Package 'shinyaframe'

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Type Package

Title 'WebVR' Data Visualizations with 'RStudio Shiny' and 'Mozilla A-Frame'

Version 1.0.1

Description Make R data available in Web-based virtual reality experiences for immersive, cross-platform data visualizations. Includes the 'gg-aframe' JavaScript package for a Grammar of Graphics declarative HTML syntax to create 3-dimensional data visualizations with 'Mozilla A-Frame' <https://aframe.io>.

License AGPL-3

Encoding UTF-8

LazyData true

Imports shiny, htmlwidgets, htmltools

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Suggests knitr, rmarkdown, scales, dplyr

VignetteBuilder knitr

NeedsCompilation no

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R topics documented:

aDataScene *A-Frame Scene with R data*

Description

Create an HTML widget to sync R data with an A-Frame scene via the data-binding A-Frame component.

Usage

```
aDataScene(data, elementId = NULL)
```

Arguments

data	A data frame or a list of vectors, matrices, and/or data frames
elementId	Optionally define the output HTML element id

Details

Data will be synced to the data-binding system from the gg-aframe JavaScript library for A-Frame. Data can be bound to automatically update components in the scene with the data-binding A-Frame component. Repeat calls (e.g. within a Shiny reactive expression) will update the data-binding store and refresh bound components with the new data.

If data is a data frame, each variable will be available, by name, as a JavaScript Array in the scene data store (i.e. long form). If it is a list, each list item will be available, by name, as a JavaScript Array in the scene data store. Data frames within the list will be available as an array of Objects, with each object representing a row from the data frame (i.e. wide form).

To send multiple data frames in long form, combine them with c, and each column will be available by name in the A-Frame data-binding system. To send multiple data frames in wide form, combine them as named items in a list, and each data frame will be available as an array of objects (rows) under the name used.

Note: aDataScene is only compatible for use in Shiny apps viewed with a modern Web browser and internet connection. WebVR data visualizations are not available in Rmd documents, R Notebooks, or the RStudio Viewer at this time.

See Also

renderADataScene

Examples

```
library(dplyr)
library(scales)

# Execute within a renderADataScene call in a Shiny server
iris %>%
  # scale positional data to (0,1)
```

```
  mutate_if(is.numeric, rescale) %>%
  # make data available in JavaScript
  aDataScene()
```

---

aDataScene-shiny *Shiny bindings for aDataScene*

Description

Output and render functions for using aDataScene within Shiny applications.

Usage

```
aDataSceneOutput(outputId, ..., skipDependencies = FALSE)

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

Arguments

outputId	output variable to read from
...	Attributes, A-Frame components, and/or child elements for output in HTML.
skipDependencies	Option to omit packaged A-Frame JavaScript libraries. See details.
expr	An expression that returns a call to aDataScene
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.

Details

A-Frame v0.7.1, gg-aframe v0.2.3, and aframe-environment-component v1.0.0 come packaged with shinyaframe. To use different versions, set skipDependencies to TRUE and source the libraries directly (for example with includeScript or tag).

See Also

'gg-aframe' syntax documentation

Examples

```
# Simple 3D scatterplot.
# See package vignette for additional asethetics, guides, and legends
if (interactive()) {
  library(dplyr)
  library(shiny)
  library(scales)
```

```
shinyApp(
  ui = fluidPage(
    aDataSceneOutput(
      outputId = "mydatascene",
      # gg-aframe plot syntax
      atags$entity(
        plot = "", position = "0 1.6 -1.38", rotation = "0 45 0",
        atags$entity(
          `layer-point` = "", `mod-oscillate` = "",
          `data-binding__sepal.length`="target: layer-point.x",
          `data-binding__sepal.width`="target: layer-point.y",
          `data-binding__petal.length`="target: layer-point.z",
          # add 4th positional by animating y position between two mappings
          `data-binding__petal.width`="target: mod-oscillate.y",
          `data-binding__species`="target: layer-point.shape"
        )
      )
    )
  ),
  server = function(input, output, session) {
    output$mydatascene <- renderADataScene({
      names(iris) <- tolower(names(iris))
      iris %>%
        # scale positional data
        mutate_if(is.numeric, rescale) %>%
        aDataScene()
    })
  }
)
}
```

`aframetags` *A-Frame Custom Elements*

Description

Functions to output A-Frame's custom HTML elements

Usage

```
aframeScene(...)

aframeAssets(...)

aframeMixin(...)

aframeEntity(...)
```

```
aframeSphere(...)

aframeBox(...)

aframePrimitive(primitive = "entity", ...)

atags
```

Arguments

`...`	Attributes, components, and/or child elements
`primitive`	Primitive name (excluding the "a-")

Format

The `atags` list contains all of these tag functions for convenient access.

Details

These functions are just simple wrappers for `tag` to output common A-Frame custom elements.

Functions

- `aframeScene`: Top level scene entity
- `aframeAssets`: Specify assets for pre-loading
- `aframeMixin`: Reusable component specifications
- `aframeEntity`: Generic entity
- `aframeSphere`: Sphere primitive
- `aframeBox`: Box primitive
- `aframePrimitive`: All other primitives

See Also

A-Frame Documentation

Examples

