Package ‘MSG’

September 3, 2019

Type Package

Title Data and Functions for the Book Modern Statistical Graphics

Version 0.4

Description A companion to the Chinese book "Modern Statistical Graphics".

License GPL

Depends R (>= 3.5.0)

Imports RColorBrewer (>= 1.1.2)

Suggests animation (>= 2.6), igraph (>= 1.2.4.1), KernSmooth (>= 2.23.15), maps (>= 3.3.0), mvtnorm (>= 1.0.11), rgl (>= 0.100.30), RgoogleMaps (>= 1.4.4), plotrix (>= 3.7.6), ggplot2 (>= 3.2.1), grid (>= 3.6.0), sna (>= 2.4)

URL https://github.com/yihui/MSG

BugReports https://github.com/yihui/MSG/issues

RoxygenNote 6.1.1

NeedsCompilation no

Author Yihui Xie [aut, cre] (<https://orcid.org/0000-0003-0645-5666>),
Lijia Yu [ctb],
Xiangyun Huang [ctb],
Peng Zhao [ctb]

Maintainer Yihui Xie <xie@yihui.name>

Repository CRAN

Date/Publication 2019-09-03 15:50:02 UTC

R topics documented:

  MSG-package .......................................................... 2
  andrews_curve ....................................................... 2
  assists .............................................................. 3
  BinormCircle ........................................................ 4
  canabalt ............................................................. 5
Description

Datasets and functions for the Chinese book “Modern Statistical Graphics”.

Author(s)

Yihui Xie <http://yihui.name>

Description

This function evaluates the transformation of the original data matrix for $t$ from $-\pi$ to $\pi$, and uses `matplot` to draw the curves.

Usage

```r
andrews_curve(x, n = 101, type = "l", lty = 1, lwd = 1, pch = NA, xlab = "t", ylab = "f(t)", ...)
```
assists

Arguments

- `x` a data frame or matrix
- `n` number of x-axis values at which f(t) is evaluated
- `type`, `lty`, `lwd`, `pch`, `xlab`, `ylab`, ...
  passed to `matplot`

Value

a matrix of coefficients for each observation at different t values

Author(s)

Yihui Xie <http://yihui.name>

References

https://en.wikipedia.org/wiki/Andrews_plot

See Also

`matplot`

Examples

```r
andrews_curve(iris[, -5], col = as.integer(iris[, 5]))
```

---

assists

Assists between players in CLE and LAL

Description

The players in the rows assisted the ones in the columns.

References

http://www.basketballgeek.com/data/

Examples

```r
data(assists)
if (require("sna")) {
  set.seed(2011)
  gplot(assists, displaylabels = TRUE, label.cex = 0.7)
}
```
BinormCircle

Random numbers containing a "circle"

Description

The data was generated from two independent random variables (standard Normal distribution) and further points on a circle were added to the data. The order of the data was randomized.

Format

A data frame with 20000 observations on the following 2 variables.

- **V1**: the first random variable with the x-axis coordinate of the circle
- **V2**: the second random variable with the y-axis coordinate of the circle

Details

See the example section for the code to generate the data.

Source


Examples

data(BinormCircle)

```r
## original plot: cannot see anything
plot(BinormCircle)

## transparent colors (alpha = 0.1)
plot(BinormCircle, col = rgb(0, 0, 0, 0.1))

## set axes limits
plot(BinormCircle, xlim = c(-1, 1), ylim = c(-1, 1))

## small symbols
plot(BinormCircle, pch = ".")

## subset
plot(BinormCircle[sample(nrow(BinormCircle), 1000), ])

## 2D density estimation
library(KernSmooth)
fit = bkde2D(as.matrix(BinormCircle), dpik(as.matrix(BinormCircle)))
# perspective plot by persp()
persp(fit$x1, fit$x2, fit$fhat)

if (interactive() && require("rgl")) {
```
canabalt

The scores of the game Canabalt from Twitter

Description

The scores of the game Canabalt from Twitter

References

(the URL is not longer accessible)

Examples

```r
library(ggplot2)
data(canabalt)
print(qplot(device, score, data = canabalt))
print(qplot(reorder(death, score, median), score, data = canabalt, geom = "boxplot") +
  coord_flip())
```

char_gen

Generate a matrix of similar characters

Description

This function prints a matrix of characters which are very similar to each other.

