Package ‘scatterplot3d’

February 20, 2015

Version 0.3-35
Date 2014-02-11
Title 3D Scatter Plot
Author
  Uwe Ligges <ligges@statistik.tu-dortmund.de>, Martin Maechler, Sarah Schnackenberg
Maintainer Uwe Ligges <ligges@statistik.tu-dortmund.de>
Description Plots a three dimensional (3D) point cloud.
Depends R (>= 2.7.0)
License GPL-2
Encoding latin1
NeedsCompilation no
Repository CRAN
Date/Publication 2014-02-11 15:30:58

R topics documented:

scatterplot3d .......................................................... 1

Index 7

scatterplot3d 3D Scatter Plot

Description

Plots a three dimensional (3D) point cloud.
scatterplot3d

Usage

scatterplot3d(x, y=NULL, z=NULL, color=par("col"), pch=par("pch"),
main=NULL, sub=NULL, xlim=NULL, ylim=NULL, zlim=NULL,
xlab=NULL, ylab=NULL, zlab=NULL, scale.y=1, angle=40,
axis=TRUE, tick.marks=TRUE, label.tick.marks=TRUE,
x.ticklabs=NULL, y.ticklabs=NULL, z.ticklabs=NULL,
y.margin.add=0, grid=TRUE, box=TRUE, lab=par("lab"),
lab.z=mean(lab[1:2]), type="p", highlight.3d=FALSE,
mar=c(5,3,4,3)+0.1, bg=par("bg"), col.axis=par("col.axis"),
col.grid="grey", col.lab=par("col.lab"),
cex.symbols=par("cex"), cex.axis=0.8 * par("cex.axis"),
cex.lab=par("cex.lab"), font.axis=par("font.axis"),
font.lab=par("font.lab"), lty.axis=par("lty"),
lty.grid=par("lty"), lty.hide=NULL, lty.hplot=par("lty"),
log="", ...)

Arguments

x the coordinates of points in the plot.
y the y coordinates of points in the plot, optional if x is an appropriate structure.
z the z coordinates of points in the plot, optional if x is an appropriate structure.
color colors of points in the plot, optional if x is an appropriate structure. Will be
ignored if highlight.3d = TRUE.
pch plotting "character", i.e. symbol to use.
main an overall title for the plot.
sub sub-title.
xlim, ylim, zlim the x, y and z limits (min, max) of the plot. Note that setting
enlarged limits may not work as exactly as expected (a known but unfixd bug).
xlab, ylab, zlab titles for the x, y and z axis.
scale.y scale of y axis related to x- and z axis.
angle angle between x and y axis (Attention: result depends on scaling).
axis a logical value indicating whether axes should be drawn on the plot.
tick.marks a logical value indicating whether tick marks should be drawn on the plot (only
if axis = TRUE).
label.tick.marks a logical value indicating whether tick marks should be labeled on the plot (only
if axis = TRUE and tick.marks = TRUE).
x.ticklabs, y.ticklabs, z.ticklabs vector of tick mark labels.
y.margin.add add additional space between tick mark labels and axis label of the y axis
grid a logical value indicating whether a grid should be drawn on the plot.
box a logical value indicating whether a box should be drawn around the plot.
scatterplot3d

lab a numerical vector of the form c(x, y, len). The values of x and y give the (approximate) number of tickmarks on the x and y axes.
lab.z the same as lab, but for z axis.
type character indicating the type of plot: "p" for points, "l" for lines, "h" for vertical lines to x-y-plane, etc.
highlight.3d points will be drawn in different colors related to y coordinates (only if type = "p" or type = "h", else color will be used).
On some devices not all colors can be displayed. In this case try the postscript device or use highlight.3d = FALSE.
mar A numerical vector of the form c(bottom, left, top, right) which gives the lines of margin to be specified on the four sides of the plot.
bg background (fill) color for the open plot symbols given by pch = 21:25.
col.axis, col.grid, col.lab the color to be used for axis / grid / axis labels.
cex.symbols, cex.axis, cex.lab the magnification to be used for point symbols, axis annotation, labels relative to the current.
font.axis, font.lab the font to be used for axis annotation / labels.
lty.axis, lty.grid the line type to be used for axis / grid.
lty.hide line style used to plot 'non-visible' edges (defaults of the lty.axis style)
lty.hplot the line type to be used for vertical segments with type = "h".
log Not yet implemented! A character string which contains "x" (if the x axis is to be logarithmic), "y", "z", "xy", "xz", "yz", "xyz".
... more graphical parameters can be given as arguments, pch = 16 or pch = 20 may be nice.

Value

xyz.convert function which converts coordinates from 3D (x, y, z) to 2D-projection (x, y) of scatterplot3d. Useful to plot objects into existing plot.
points3d function which draws points or lines into the existing plot.
plane3d function which draws a plane into the existing plot: plane3d(Intercept, x.coef = NULL, y.coef = NULL, z.coef = NULL, lty = "dashed", lty.box = NULL, ...). Instead of Intercept a vector containing 3 elements or an (g)lm object can be specified. The argument lty.box allows to set a different line style for the intersecting lines in the box’s walls.
box3d function which “refreshes” the box surrounding the plot.

