

Package ‘threejs’

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Type Package

Title Interactive 3D Scatter Plots, Networks and Globes

Description Create interactive 3D scatter plots, network plots, and globes using the 'three.js' visualization library (<<https://threejs.org>>).

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Author B. W. Lewis [aut, cre, cph],
Three.js authors [cph] (three.js library),
jQuery Foundation [cph] (jQuery library),
Alexey Stukalov [ctb],
Yihui Xie [ctb],
Andreas Briese [ctb],
B. Thieurmél [ctb]

Maintainer B. W. Lewis <blewis@illposed.net>

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threejs-package	<i>Interactive 3D graphics including point clouds and globes using three.js and htmlwidgets.</i>
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Description

Interactive 3D graphics including point clouds and globes using three.js and htmlwidgets.

References

<http://threejs.org>

Examples

```
## Not run:
library("shiny")
runApp(system.file("examples/globe",package="threejs"))
runApp(system.file("examples/scatterplot",package="threejs"))

# See also help for globe.js and scatterplot3.js

## End(Not run)
```

ego

Facebook social circles

Description

A facebook social network subgraph obtained from the Stanford SNAP repository.

Usage

```
data(ego)
```

Format

An igraph package undirected graph object with 4039 vertices and 88234 edges. The graph includes a force-directed layout with vertices colored by the `cluster_fast_greedy` algorithm from the igraph package.

Source

Stanford SNAP network repository http://snap.stanford.edu/data/facebook_combined.txt.gz

References

J. McAuley and J. Leskovec. Learning to Discover Social Circles in Ego Networks. NIPS, 2012.

flights

Global flight example data from Callum Prentice.

Description

Global flight example data from Callum Prentice.

Usage

```
data(flights)
```

Format

A data frame with 34,296 observations of 4 variables, `origin_lat`, `origin_long`, `dest_lat`, and `dest_long`.

Source

See Callum Prentice https://raw.githubusercontent.com/callumprentice/callumprentice.github.io/master/apps/flight_stream/js/flights_one.js

gcol *A basic internal color format parser*

Description

A basic internal color format parser

Usage

```
gcol(x)
```

Arguments

x a character-valued color name

Value

a list of 3-hex-digit color values and scalar numeric alpha values

globejs *Plot Data on 3D Globes*

Description

Plot points, arcs and images on a globe in 3D using Three.js. The globe can be rotated and zoomed.

Usage

```
globejs(  
  img = system.file("images/world.jpg", package = "threejs"),  
  lat,  
  long,  
  value = 40,  
  color = "#00ffff",  
  arcs,  
  arcsColor = "#99aaff",  
  arcsHeight = 0.4,  
  arcsLwd = 1,  
  arcsOpacity = 0.2,  
  atmosphere = FALSE,  
  bg = "black",  
  height = NULL,  
  width = NULL,  
  elementId = NULL,  
  ...  
)
```

Arguments

<code>img</code>	A character string representing a file path or URI of an image to plot on the globe surface.
<code>lat</code>	Optional data point decimal latitudes, must be of same length as <code>long</code> (negative values indicate south, positive north).
<code>long</code>	Optional data point decimal longitudes, must be of same length as <code>lat</code> (negative values indicate west, positive east).
<code>value</code>	Either a single value indicating the height of all data points, or a vector of values of the same length as <code>lat</code> indicating height of each point.
<code>color</code>	Either a single color value indicating the color of all data points, or a vector of values of the same length as <code>lat</code> indicating color of each point.
<code>arcs</code>	Optional four-column data frame specifying arcs to plot. The columns of the data frame, in order, must indicate the starting latitude, starting longitude, ending latitude, and ending longitude.
<code>arcsColor</code>	Either a single color value indicating the color of all arcs, or a vector of values of the same length as the number of rows of <code>arcs</code> .
<code>arcsHeight</code>	A single value between 0 and 1 controlling the height above the globe of each arc.
<code>arcsLwd</code>	Either a single value indicating the line width of all arcs, or a vector of values of the same length as the number of rows of <code>arcs</code> .
<code>arcsOpacity</code>	A single value between 0 and 1 indicating the opacity of all arcs.
<code>atmosphere</code>	TRUE enables WebGL atmosphere effect.
<code>bg</code>	Plot background color.
<code>height</code>	The container div height.
<code>width</code>	The container div width.
<code>elementId</code>	Use an explicit element ID for the widget (rather than an automatically generated one). Useful if you have other JavaScript that needs to explicitly discover and interact with a specific widget instance.
<code>...</code>	Additional arguments to pass to the <code>three.js</code> renderer (see below for more information on these options).

