

Package ‘colors3d’

July 22, 2025

Title Generate 2D and 3D Color Palettes

Version 1.0.1

Description Generate multivariate color palettes to represent two-dimensional or three-dimensional data in graphics (in contrast to standard color palettes that represent just one variable). You tell 'colors3d' how to map color space onto your data, and it gives you a color for each data point. You can then use these colors to make plots in base 'R', 'ggplot2', or other graphics frameworks.

Depends R (>= 3.2.2)

License MIT + file LICENSE

URL <https://github.com/matthewkling/colors3d>

BugReports <https://github.com/matthewkling/colors3d/issues>

RoxygenNote 7.2.3

Encoding UTF-8

Imports combinat, FNN, grDevices, plyr, scales, stats

NeedsCompilation no

Author Matthew Kling [aut, cre, cph]

Maintainer Matthew Kling <mattkling@berkeley.edu>

Repository CRAN

Date/Publication 2023-10-31 18:20:07 UTC

Contents

colors2d	2
colors3d	3
colorwheel2d	4
distant_colors	5
polarize	6

Index	7
--------------	----------

`colors2d`*Map values to a 2D legend interpolated from 4 corner colors.*

Description

This function returns a color value for each row of the 2-column dataset supplied, based on a 2D color palette interpolated from 4 corner colors.

Usage

```
colors2d(  
  data,  
  colors = c("yellow", "green", "blue", "magenta"),  
  xtrans = c("none", "log", "rank"),  
  ytrans = c("none", "log", "rank")  
)
```

Arguments

<code>data</code>	Matrix or data frame with 2 numeric columns; they will map to x and y.
<code>colors</code>	Vector of 4 corner colors to interpolate, clockwise from upper right.
<code>xtrans, ytrans</code>	Transformation to apply to x and y variables before applying a linear color mapping: either "none" (default), "log", or "rank".

Value

Character vector of colors.

Examples

```
plot(iris,  
     col = colors2d(iris[, c("Sepal.Length", "Sepal.Width")]),  
     pch = 19, cex = 2)  
  
plot(iris,  
     col = colors2d(iris[, c("Sepal.Length", "Sepal.Width")],  
                   colors = c("limegreen", "gold", "black", "dodgerblue"),  
                   xtrans = "rank", ytrans = "rank"),  
     pch = 19, cex = 2)
```

colors3d	<i>Map values to a 3D legend in RGB colorspace.</i>
----------	---

Description

This function returns a color value for each row of the 3-column dataset supplied, by transforming the input data and using it as RGB values.

Usage

```
colors3d(data, trans = "none", order = 1, inversion = 1, opacity = NULL)
```

Arguments

data	Matrix or data frame with 3 numeric columns.
trans	Either "none" (default, histogram is rescaled) or "rank" (histogram is flattened).
order	Integer from 1 to 6, each denoting a unique permutation of variables-to-color band mapping. Under the default value of 1, the three variables in 'data' are respectively mapped onto the R, G, and B bands of colorspace.
inversion	Integer from 1 to 8, each denoting a unique combination of variables to reverse before mapping. Under the default value of 1, all three variables are mapped with positive values at the high end of the color band. Together with the 'order' parameter, this allows all possible 48 unique mappings of a given set of variables onto 3D colorspace.
opacity	Not currently used.

Value

Character vector of colors.

Examples

```
d <- expand.grid(x = 1:49, y = 1:49)
d$z <- cos(sqrt((d$x-25)^2 + (d$y-25)^2))
plot(d[, 1:2], col = colors3d(d), pch = 15, cex = 2)

plot(d[, 1:2], col = colors3d(d, order = 2, inversion = 2), pch = 15, cex = 2)
```

colorwheel2d

Map values to a 2D colorwheel legend.

Description

This function returns a color value for each row of the 2-column dataset supplied, based on a 2D color palette defined by a center color and a series of peripheral colors.

Usage

```
colorwheel2d(
  data,
  colors = c("black", "yellow", "green", "cyan", "blue", "magenta", "red"),
  origin = NULL,
  xyratio = NULL,
  kernel = NULL
)
```

Arguments

data	Matrix or data frame with 2 numeric columns; they will map to x and y.
colors	Vector of colors to interpolate: center followed by periphery counterclockwise from 3 o'clock.
origin	Coordinates of color wheel center.
xyratio	Scalar representing how to map the elliptical color wheel in the data space (the default 1 a circular mapping that weights the two dimensions equally).
kernel	Optional function describing the shape of radial color gradients (default is a linear mapping corresponding to a triangular kernel); this function should take a vector of distances to the center as its sole input and return a positive number.

Value

Character vector of colors.

Examples

```
plot(iris,
     col = colorwheel2d(iris[, c("Sepal.Length", "Sepal.Width")]),
     pch = 19, cex = 2)

plot(iris,
     col = colorwheel2d(
       iris[, c("Sepal.Length", "Sepal.Width")],
       origin = c(5.5, 2.5),
       kernel = function(x) x ^ .5),
     pch = 19, cex = 2)
```

distant_colors	<i>Palettes of dissimilar colors in RGB space.</i>
----------------	--

Description

Many standard palette generators use only a slice of color space, which can cause a lack of differentiability in palettes used to visualize categorical factors with many levels. This function attempts to overcome this by generating colors using nearest-neighbor distance maximization in 3D RGB space.

Usage

```
distant_colors(  
  n,  
  res = 20,  
  maxreps = 1000,  
  radius = 10,  
  avoid_white = TRUE,  
  seed = NULL  
)
```

Arguments

n	Number of colors (integer).
res	Number of distinct values in each RGB dimension (integer).
maxreps	Max number of optimization iterations (integer).
radius	Neighborhood size for potential moves, analagous to heating.
avoid_white	Logical, default is TRUE.
seed	Integer used to seed randomization during search; leave as NULL to generate different results each time, or set a value to generate reproducible results.

Value

Character vector of colors.

Examples

```
plot(runif(20), runif(20),  
     col = distant_colors(20),  
     pch = 16, cex = 3)
```

polarize	<i>Internal function converting x-y to distance-angle.</i>
----------	--

Description

Internal function converting x-y to distance-angle.

Usage

```
polarize(data, xyratio, xorigin = 0, yorigin = 0)
```

Arguments

data	Matrix or data frame with 2 numeric columns representing x and y.
xyratio	Single number indicating unit ratio in x vs y direction.
xorigin, yorigin	Numbers indicating center of polarization.

Value

2-column matrix of distances and angles.

Index

colors2d, [2](#)
colors3d, [3](#)
colorwheel2d, [4](#)

distant_colors, [5](#)

polarize, [6](#)