Usage

```r
char_gen(x = c("V", "W"), n = 300, nrow = 10)
```
Arguments

- x: a character vector of length 2 (usually two similar characters)
- n: the total number of characters in the matrix
- nrow: the number of rows

Value

A character matrix on the screen

Author(s)

Yihui Xie <http://yihui.name>

Examples

- char_gen()
- char_gen(c("O", "Q"))

---

Description

This data contains the life expectancy and number of people with higher education in the 31 provinces and districts in China (2005).

Format

A data frame with 31 observations on the following 2 variables.

- Life.Expectancy: Life expectancy
- High.Edu.NO: Number of people with higher education

Source


Examples

```r
data(ChinaLifeEdu)
x = ChinaLifeEdu
plot(x, type = "n", xlim = range(x[, 1]), ylim = range(x[, 2]))
u = par("usr")
rect(u[1], u[3], u[2], u[4], col = "antiquewhite", border = "red")
library(KernSmooth)
est = bkde2D(x, apply(x, 2, dpik))
contour(est$x1, est$x2, est$fhat, nlevels = 15, col = "darkgreen", add = TRUE, vfont = c("sans serif", "plain"))
```
Country power indicators of China vs America

Description
Country power indicators of China vs America

References

Examples
data(cn_vs_us)

cut_plot
Cut the points in a scatter plot into groups according to x-axis

Description
This function can categorize the variable on the x-axis into groups and plot the mean values of y. The purpose is to show the arbitrariness of the discretization of data.

Usage
cut_plot(x, y, breaks, ..., pch.cut = 20)

Arguments
x the x variable
y the y variable
breaks the breaks to cut the x variable
... other arguments to be passed to plot.default
pch.cut the point symbol to denote the mean values of y

Author(s)
Yihui Xie <http://yihui.name>

Examples
x = rnorm(100)
y = rnorm(100)
cut_plot(x, y, seq(min(x), max(x), length = 5))
eq2010

Longitude and latitude of earthquakes in the Sichuan Province

Description

Longitude and latitude of earthquakes in the Sichuan Province

Examples

data(eq2010)
plot(lat ~ long, data = eq2010)

Export.USCN

Export of US and China from 1999 to 2004 in US dollars

Description

Export of US and China from 1999 to 2004 in US dollars

Format

A data frame with 13 observations on the following 3 variables.

- Export amount of export
- Year year from 1999 to 2004
- Country country: US or China

Source

http://stat.wto.org

Examples

data(Export.USCN)
par(mar = c(4, 4.5, 1, 4.5))
plot(1:13, Export.USCN$Export, xlab = "Year / Country", ylab = "US Dollars ($10^16)", axes = FALSE, type = "h", lwd = 10, col = c(rep(2, 6), NA, rep(4, 6)), lend = 1, panel.first = grid())
xlabel = paste(Export.USCN$Year, \n"\n", Export.USCN$Country)
xlabel[7] = ""
xlabel
abline(v = 7, lty = 2)
axis(1, at = 1:13, labels = xlabel, tick = FALSE, cex.axis = 0.75)
axis(2)
(ylabel = pretty(Export.USCN$Export * 8.27))
axis(4, at = ylabel/8.27, labels = ylabel)
mtext("Chinese RMB", side = 4, line = 2)
box()
Percentage data in Chinese government websites

Description

This data was collected from Google by searching for percentages in Chinese government websites.

Format

A data frame with 10000 observations on the following 4 variables.

- **percentage**: a numeric vector: the percentages
- **count**: a numeric vector: the number of webpages corresponding to a certain percentage
- **round0**: a logical vector: rounded to integers?
- **round1**: a logical vector: rounded to the 1st decimal place?

Details

We can specify the domain when searching in Google. For this data, we used `site:gov.cn`, e.g. to search for `87.53% site:gov.cn`.