Value

An `htmlwidget` object (displayed using the object's `show` or `print` method).

Available rendering options

- `"bodycolor"` The diffuse reflective color of the globe.
- `"emissive"` The emissive color of the globe object.
- `"lightcolor"` The color of the ambient light in the scene.
- `"fov"` The initial field of view, default is 35.
- `"rotationlat"` The initial globe latitudinal rotation in radians, default is 0.

- "rotationlong" The initial globe longitudinal rotation in radians, default is 0.
- "pointsize" The numeric size of the points/bars, default is 1.
- "renderer" Manually set the three.js renderer to one of 'auto' or 'canvas'. The canvas renderer works across a greater variety of viewers and browsers. The default setting of 'auto' automatically chooses WebGL rendering if it's available.

Specify colors with standard color names or hex color representations. The default values (well-suited to many earth-like map images) are `lightcolor = "#aaeeff"`, `emissive = "#000000"`, and `bodycolor = "#ffffff"`. Larger fov values result in a smaller (zoomed out) globe. The latitude and longitude rotation values are relative to the center of the map image. Their default values of zero radians result in the front of the globe corresponding to the center of the flat map image.

Note

The `img` argument specifies the WebGL texture image to wrap on a sphere. If you plan to plot points using `lat` and `lon` the image must be a plate carree (aka lat/long) equirectangular map projection; see https://en.wikipedia.org/wiki/Equirectangular_projection for details. Lat/long maps are commonly found for most planetary bodies in the solar system, and are also easily generated directly in R (see the references and examples below).

References

The three.js project <http://threejs.org>. (The corresponding three.js javascript file is in `system.file("htmlwidgets/globejs", "three.js")`.)
 An excellent overview of available map coordinate reference systems (PDF): <https://www.nceas.ucsb.edu/~frazier/RSpatialGuides/OverviewCoordinateReferenceSystems.pdf>

Examples

```
# Plot flights to frequent destinations from Callum Prentice's
# global flight data set,
# http://callumprentice.github.io/apps/flight_stream/index.html
data(flights)
# Approximate locations as factors
dest <- factor(sprintf("%.2f:%.2f", flights[,3], flights[,4]))
# A table of destination frequencies
freq <- sort(table(dest), decreasing=TRUE)
# The most frequent destinations in these data, possibly hub airports?
frequent_destinations <- names(freq)[1:10]
# Subset the flight data by destination frequency
idx <- dest %in% frequent_destinations
frequent_flights <- flights[idx, ]
# Lat/long and counts of frequent flights
ll <- unique(frequent_flights[,3:4])
# Plot frequent destinations as bars, and the flights to and from
# them as arcs. Adjust arc width and color by frequency.
globejs(lat=ll[, 1], long=ll[, 2], arcs=frequent_flights,
        bodycolor="#aaaaff", arcsHeight=0.3, arcsLwd=2,
        arcsColor="#ffff00", arcsOpacity=0.15,
        atmosphere=TRUE, color="#00aaff", pointsize=0.5)

## Not run:
```

```
# Plot populous world cities from the maps package.
library(threejs)
library(maps)
data(world.cities, package="maps")
cities <- world.cities[order(world.cities$pop, decreasing=TRUE)[1:1000],]
value <- 100 * cities$pop / max(cities$pop)
col <- colorRampPalette(c("cyan", "lightgreen"))(10)[floor(10 * value/100) + 1]
globejs(lat=cities$lat, long=cities$long, value=value, color=col, atmosphere=TRUE)

# Plot the data on the moon:
moon <- system.file("images/moon.jpg", package="threejs")
globejs(img=moon, bodycolor="#555555", lightcolor="#aaaaaa",
        lat=cities$lat, long=cities$long,
        value=value, color=col)

# Using global plots from the mapproj, rworldmap, or sp packages.

# Instead of using ready-made images of the earth, we can use
# many R spatial imaging packages to produce globe images
# dynamically. With a little extra effort you can build globes with total
# control over how they are plotted.

library(mapproj)
library(threejs)
data(wrld_simpl)

bgcolor <- "#000025"
earth <- tempfile(fileext=".jpg")

# NOTE: Use antialiasing to smooth border boundary lines. But! Set the jpeg
# background color to the globe background color to avoid a visible aliasing
# effect at the the plot edges.

jpeg(earth, width=2048, height=1024, quality=100, bg=bgcolor, antialias="default")
par(mar = c(0,0,0,0), pin = c(4,2), pty = "m", xaxs = "i",
    xaxt = "n", xpd = FALSE, yaxs = "i", bty = "n", yaxt = "n")
plot(wrld_simpl, col="black", bg=bgcolor, border="cyan", ann=FALSE,
     setParUsrBB=TRUE)
dev.off()
globejs(earth)

# A shiny example:
shiny::runApp(system.file("examples/globe",package="threejs"))

## End(Not run)

# See http://bwlewis.github.io/rthreejs for additional examples.
```

