

Package ‘graph3d’

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Type Package

Title A Wrapper of the JavaScript Library 'vis-graph3d'

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Description Create interactive visualization charts to draw data in three dimensional graphs. The graphs can be included in Shiny apps and R markdown documents, or viewed from the R console and 'RStudio' Viewer. Based on the 'vis.js' Graph3d module and the 'htmlwidgets' R package.

License GPL-3

Imports htmlwidgets, lazyeval

Suggests shiny, viridisLite

Encoding UTF-8

LazyData true

RoxygenNote 7.1.1

URL <https://github.com/stla/graph3d>

BugReports <https://github.com/stla/graph3d/issues>

NeedsCompilation no

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`graph3d`*3D chart*

Description

Generate an interactive 3D chart.

Usage

```
graph3d(  
  data = NULL,  
  x = ~x,  
  y = ~y,  
  z = ~z,  
  frame = NULL,  
  style = NULL,  
  type = "surface",  
  surfaceColors = c("#FF0000", "#FFF000", "#00FF00", "#68E8FB", "#000FFF"),  
  dataColor = NULL,  
  xBarWidth = NULL,  
  yBarWidth = NULL,  
  xlab = NULL,  
  ylab = NULL,  
  zlab = NULL,  
  xValueLabel = NULL,  
  yValueLabel = NULL,  
  zValueLabel = NULL,  
  width = "100%",  
  height = "100%",  
  backgroundColor = NULL,  
  showPerspective = TRUE,  
  showGrid = TRUE,  
  showShadow = FALSE,  
  showXAxis = TRUE,  
  showYAxis = TRUE,  
  showZAxis = TRUE,  
  axisColor = NULL,  
  axisFontSize = 30,  
  gridColor = NULL,  
  keepAspectRatio = TRUE,  
  verticalRatio = 0.5,  
  tooltip = TRUE,  
  tooltipDelay = NULL,  
  tooltipStyle = NULL,  
  showLegend = TRUE,  
  legendLabel = NULL,  
  cameraPosition = list(horizontal = 1, vertical = 0.5, distance = 2.8),
```

```

xCenter = NULL,
yCenter = NULL,
xMin = NULL,
xMax = NULL,
yMin = NULL,
yMax = NULL,
zMin = NULL,
zMax = NULL,
xStep = NULL,
yStep = NULL,
zStep = NULL,
showAnimationControls = TRUE,
animationInterval = 100,
animationPreload = TRUE,
frameLabel = NULL,
onclick = NULL,
elementId = NULL
)

```

Arguments

data	dataframe containing the data for the chart; if not NULL, the variables passed to x, y, z, frame and style are searched among the columns of data
x	a right-sided formula giving the variable for the locations of the points on the x-axis; required
y	a right-sided formula giving the variable for the locations of the points on the y-axis; required
z	a right-sided formula giving the variable for the locations of the points on the z-axis; required
frame	a right-sided formula giving the variable for the frames of the animation; optional
style	a right-sided formula required for type="dot-color" and type="dot-size"; the variable given by this formula can be a numeric vector for the data value appearing in the legend, or a list of style properties; see the examples
type	the type of the chart, one of "bar", "bar-color", "bar-size", "dot", "dot-line", "dot-color", "dot-size", "line", "grid", or "surface"
surfaceColors	a vector of colors for type="surface", or a list of the form <code>list(hue = list(start=-360, end=360, saturation=50, brightness=100, colorStops=8))</code> ; see the vis-graph3d documentation for more information
dataColor	a string or a list; see the type="line" example and the vis-graph3d documentation
xBarWidth, yBarWidth	the widths of bars in x and y directions for type="bar" and type="bar-color"; by default, the width is equal to the smallest distance between the data points
xlab	string, the label on the x-axis
ylab	string, the label on the y-axis