Source

Google (date: 2009/12/17)

Examples

```r
data(gov.cn.pct)
pct.lowess = function(cond) {
  with(gov.cn.pct, {
    plot(count ~ percentage, pch = ifelse(cond, 4, 20), col = rgb(0:1,
          0, 0, c(0.04, 0.5))[cond + 1], log = "y")
    lines(lowess(gov.cn.pct[cond, 1:2], f = 1/3), col = 2, lwd = 2)
    lines(lowess(gov.cn.pct[!cond, 1:2], f = 1/3), col = 1, lwd = 2)
  })
}
par(mar = c(3.5, 3.5, 1, 0.2), mfrow = c(2, 2))
with(gov.cn.pct, {
  plot(percentage, count, type = "l", panel.first = grid())
  plot(percentage, count, type = "l", xlab = c(10, 11), panel.first = grid())
  pct.lowess(round0)
  pct.lowess(round1)
})
if (interactive()) {
  devAskNewPage(ask = TRUE)
}
with(gov.cn.pct, {
  plot(count ~ percentage, type = "l")
  grid()
```

devAskNewPage(ask = FALSE)

for (i in 0:99) {
  plot(count ~ percentage, type = "l", xlim = i + c(0, 1),
       panel.first = grid())
}

devAskNewPage(ask = TRUE)

plot(count ~ percentage, pch = 20, col = rgb(0:1, 0, 0, c(0.07, 1))[round0 + 1], log = "y")
lines(lowess(gov.cn.pct[round0, 1:2], f = 1/3), col = "red",
      lwd = 2)
lines(lowess(gov.cn.pct[!round0, 1:2], f = 1/3), col = "black",
      lwd = 2)

plot(count ~ percentage, pch = 20, col = rgb(0:1, 0, 0, c(0.07, 1))[round1 + 1], log = "y")
lines(lowess(gov.cn.pct[round1, 1:2], f = 1/3), col = "red",
      lwd = 2)
lines(lowess(gov.cn.pct[!round1, 1:2], f = 1/3), col = "black",
      lwd = 2)
}

---

heart_curve  

*Draw a heart curve*

**Description**

Calculate the coordinates of a heart shape and draw it with a polygon.

**Usage**

```r
heart_curve(n = 101, ...)```

**Arguments**

- `n`  
  the number of points to use when calculating the coordinates of the heart shape

- `...`  
  other arguments to be passed to `polygon`, e.g. the color of the polygon (usually red)

**Author(s)**

Yihui Xie <http://yihui.name>
Examples

heart_curve()
heart_curve(col = "red")
heart_curve(col = "pink", border = "red")

Description

The proportions of sand, silt and clay in soil samples are given for 8 contiguous sites. The sites extended over the crest and flank of a low rise in a valley underlain by marl near Albudeite in the province of Murcia, Spain. The sites were small areas of ground surface of uniform shape internally and delimited by relative discontinuities externally. Soil samples were obtained for each site at 11 random points within a 10m by 10m area centred on the mid-point of the site. All samples were taken from the same depth. The data give the sand, silt and clay content of each sample, expressed as a percentage of the total sand, silt and clay content.

References

http://www.statsci.org/data/general/murcia.html

Examples

data(murcia)
boxplot(sand ~ site, data = murcia)

Description

Attributes of some music clips

References


Examples

data(music)
PlantCounts  
*Number of plants corresponding to altitude*

**Description**

For each altitude, the number of plants is recorded.

**Format**

A data frame with 600 observations on the following 2 variables.

- **altitude**: altitude of the area
- **counts**: number of plants

**Source**


**Examples**

```r
## different span for LOWESS
data(PlantCounts)
par(las = 1, mar = c(4, 4, 0.1, 0.1), mgp = c(2.2, 0.9, 0))
with(PlantCounts, {
  plot(altitude, counts, pch = 20, col = rgb(0, 0, 0.5), panel.first = grid())
  for (i in seq(0.01, 1, length = 70)) {
    lines(lowess(altitude, counts, f = i), col = rgb(0, i, 0), lwd = 1.5)
  }
})
```

---

quake6  
*Earth quakes from 1973 to 2010*

**Description**

The time, location and magnitude of all the earth quakes with magnitude being greater than 6 since 1973.

**References**

http://cos.name/cn/topic/101510

**Examples**