Description

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

Usage

```
globeOutput(outputId, width = "100%", height = "600px")

renderGlobe(expr, env = parent.frame(), quoted = FALSE)

scatterplotThreeOutput(outputId, width = "100%", height = "500px")

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

Arguments

outputId	output variable to read from
width, height	Must be a valid CSS unit (like "100%", "400px", "auto") or a number, which will be coerced to a string and have "px" appended.
expr	An expression that generates threejs graphics.
env	The environment in which to evaluate expr.
quoted	Is expr a quoted expression (with quote())? This is useful if you want to save an expression in a variable.

graphjs

Interactive 3D Graph Visualization

Description

Make interactive 3D plots of [igraph](#) objects.

Usage

```
graphjs(
  g,
  layout,
  vertex.color,
  vertex.size,
  vertex.shape,
  vertex.label,
  edge.color,
  edge.width,
  edge.alpha,
  main = "",
  bg = "white",
  width = NULL,
```



```

    height = NULL,
    elementId = NULL,
    ...
)

```

Arguments

<code>g</code>	an igraph graph object or a list of <code>igraph</code> objects (see notes)
<code>layout</code>	optional graph layout or list of layouts (see notes)
<code>vertex.color</code>	optional vertex color or vector of colors as long as the number of vertices in <code>g</code>
<code>vertex.size</code>	optional vertex size or vector of sizes
<code>vertex.shape</code>	optional vertex shape or vector of shapes
<code>vertex.label</code>	optional mouse-over vertex label or vector of labels
<code>edge.color</code>	optional edge color or vector of colors as long as the number of edges in <code>g</code>
<code>edge.width</code>	optional edge width (single scalar value, see notes)
<code>edge.alpha</code>	optional single numeric edge transparency value
<code>main</code>	plot title text
<code>bg</code>	plot background color
<code>width</code>	the widget container div width in pixels
<code>height</code>	the widget container div height in pixels
<code>elementId</code>	Use an explicit element ID for the widget (rather than an automatically generated one). Useful if you have other JavaScript that needs to explicitly discover and interact with a specific widget instance.
<code>...</code>	optional additional arguments passed to scatterplot3js

Value

An `htmlwidget` object that is displayed using the object's `show` or `print` method. (If you don't see your widget plot, try printing it with the `print` function.)

Interacting with the plot

Press and hold the left mouse button, or touch or trackpad equivalent, and move the mouse to rotate the plot. Press and hold the right mouse button to pan. Use the mouse scroll wheel to zoom. If `vertex.labels` are specified (see below), moving the mouse pointer over a point will display the label. Alternatively use `vertex.shape` to plot character names as shown in the examples below. Set the optional experimental `use.orbitcontrols=TRUE` argument to use a more CPU-efficient but somewhat less fluid mouse/touch interface.

Layout options

Use the `layout` parameter to control the visualization layout by supplying either a three-column matrix of vertex `x`, `y`, `z` coordinates, or a function that returns such a layout. The `igraph` [layout_with_fr](#) force-directed layout is used by default (note that only 3D layouts are supported). Also see the animation section below.

Vertex options

Optional parameters beginning with `vertex.` represent a subset of the `igraph` package vertex visualization options and work similarly, see `link{igraph.plotting}`. Vertex shapes in `graphjs` act somewhat differently, and are mapped to the `pch` option in `scatterplot3js`. In particular, `pch` character symbols or even short text strings may be specified. The `vertex.label` option enables a mouse-over label display instead of plotting labels directly near the vertices. (Consider using the text `pch` options for that instead.)

Edge options