zlab	string, the label on the z-axis
xValueLabel	JavaScript function for custom formatting of the labels along the x-axis, for example <code>JS("function(x){return (x * 100) + '%'}")</code>
yValueLabel	same as xValueLabel for the y-axis
zValueLabel	same as xValueLabel for the z-axis
width, height	the dimensions of the chart given as strings, in pixels (e.g. "400px") or percentages (e.g. "80%")
backgroundColor	the background color of the chart, either a string giving a HTML color (like "red" or "#00CC00"), or a list of the form <code>list(fill="black", stroke="yellow", strokeWidth=3)</code> ; fill is the chart fill color, stroke is the color of the chart border, and strokeWidth is the border width in pixels
showPerspective	logical; if TRUE, the graph is drawn in perspective: points and lines which are further away are drawn smaller
showGrid	logical; if TRUE, grid lines are drawn in the x-y surface
showShadow	logical, whether to show shadow on the graph
showXAxis	logical; if TRUE, x-axis and x-axis labels are drawn
showYAxis	logical; if TRUE, y-axis and y-axis labels are drawn
showZAxis	logical; if TRUE, z-axis and z-axis labels are drawn
axisColor	a HTML color given as a string, the color of the axis lines and the text along the axes
axisFontSize	a positive number, the font size of the axes labels
gridColor	a HTML color given as a string, the color of the grid lines
keepAspectRatio	logical; if TRUE, the x-axis and the y-axis keep their aspect ratio; if FALSE, the axes are scaled such that they both have the same, maximum width
verticalRatio	value between 0.1 and 1 which scales the vertical size of the graph; when keepAspectRatio=FALSE and verticalRatio=1, the graph will be a cube
tooltip	logical, whether to see the tooltips, or a JavaScript function to customize the tooltips; see the barplot example
tooltipDelay	a number, the delay time in ms for the tooltip to appear when the mouse cursor hovers over an x-y grid tile
tooltipStyle	a list of tooltip style properties; see the vis-graph3d documentation
showLegend	logical, whether to see the legend if the graph type supports it
legendLabel	a string, the label of the legend
cameraPosition	a list with three fields to set the initial rotation and position if the camera: horizontal, a value in radians, vertical, a value in radians between 0 and $\pi/2$, and distance, the distance between 0.71 and 5 from the camera to the center of the graph
xCenter	a string giving the horizontal center position of the graph as a percentage (like "50%") or in pixels (like "100px"); default to "55%"

yCenter	same as xCenter for the vertical center position of the graph; default to "45%"
xMin	minimum value for the x-axis; if not set, the smallest value of x is used
xMax	maximum value for the x-axis; if not set, the largest value of x is used
yMin	minimum value for the y-axis; if not set, the smallest value of y is used
yMax	maximum value for the y-axis; if not set, the largest value of y is used
zMin	minimum value for the z-axis; if not set, the smallest value of z is used
zMax	maximum value for the z-axis; if not set, the largest value of z is used
xStep	a number, the step size for the grid on the x-axis
yStep	a number, the step size for the grid on the y-axis
zStep	a number, the step size for the grid on the z-axis
showAnimationControls	logical, only applicable when the graph contains an animation (i.e. frame is not NULL), whether to show the animation controls (buttons previous, start/stop, next, and a slider)
animationInterval	a number, the animation interval in milliseconds; default to 1000
animationPreload	logical; if FALSE, the animation frames are loaded as soon as they are requested; if TRUE, the animation frames are automatically loaded in the background
frameLabel	string, the label for the animation slider
onclick	a JavaScript function to handle the click event on a point; see the vis-graph3d documentation and the second example in graph3d-shiny
elementId	an id for the widget

Details

See the [vis-graph3d](#) documentation.