```r
data(quake6)
library(ggplot2)
qplot(year, month, data = quake6) + stat_sum(aes(size = ..n..)) + scale_size(range = c(1, 10))
```
The differences of P-values in t test assuming equal or unequal variances

Description

Given that the variances of two groups are unequal, we compute the difference of P-values assuming equal or unequal variances respectively by simulation.

Format

A data frame with 1000 rows and 99 columns.

Details

See the Examples section for the generation of this data.

Source

By simulation.

References


Examples

data(t.diff)
boxplot(t.diff, axes = FALSE, xlab = expression(n[1]))
axis(1)
axis(2)
box()

## reproducing the data
if (interactive()) {
  set.seed(123)
  t.diff = NULL
  for (n1 in 2:100) {
    t.diff = rbind(t.diff, replicate(1000, {
      x1 = rnorm(n1, mean = 0, sd = runif(1, 0.5, 1))
      x2 = rnorm(30, mean = 1, sd = runif(1, 2, 5))
      t.test(x1, x2, var.equal = TRUE)$p.value - t.test(x1, x2, var.equal = FALSE)$p.value
    }))
  }
  t.diff = as.data.frame(t(t.diff))
colnames(t.diff) = 2:100
}
Results of a Simulation to Tukey's Fast Test

Description
For the test of means of two samples, we calculated the P-values and recorded the counts of Tukey’s rule of thumb.

Format
A data frame with 10000 observations on the following 3 variables.

- `pvalue.t` P-values of t test
- `pvalue.w` P-values of Wilcoxon test
- `count` Tukey’s counts

Details
See the reference for details.

Source
Simulation; see the Examples section below.

References

Examples
data(tukeyCount)

```r
## does Tukey’s rule of thumb agree with t test and Wilcoxon test?
with(tukeyCount, {
  ucount = unique(count)
  stripchart(pvalue.t ~ count, method = "jitter", jitter = 0.2, pch = 19,
              cex = 0.7, vertical = TRUE, at = ucount - 0.2, col = rgb(1, 0, 0, 0.2),
              xlim = c(min(count) - 1, max(count) + 1), xaxt = "n", xlab = "Tukey Count",
              ylab = "P-values")
  stripchart(pvalue.w ~ count, method = "jitter", jitter = 0.2, pch = 21,
              cex = 0.7, vertical = TRUE, at = ucount + 0.2, add = TRUE, col = rgb(0,
              0, 1, 0.2), xaxt = "n")
  axis(1, unique(count))
  lines(sort(ucount), tapply(pvalue.t, count, median), type = "o", pch = 19,
        cex = 1.3, col = "red")
  lines(sort(ucount), tapply(pvalue.w, count, median), type = "o", pch = 21,
        cex = 1.3, col = "blue", lty = 2)
  legend("topright", c("t test", "Wilcoxon test"), col = c("red", "blue"),
```
library(ggplot2)
qplot(pay, data = tvearn, geom = c("jitter", "smooth"), color = type)
Usage

vec2col(vec, n, name)

## Default S3 method:
vec2col(vec, n, name)

## S3 method for class 'factor'
vec2col(vec, n, name)

Arguments

vec  the numeric or factor vector
n   the number of colors to be generated from the palette
name  the name of the palette

Value

a vector of colors corresponding to the input vector

Author(s)

Yihui Xie <http://yihui.name>

Examples

## convert factor to colors
with(iris, plot(Petal.Length, Petal.Width, col = vec2col(Species), pch = 19))

# another palette
with(iris, plot(Petal.Length, Petal.Width, col = vec2col(Species, name = "Dark2"),
    pch = 19))

## turn numeric values to colors
with(iris, plot(Petal.Length, Petal.Width, col = vec2col(Petal.Width), pch = 19))
Index

*Topic package
   MSG-package, 2

andrews_curve, 2
assists, 3

BinormCircle, 4

canabalt, 5
char_gen, 5
ChinaLifeEdu, 6
cn_vs_us, 7
cut_plot, 7
eq2010, 8
Export.USCN, 8
gov.cn.pct, 9

heart_curve, 10

matplot, 3
MSG (MSG-package), 2
MSG-package, 2
murcia, 11
music, 11

PlantCounts, 12
plot.default, 7
polygon, 10

quake6, 12

t.diff, 13
tukeyCount, 14
tvearn, 15

vec2col, 15