Optional parameters beginning with `edge.` represent a subset of the `igraph` edge visualization options and work similarly as the `vertex.` options above. The current version of the package only supports uniform edge widths specified by a single scalar value. This choice was made for performance reasons to support large visualizations.

Graph animation

Specifying a list of three-column layout matrices in `layout` displays a linear interpolation from one layout to the next, providing a simple mechanism for graph animation. Each layout must have the same number of rows as the number of vertices in the graph.

Specify the optional `fp1` (frames per layout) parameter to control the number of interpolating animation frames between layouts. See the examples.

Optionally specify a list of graph objects in `g` to vary the displayed edges and edge colors from one layout to the next, with the restriction that each graph object must refer to a uniform number of vertices.

The lists of graphs may optionally include varying vertex and edge colors. Alternatively, specify a list of `vertex.color` vectors (one for each layout) to animate vertex colors. Similarly, optionally specify a list of `edge.color` vectors to animate edge colors.

Optionally provide a list of main title text strings to vary the title with each animation layout.

None of the other plot parameters may be animated.

Click animation

Specify the option `click=list` to animate the graph when specified vertices are clicked interactively, where `list` is a named list of animation entries. Each entry must itself be a list with the following entries

- `g` optional a single `igraph` object with the same number of vertices as `g` above (if specified this must be the first entry)
- `layout` - optional a single `igraph` layout, or differential layout if `cumulative=TRUE`
- `vertex.color` - optional single vector of vertex colors
- `edge.color` - optional single vector of edge colors
- `cumulative` - optional boolean entry, if `TRUE` then vertex positions are added to current plot, default is `FALSE`

At least one of `g` or `layout` must be specified in each animation list entry. The layouts and colors may be alternatively imbedded in the `igraph` object itself. Each animation list entry must be named by a number corresponding to the vertex enumeration in `g`. An animation sequence is triggered when a corresponding vertex is clicked. For instance, to trigger animations when vertices number 1 or 5 are clicked, include list entries labeled "1" and "5". See the demos in `demo(package="threejs")` for detailed examples.

Other interactions

Specify the argument `brush=TRUE` to highlight a clicked vertex and its directly connected edges (click off of a vertex to reset the display). Optionally set the `highlight=<hex color>` and `lowlight=<hex color>` to manually control the brushing display colors.

Crosstalk

`graphjs()` works with crosstalk selection (but not filtering yet); see <https://rstudio.github.io/crosstalk/>. Enable crosstalk by supplying the optional argument `crosstalk=df`, where `df` is a crosstalk-SharedData data.frame-like object with the same number of rows as graph vertices (see the examples).

Note

Edge transparency values specified as part of `edge.color` are ignored, however you can set an overall transparency for edges with `edge.alpha`.

References

The three.js project <http://threejs.org>.

See Also

[igraph.plotting](#), [scatterplot3js](#)

Examples

```
set.seed(1)
g <- sample_islands(3, 10, 5/10, 1)
i <- cluster_louvain(g)
(graphjs(g, vertex.color=c("orange", "green", "blue")[i$membership], vertex.shape="sphere"))

# similar example with user-defined directional lighting
l1 = light_directional(color = "red", position = c(0, -0.8, 0.5))
l2 = light_directional(color = "yellow", position = c(0, 0.8, -0.5))
l3 = light_ambient(color = "#555555")
(graphjs(g, vertex.color="gray", vertex.shape="sphere", lights=list(l1, l2, l3)))

# Les Miserables Character Co-appearance Data
data("LeMis")
(graphjs(LeMis))

# ...plot Character names
```

```

(graphjs(LeMis, vertex.shape=V(LeMis)$label))

