,6L) # Write the integer 6 at this address.
x
writeaddr(addr+4L,7L) # An integer is coded over 4 bytes,
                     # hence increment the address by 4 to
                     # get to x[2].

x
x <- c(12.8,4.5)
x
addr <- getaddr(x) # Get the address of the first box
                  # of the 128-box block where x is
                  # stored.

writeaddr(addr,6.2)
x
writeaddr(addr+8L,7.1) # A double is coded over 8 bytes.
x
```

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