```
# Construct A-Frame HTML syntax for a 3D scene with a red box and blue sky
atags$scene(
  atags$box(color = "red", position = "0 0.5 -3"),
  atags$other("sky", color = "#89b6ff")
)
```

shinyaframe *WebVR Data Visualizations*

Description

Make R data available in Web-based virtual reality experiences for immersive, cross-platform data visualizations. Includes the 'gg-aframe' JavaScript package for a Grammar of Graphics declarative HTML syntax to create 3-dimensional visualizations.

Examples

```
# Example Shiny app from package vignette
if (interactive()) {
  library(shiny)
  library(dplyr)
  library(scales)
  library(shinyaframe)

  shinyApp(
    ui = fluidPage(
      aDataSceneOutput(
        # attributes and child elements provided as arguments
        # server output variable name
        outputId = "mydatascene",
        # add backdrop
        environment = "",
        # gg-aframe plot syntax
        atags$entity(
          # an empty string sets attributes with no additional properties
          plot = "",
          # sizable scale option uses polyhedra scaled for equivalent volumes
          `scale-shape` = "sizable",
          position = "0 1.6 -1.38",
          atags$entity(
            `layer-point` = "",
            `data-binding__sepal.length`="target: layer-point.x",
            `data-binding__sepal.width`="target: layer-point.y",
            `data-binding__petal.length`="target: layer-point.z",
            `data-binding__species`="target: layer-point.shape",
            `data-binding__petal.width.size`="target: layer-point.size",
            `data-binding__species.color`="target: layer-point.color"
          ),
          atags$entity(
            `guide-axis` = "axis: x",
            `data-binding__xbreaks` = "target: guide-axis.breaks",
            `data-binding__xlabels` = "target: guide-axis.labels",
            `data-binding__xtitle` = "target: guide-axis.title"
          ),
          atags$entity(
            `guide-axis` = "axis: y",
```

```
        `data-binding__ybreaks` = "target: guide-axis.breaks",
        `data-binding__ylabels` = "target: guide-axis.labels",
        `data-binding__ytitle` = "target: guide-axis.title"
      ),
      atags$entity(
        `guide-axis` = "axis: z",
        `data-binding__zbreaks` = "target: guide-axis.breaks",
        `data-binding__zlabels` = "target: guide-axis.labels",
        `data-binding__ztitle` = "target: guide-axis.title"
      ),
      atags$entity(
        `guide-legend` = "aesthetic: shape",
        `data-binding__shapetitle` = "target: guide-legend.title"
      ),
      atags$entity(
        `guide-legend` = "aesthetic: size",
        `data-binding__sizebreaks` = "target: guide-legend.breaks",
        `data-binding__sizelabels` = "target: guide-legend.labels",
        `data-binding__sizetitle` = "target: guide-legend.title"
      ),
      atags$entity(
        `guide-legend` = "aesthetic: color",
        `data-binding__colorbreaks` = "target: guide-legend.breaks",
        `data-binding__colorlabels` = "target: guide-legend.labels",
        `data-binding__colortitle` = "target: guide-legend.title"
      ),
      # animate the plot rotation
      atags$other('animation', attribute = "rotation",
                  from = "0 45 0", to = "0 405 0",
                  dur = "10000", `repeat` = "indefinite")
    )
  )
),
server = function(input, output, session) {
  output$mydatascene <- renderADataScene({
    names(iris) <- tolower(names(iris))
    # Margin in (0,1) scale keeps polyhedra from sticking out of plot area
    positional_to <- c(0.01, 0.99)
    # convert to #RRGGBB color
    color_scale = setNames(rainbow(3, 0.75, 0.5, alpha = NULL),
                           unique(iris$species))
    iris %>%
      # scale positional data
      mutate_if(is.numeric, rescale, to = positional_to) %>%
      # scale size data to relative percentage, using cube root to correct
      # for radius->volume perception bias
      mutate(petal.width.size = rescale(petal.width^(1/3), to = c(0.5, 2)),
             species.color = color_scale[species]) ->
      iris_scaled

    # provide guide info
    make_guide <- function (var, aes, breaks = c(0.01, 0.5, 0.99)) {
      guide = list()
```

```
            domain = range(iris[[var]])
            guide[[paste0(aes, "breaks")]] <- breaks
            guide[[paste0(aes, "labels")]] <- c(domain[1],
                                                round(mean(domain), 2),
                                                domain[2])
            guide[[paste0(aes, "title")]] <- var
            guide
          }
          Map(make_guide,
              var = c("sepal.length", "sepal.width", "petal.length"),
              aes = c("x", "y", "z")) %>%
            # repeat radius adjustment in the guide
            c(list(make_guide("petal.width", "size", c(0.5, 1.25, 2)^(1/3)))) %>%
            Reduce(f = c) ->
            guides
          guides$shapetitle = "species"
          guides$colortitle = "species"
          guides$colorbreaks = color_scale
          guides$colorlabels = names(color_scale)

          # convert data frame to list and combine with guides list
          aDataScene(c(iris_scaled, guides))
        })
      }
    )
  }
```

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