# SNAP Facebook ego network dataset
data("ego")
(graphjs(ego, bg="black"))

## Not run:
# A shiny example
shiny::runApp(system.file("examples/graph", package="threejs"))

# A graph animation that shows several layouts
data("LeMis")
graphjs(LeMis,
  layout=list(
    layout_randomly(LeMis, dim=3),
    layout_on_sphere(LeMis),
    layout_with_drl(LeMis, dim=3), # note! somewhat slow...
    layout_with_fr(LeMis, dim=3, niter=30)),
  main=list("random layout", "sphere layout", "drl layout", "fr layout"),
  fpl=300)

# A simple graph animation illustrating edge modification
g <- make_ring(5) - edges(1:5)
graph_list <- list(
  g + edge(1, 2),
  g + edge(1, 2) + edge(2, 3),
  g + edge(1, 2) + edge(2, 3) + edge(3, 4),
  g + edge(1, 2) + edge(2, 3) + edge(3, 4) + edge(4, 5),
  g + edge(1, 2) + edge(2, 3) + edge(3, 4) + edge(4, 5) + edge(5, 1))
graphjs(graph_list, main=paste(1:5),
  vertex.color=rainbow(5), vertex.shape="sphere", edge.width=3)

# see `demo(package="threejs")` for more animation demos.

# A crosstalk example
library(crosstalk)
library(DT)
data(LeMis)
sd = SharedData$new(data.frame(Name = V(LeMis)$label))
print(bscols(
  graphjs(LeMis, brush=TRUE, crosstalk=sd),
  datatable(sd, rownames=FALSE, options=list(dom='tp'))
))

## End(Not run)

```

Description

Les Miserables Character Coappearance Data

Usage

```
data(LeMis)
```

Format

An igraph package graph object.

Source

Mike Bostock's D3.js force-directed graph example <http://bl.ocks.org/mbostock/4062045>. Data based on character coappearance in Victor Hugo's Les Miserables, compiled by Donald Knuth (<http://www-cs-faculty.stanford.edu/~uno/sgb.html>).

light_ambient

Plot illumination

Description

Plot illumination

Usage

```
light_ambient(color = "#eeeeee")
```

Arguments

color the ambient light color

Value

An object for use with the lights argument in scatterplot3js and graphjs.

light_directional	<i>Plot illumination</i>
-------------------	--------------------------

Description

Plot illumination

Usage

```
light_directional(color = "#e0e0e0", position = c(0, 0, 0))
```

Arguments

color	the light color
position	the light position as an (x, y, z) coordinate vector with entries in [-1, 1]

Value

An object for use with the lights argument in scatterplot3js and graphjs.

lines3d	<i>Add lines to a 3D scatterplot</i>
---------	--------------------------------------

Description

Add lines to a 3D scatterplot

Usage

```
lines3d(s, from, to, lwd = 1, alpha = 1, color)
```

Arguments

s	A scatterplot object returned by scatterplot3js .
from	A vector of integer indices of starting points.
to	A vector of integer indices of ending points of the same length as from.
lwd	A single numeric value of line width (applies to all lines).
alpha	A single numeric value of line alpha (applies to all lines).
color	Either a single color value or vector of values as long as from of line colors; line colors default to interpolating their vertex point colors.

Value

A new scatterplot htmlwidget object.

Note

This function replaces the old points3d approach used by scatterplot3d.

Examples

```
## Not run:
x <- rnorm(5)
y <- rnorm(5)
z <- rnorm(5)
scatterplot3js(x, y, z, pch="@", color=rainbow(5)) %>%
  lines3d(c(1, 2), c(3, 4), lwd=2)

## End(Not run)
```

points3d

Add points to a 3D scatterplot

Description

Add points to a 3D scatterplot

Usage

```
points3d(s, x, y, z, color = "orange", pch = "@", size = 1, labels = "")
```

Arguments

s	A non-animated scatterplot object returned by scatterplot3js .
x	Either a vector of x-coordinate values or a three-column data matrix with columns corresponding to the x,y,z coordinate axes. Column labels, if present, are used as axis labels.
y	(Optional) vector of y-coordinate values, not required if x is a matrix.
z	(Optional) vector of z-coordinate values, not required if x is a matrix.
color	Either a single hex or named color name (all points same color), or a vector of hex or named color names as long as the number of points in x.
pch	Optional point glyphs or text strings, see scatterplot3js .
size	The plot point radius, either as a single number or a vector of sizes of length <code>nrow(x)</code> .
labels	Character vector of length x of point labels displayed when the mouse moves over the points.

Value

A new scatterplot htmlwidget object.

Note

This function replaces the old `points3d` approach used by `scatterplot3d`.

Examples