Note

Some graphical parameters should only be set as arguments in scatterplot3d but not in a previous par() call. One of these is mar, which is also non-standard in another way: Users who want to extend an existing scatterplot3d graphic with another function than points3d, plane3d or box3d,
should consider to set `par(mar = c(b, l, t, r))` to the value of `mar` used in `scatterplot3d`, which defaults to `c(5, 3, 4, 3) + \text{0.1}`.

Other `par` arguments may be split into several arguments in `scatterplot3d`, e.g., for specifying the line type. And finally some of `par` arguments do not apply here, e.g., many of those for axis calculation. So we recommend to try the specification of graphical parameters at first as arguments in `scatterplot3d` and only if needed as arguments in previous `par()` call.

### Author(s)

Uwe Ligges <ligges@statistik.tu-dortmund.de>; [http://www.statistik.tu-dortmund.de/~ligges](http://www.statistik.tu-dortmund.de/~ligges).

### References


### See Also

`persp`, `plot`, `par`.

### Examples

```r
## On some devices not all colors can be displayed.
## Try the postscript device or use highlight.3d = FALSE.

## example 1
z <- seq(-10, 10, 0.01)
x <- cos(z)
y <- sin(z)
scatterplot3d(x, y, z, highlight.3d=TRUE, col.axis="blue",
col.grid="lightblue", main="scatterplot3d - 1", pch=20)

## example 2
temp <- seq(-pi, 0, length = 50)
x <- c(rep(1, 50) %*% t(cos(temp)))
y <- c(cos(temp) %*% t(sin(temp)))
z <- c(sin(temp) %*% t(sin(temp)))
scatterplot3d(x, y, z, highlight.3d=TRUE,
col.axis="blue", col.grid="lightblue",
main="scatterplot3d - 2", pch=20)

## example 3
temp <- seq(-pi, 0, length = 50)
x <- c(rep(1, 50) %*% t(cos(temp)))
y <- c(cos(temp) %*% t(sin(temp)))
z <- 10 * c(sin(temp) %*% t(sin(temp)))
color <- rep("green", length(x))
temp <- seq(-10, 10, 0.01)
x <- c(x, cos(temp))
y <- c(y, sin(temp))
```
z <- c(z, temp)
color <- c(color, rep("red", length(temp)))
scatterplot3d(x, y, z, color, pch=20, zlim=c(-2, 10),
              main="scatterplot3d - 3")

## example 4
my.mat <- matrix(runif(25), nrow=5)
dimnames(my.mat) <- list(LETTERS[1:5], letters[11:15])
my.mat # the matrix we want to plot ...
s3d.dat <- data.frame(cols=as.vector(col(my.mat)),
                      rows=as.vector(row(my.mat)),
                      value=as.vector(my.mat))
scatterplot3d(s3d.dat, type="h", lwd=5, pch",
              x.ticklabs=colnames(my.mat), y.ticklabs=rownames(my.mat),
              color=grey(25:1/40), main="scatterplot3d - 4")

## example 5
data(trees)
s3d <- scatterplot3d(trees, type="h", highlight.3d=TRUE,
                  angle=55, scale.y=0.7, pch=16, main="scatterplot3d - 5")
# Now adding some points to the "scatterplot3d"
s3d$points3d(seq(10,20,2), seq(85,60,-5), seq(60,10,-10),
              col="blue", type="h", pch=16)
# Now adding a regression plane to the "scatterplot3d"
attach(trees)
my.lm <- lm(Volume ~ Girth + Height)
s3d$plane3d(my.lm, lty.box = "solid")

## example 6; by Martin Maechler
cubedraw <- function(res3d, min = 0, max = 255, cex = 2, text. = FALSE)
{
  ## Purpose: Draw nice cube with corners
  cube01 <- rbind(c(0,0,1), 0, c(1,0,0), c(1,1,0), 1, c(0,1,1), # < 6 outer
                  c(1,0,1), c(0,1,0)) # < "inner": fore- & back-ground
  cub <- min + (max-min)*cube01
  ## visible corners + lines:
  res3d$points3d(cub[c(1:6,1,7,3,7,5) ,], cex = cex, type = 'b', lty = 1)
  ## hidden corner + lines
  res3d$points3d(cub[c(2,8,4,8,6), ], cex = cex, type = 'b', lty = 3)
  if(text.)## debug
    text(res3d$xyz.convert(cub), labels=1:nrow(cub), col='tomato', cex=2)
}

## 6 a) The named colors in R, i.e. colors()
cc <- colors()
crgb <- t(col2rgb(cc))
par(xpd = TRUE)
rr <- scatterplot3d(crgb, color = cc, box = FALSE, angle = 24,
                    xlim = c(-50, 300), ylim = c(-50, 300), zlim = c(-50, 300))
cubedraw(rr)

## 6 b) The rainbow colors from rainbow(201)
rbc <- rainbow(201)
Rrb <- t(col2rgb(rbc))
rR <- scatterplot3d(Rrb, color = rbc, box = FALSE, angle = 24,
                   xlim = c(-50, 300), ylim = c(-50, 300), zlim = c(-50, 300))
cubedraw(rR)
R$points3d(Rrb, col = rbc, pch = 16)
Index

* Topic hplot
  scatterplot3d, 1

par, 3, 4
persp, 4
plot, 4
scatterplot3d, 1