Examples

```
# 3d bar plot ####
dat <- data.frame(x = c(1,1,2,2), y = c(1,2,1,2), z = c(1,2,3,4))
graph3d(dat, type = "bar", zMin = 0)
# change bar widths
graph3d(dat, type = "bar", zMin = 0, xBarWidth = 0.3, yBarWidth = 0.3)
# with custom tooltips
graph3d(dat, type = "bar", zMin = 0,
        tooltip = JS(c("function(xyz){",
                        "  var x = 'X: ' + xyz.x.toFixed(2);",
                        "  var y = 'Y: ' + xyz.y.toFixed(2);",
                        "  var z = 'Z: ' + xyz.z.toFixed(2);",
                        "  return x + '<br/>' + y + '<br/>' + z;",
                        "}")
        ))
)

# bivariate Gaussian density ####
```

```

dat <- expand.grid(
  x = seq(-4,4,length.out=100),
  y = seq(-4,4,length.out=100)
)
dat <- transform(dat, density = dnorm(x)*dnorm(y))
graph3d(dat, z = ~density, keepAspectRatio = FALSE, verticalRatio = 1)

# animation ####
f <- function(x, y) sin(x/50) * cos(y/50) * 50 + 50
t_ <- seq(0, 2*pi, length.out = 90)[-90]
x_ <- y_ <- seq(0, 314, length.out = 50)
dat <- expand.grid(x = x_, y = y_, t = t_)
dat <- transform(dat, z = f(x*cos(t) - y*sin(t), x*sin(t) + y*cos(t)))
graph3d(dat, frame = ~t, tooltip = FALSE)

# scatterplot ####
dat <- iris
dat$style <- I(lapply(iris$Species, function(x){
  switch(as.character(x),
    setosa      = list(fill="red",   stroke="#000"),
    versicolor = list(fill="green",  stroke="#000"),
    virginica  = list(fill="blue",   stroke="#000"))
}))
graph3d(dat, x = ~Sepal.Length, y = ~Sepal.Width, z = ~Petal.Length,
  style = ~style, type = "dot-color", showLegend = FALSE)

# line #####
t_ <- seq(0, 2*pi, length.out = 200)
dat <- data.frame(
  x = cos(t_),
  y = sin(t_),
  z = 2 * cos(3*t_)
)
graph3d(dat, type = "line", dataColor = list(strokeWidth = 5, stroke = "red"),
  verticalRatio = 1)

# a complex function ####
dat <- expand.grid(
  x = seq(-1, 1, length.out = 100),
  y = seq(-1, 1, length.out = 100)
)
dat <- transform(dat, sine = sin(x + 1i*y))
dat <- transform(dat, modulus = Mod(sine), phase = Arg(sine))
graph3d(dat, z = ~modulus, style = ~phase, type = "dot-color",
  legendLabel = "phase")

```

Description

These objects are imported from other packages. Follow the links to their documentation: [JS](#), [saveWidget](#).

graph3d-shiny	<i>Shiny bindings for graph3d</i>
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Description

Output and render functions for using graph3d within Shiny applications and interactive Rmd documents.

Usage

```
graph3dOutput(outputId, width = "100%", height = "400px")
```

```
renderGraph3d(expr, env = parent.frame(), quoted = FALSE)
```

Arguments

outputId	output variable to read from
width, height	dimensions, must be valid CSS units (like '100%', '400px', 'auto') or a number, which will be coerced to a string and have 'px' appended
expr	an expression that generates a graph3d HTML widget
env	the environment in which to evaluate expr
quoted	logical, whether expr is a quoted expression (with quote()); this is useful if you want to save an expression in a variable

Examples

```
if(interactive()) {
  # 'surfaceColors' example ####

  library(shiny)
  library(viridisLite)
  library(graph3d)

  x <- y <- seq(-10, 10, length.out = 100)
  dat <- expand.grid(x = x, y = y)
  f <- function(x, y){
    r <- sqrt(x^2+y^2)
    10 * ifelse(r == 0, 1, sin(r)/r)
  }
  dat <- transform(dat, z = f(x, y))

  ui <- fluidPage(
```

```

    br(),
    fluidRow(
      column(
        width = 2,
        radioButtons("colors", "Colors",
                     c("viridis", "inferno", "magma", "plasma", "cividis"))
      ),
      column(
        width = 10,
        graph3dOutput("mygraph", height = "550px")
      )
    )
  )
)

server <- function(input, output, session){

  Colors <- reactive({
    colors <- switch(
      input$colors,
      viridis = viridis(5),
      inferno = inferno(5),
      magma = magma(5),
      plasma = plasma(5),
      cividis = cividis(5)
    )
    substring(colors, 1L, 7L)
  })

  output[["mygraph"]] <- renderGraph3d({
    graph3d(dat, surfaceColors = Colors(), showLegend = FALSE)
  })

}

shinyApp(ui, server)

}

if(interactive()) {

  # 'onclick' example ####

  library(shiny)
  library(graph3d)

  dat <- data.frame(x = rnorm(30), y = rnorm(30), z = rnorm(30))

  onclick <- c(
    "function(point){",
    "  Shiny.setInputValue('point', point);",
    "}"
  )
}

```



```
ui <- fluidPage(
  br(),
  fluidRow(
    column(
      width = 4,
      h4("You clicked:"),
      verbatimTextOutput("pointClicked")
    ),
    column(
      width = 8,
      graph3dOutput("mygraph", height = "550px")
    )
  )
)

server <- function(input, output, session){

  output[["mygraph"]] <- renderGraph3d({
    graph3d(dat, type = "dot", width = "550px", height = "550px",
      onclick = JS(onclick), tooltip = FALSE)
  })

  output[["pointClicked"]] <- renderPrint({
    input[["point"]]
  })

}

shinyApp(ui, server)

}
```

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