```
## Not run:
# Adding point labels to a scatterplot:
x <- rnorm(5)
y <- rnorm(5)
z <- rnorm(5)
scatterplot3js(x, y, z, pch="o") %>%
  points3d(x + 0.1, y + 0.1, z, color="red", pch=paste("point", 1:5))

# Adding point labels to a graph, obtaining the graph vertex coordinates
# with the `vertices()` function:
data(LeMis)
graphjs(LeMis) %>% points3d(vertices(.), color="red", pch=V(LeMis)$label)

## End(Not run)
```

 scatterplot3js

Interactive 3D Scatterplots

Description

A 3D scatterplot widget using three.js. Many options follow the `scatterplot3d` package.

Usage

```
scatterplot3js(
  x,
  y,
  z,
  height = NULL,
  width = NULL,
  axis = TRUE,
  num.ticks = c(6, 6, 6),
  x.ticklabs = NULL,
  y.ticklabs = NULL,
  z.ticklabs = NULL,
  color = "steelblue",
  size = cex.symbols,
  stroke = "black",
  flip.y = TRUE,
  grid = TRUE,
  renderer = c("auto", "canvas"),
  signif = 8,
```



```

    bg = "#ffffff",
    cex.symbols = 1,
    xlim,
    ylim,
    zlim,
    axis.scale = c(1, 1, 1),
    pch = "@",
    elementId = NULL,
    ...
)

```

Arguments

x	Either a vector of x-coordinate values or a three-column data matrix with columns corresponding to the x,y,z coordinate axes. Column labels, if present, are used as axis labels.
y	(Optional) vector of y-coordinate values, not required if x is a matrix.
z	(Optional) vector of z-coordinate values, not required if x is a matrix.
height	The container div height.
width	The container div width.
axis	A logical value that when TRUE indicates that the axes will be displayed.
num.ticks	A three-element or one-element vector with the suggested number of ticks to display per axis. If a one-element vector, this number of ticks will be used for the axis with the smallest axis.scale, and the number of ticks on the remaining axes will be increased proportionally to the axis.scale values. Set to NULL to not display ticks. The number of ticks may be adjusted by the program.
x.ticklabs	A vector of tick labels of length num.ticks[1], or NULL to show numeric labels.
y.ticklabs	A vector of tick labels of length num.ticks[2], or NULL to show numeric labels.
z.ticklabs	A vector of tick labels of length num.ticks[3], or NULL to show numeric labels.
color	Either a single hex or named color name (all points same color), or a vector of hex or named color names as long as the number of data points to plot.
size	The plot point radius, either as a single number or a vector of sizes of length nrow(x).
stroke	A single color stroke value (surrounding each point). Set to null to omit stroke (only available in the canvas renderer).
flip.y	Reverse the direction of the y-axis (the default value of TRUE produces plots similar to those rendered by the R scatterplot3d package).
grid	Set FALSE to disable display of a grid.
renderer	Select from available plot rendering techniques of 'auto' or 'canvas'. Set to 'canvas' to explicitly use non-accelerated Canvas rendering, otherwise WebGL is used if available.
signif	Number of significant digits used to represent point coordinates. Larger numbers increase accuracy but slow plot generation down.
bg	The color to be used for the background of the device region.

<code>cex.symbols</code>	Equivalent to the <code>size</code> parameter.
<code>xlim</code>	Optional two-element vector of x-axis limits. Default auto-scales to data.
<code>ylim</code>	Optional two-element vector of y-axis limits. Default auto-scales to data.
<code>zlim</code>	Optional two-element vector of z-axis limits. Default auto-scales to data.
<code>axis.scale</code>	Three-element vector to scale each axis as displayed on the plot, after first scaling them all to a unit length. Default <code>c(1, 1, 1)</code> thus results in the axes of equal length. If <code>NA</code> , the displayed axes will be scaled to the ratios determined from <code>c(xlim, ylim, zlim)</code> .
<code>pch</code>	Optional point glyphs, see notes.
<code>elementId</code>	Use an explicit element ID for the widget (rather than an automatically generated one). Useful if you have other JavaScript that needs to explicitly discover and interact with a specific widget instance.
<code>...</code>	Additional options (see note).

Value

An `htmlwidget` object that is displayed using the object's `show` or `print` method. (If you don't see your widget plot, try printing it with the `print` function.)

Scaling the axes

With the default values, the displayed axes are scaled to equal one-unit length. If you instead need to maintain the relative distances between points in the original data, and the same distance between the tick labels, pass `num.ticks=6` (or any other single number) and `axis.scale=NA`

Interacting with the plot

Press and hold the left mouse button (or touch or trackpad equivalent) and move the mouse to rotate the plot. Press and hold the right mouse button (or touch equivalent) to pan. Use the mouse scroll wheel or touch equivalent to zoom. If `labels` are specified (see below), moving the mouse pointer over a point will display the label.

Detailed plot options

Use the optional `...` argument to explicitly supply `axisLabels` as a three-element character vector, see the examples below. A few additional plot options are also supported:

- "lights" a list of `light_ambient` and `light_directional` objects
- "cex.lab" font size scale factor for the axis labels
- "cex.axis" font size scale factor for the axis tick labels
- "font.axis" CSS font string used for all axis labels
- "font.symbols" CSS font string used for plot symbols
- "font.main" CSS font string used for main title text box
- "labels" character vector of length `x` of point labels displayed when the mouse moves over the points

- "main" Plot title text
- "top" Top location in pixels from top of the plot title text
- "left" Left location in pixels from center of the plot title text

The default CSS font string is "48px Arial". Note that the format of this font string differs from, for instance, the usual `par(font.axis)`.

Use the `pch` option to specify points styles in WebGL-rendered plots. `pch` may either be a single character value that applies to all points, or a vector of character values of the same length as `x`. All character values are used literally (`'+'`, `'x'`, `'*'`, etc.) except for the following special cases:

- "o" Plotted points appear as 3-d spheres.
- "@" Plotted points appear as stroked disks.
- "." Points appear as tiny squares.

Character strings of more than one character are supported—see the examples. The @ and . option exhibit the best performance, consider using one of those to plot large numbers of points.

Set the optional experimental use `.orbitcontrols=TRUE` argument to use a more CPU-efficient but somewhat less fluid mouse/touch interface.

Plotting lines

See [lines3d](#) for an alternative interface. Lines are optionally drawn between points specified in `x`, `y`, `z` using the following new plot options.

- "from" A numeric vector of indices of line starting vertices corresponding to entries in `x`.
- "to" A numeric vector exactly as long as `from` of indices of line ending vertices corresponding to entries in `x`.
- "lcol" Either a single color value or vector of values as long as `from`; line colors default to interpolating their vertex point colors.
- "lwd" A single numeric value of line width (for all lines), defaults to 1.
- "linealpha" A single numeric value between 0 and 1 inclusive setting the transparency of all plot lines, defaulting to 1.

Highlighting selected points

Specify the argument `brush=TRUE` to highlight a clicked point (currently limited to single-point selection). Optionally set the `highlight=<color>` and `lowlight=<color>` to manually control the brushing display colors. This feature works with `crosstalk`.

Crosstalk

The `scatterplot3js()` and `graphjs()` functions work with `crosstalk` selection (but not filtering yet); see <https://rstudio.github.io/crosstalk/>. Enable `crosstalk` with the optional argument `crosstalk=df`, where `df` is a `crosstalk-SharedData` data.frame-like object with the same number of rows as points (`scatterplot3js()`) or graph vertices (`graphjs()`) (see the examples).

Note

Points with missing values are omitted from the plot, please try to avoid missing values in `x`, `y`, `z`.

References

The three.js project: <http://threejs.org>. The HTML Widgets project: <http://htmlwidgets.org>.

See Also

scatterplot3d, rgl, points3d, lines3d, light_ambient, light_directional

Examples

```
# Example 1 from the scatterplot3d package (cf.)
z <- seq(-10, 10, 0.1)
x <- cos(z)
y <- sin(z)
scatterplot3js(x, y, z, color=rainbow(length(z)))

# Same example with explicit axis labels
scatterplot3js(x, y, z, color=rainbow(length(z)), axisLabels=c("a", "b", "c"))

# Same example showing multiple point styles with pch
scatterplot3js(x, y, z, color=rainbow(length(z)),
               pch=sample(c(".", "o", letters), length(x), replace=TRUE))

# Point cloud example, should run this with WebGL!
N <- 20000
theta <- runif(N) * 2 * pi
phi <- runif(N) * 2 * pi
R <- 1.5
r <- 1.0
x <- (R + r * cos(theta)) * cos(phi)
y <- (R + r * cos(theta)) * sin(phi)
z <- r * sin(theta)
d <- 6
h <- 6
t <- 2 * runif(N) - 1
w <- t^2 * sqrt(1 - t^2)
x1 <- d * cos(theta) * sin(phi) * w
y1 <- d * sin(theta) * sin(phi) * w
i <- order(phi)
j <- order(t)
col <- c( rainbow(length(phi))[order(i)],
          rainbow(length(t), start=0, end=2/6)[order(j)] )
M <- cbind(x=c(x, x1), y=c(y, y1), z=c(z, h*t))
scatterplot3js(M, size=0.5, color=col, bg="black", pch=".")

# Plot generic text using 'pch' (we label some points in this example)
set.seed(1)
x <- rnorm(5); y <- rnorm(5); z <- rnorm(5)
scatterplot3js(x, y, z, pch="@") %>%
  points3d(x + 0.1, y + 0.1, z, color="red", pch=paste("point", 1:5))

## Not run:
```

```

# A shiny example
shiny::runApp(system.file("examples/scatterplot", package="threejs"))

## End(Not run)

## Not run:
# A crosstalk example
library(crosstalk)
library(d3scatter) # devtools::install_github("jcheng5/d3scatter")
z <- seq(-10, 10, 0.1)
x <- cos(z)
y <- sin(z)
sd <- SharedData$new(data.frame(x=x, y=y, z=z))
print(bscols(
  scatterplot3js(x, y, z, color=rainbow(length(z)), brush=TRUE, crosstalk=sd),
  d3scatter(sd, ~x, ~y, width="100%", height=300)
))

## End(Not run)

```

 texture

Convert an image file or uri to a three.js texture

Description

Convert file image representations in R into JSON-formatted arrays suitable for use as three.js textures. This function is automatically invoked for images used in the `globejs` function.

Usage

```
texture(data)
```

Arguments

`data` A character string file name referring to an image file, or referring to an image uri (see the examples).

Value

JSON-formatted list with image, width, and height fields suitable for use as a three.js texture created with the `base64texture` function. The image field contains a base64 dataURI encoding of the image.

Note

Due to browser "same origin policy" security restrictions, loading textures from a file system in three.js may lead to a security exception, see <https://github.com/mrdoob/three.js/wiki/How-to-run-things-locally>. References to file locations work in Shiny apps, but not in stand-alone examples. The `texture` function facilitates transfer of image texture data from R into three.js textures. Binary image data are encoded and inserted into three.js without using files as dataURIs.

References

The threejs project <http://threejs.org>. <https://github.com/mrdoob/three.js/wiki/How-to-run-things-locally>

Examples

```
## Not run:  
# A big image (may take a while to download):  
img <- paste("http://eoimages.gsfc.nasa.gov/",  
            "images/imagerecords/73000/73909/",  
            "world.topo.bathy.200412.3x5400x2700.jpg", sep="")  
t <- texture(img)  
  
## End(Not run)
```

vertices,scatterplotThree-method

Extract a matrix of vertex coordinates from a threejs widget

Description

Extract a matrix of vertex coordinates from a threejs widget

Usage

```
## S4 method for signature 'scatterplotThree'  
vertices(...)
```

Arguments

... a scatterplotThree object from the threejs package.

See Also

points3d

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