Package ‘scifigure’

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Title Visualize ‘Reproducibility’ and ‘Replicability’ in a Comparison of Scientific Studies

Version 0.2

Description Users may specify what fundamental qualities of a new study have or have not changed in an attempt to reproduce or replicate an original study. A comparison of the differences is visualized. Visualization approach follows ‘Patil’, ‘Peng’, and ‘Leek’ (2016) <doi:10.1101/066803>.

Depends R (>= 3.0)

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Encoding UTF-8

LazyData true

RoxygenNote 6.1.1

Imports grid

Suggests knitr, rmarkdown, covr, testthat, png

VignetteBuilder knitr

NeedsCompilation no

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Description

A dataset containing icon images used to render all figures in the scifigure package.

Usage

icons

Format

A list of length 44, with each item a 75x75x4 bitmap

Description

A dataset containing icon images showing difference rather than entity used to render all difference figures in the scifigure package.

Usage

icons_diff

Format

A list of length 44, with each item a 75x75x4 bitmap
**init_experiments**

Initialize a skeleton data frame to create a figure with `sci_figure`

**Description**

`init_experiments` generates a dataframe with the proper row and column headers for user manipulation before calling `sci_figure`.

**Usage**

```r
init_experiments(nexp = 3, exp_names = paste0("Exp", 1:nexp),
  stage_names = c("population", "question", "hypothesis",
  "experimental_design", "experimenter", "data", "analysis_plan",
  "analyst", "code", "estimate", "claim"))
```

**Arguments**

- `nexp` The number of scientific experiments to be represented in the data frame, i.e. number of columns.
- `exp_names` The names of each experiment, i.e. column names. Default: "Exp1, Exp2, ...
- `stage_names` The names of each step in the process, i.e. row names. Defaults match Patil et. al.

**See Also**

- `sci_figure`

**Examples**

```r
# Generate the default data frame of three experiments
init_experiments()

init_experiments(nexp = 5,
  exp_names = c("Run_16_01", "Run_16_04", "Run_16_07",
  "Run_16_09", "Run_16_12"))

testthat::expect_error({
  init_experiments(nexp = 2, exp_names = names)
})
```
replicate_figure

Description

replicate_figure is a wrapper around the sci_figure function to illustrate replicability in a two-experiment setting. Options for sci_figure are accepted, but this may be run as is.

Usage

replicate_figure(...) 

Arguments

... Additional arguments passed to sci_figure.

See Also

sci_figure for additional arguments.

reproduce_figure

Description

reproduce_figure is a wrapper around the sci_figure function to illustrate reproducibility in a two-experiment setting. Options for sci_figure are accepted, but this may be run as is.

Usage

reproduce_figure(...) 

Arguments

... Additional arguments passed to sci_figure.

See Also

sci_figure for additional arguments.
sci_figure  

Create a figure depicting reproducibility/replicability of a set of scientific experiments

Description

sci_figure creates a graphical representation of changes in a set of subsequent studies or reproduction attempts as compared to an original study.

Usage

```r
sci_figure(experiments, custom_icons = NULL, 
stage_names = c("Population", "Question", "Hypothesis", "Exp. Design", 
"Claim"), hide_stages = NULL, diff = FALSE, showlegend = TRUE, 
cols = c("#D20000", "#007888", "#CDCDCD", "black"), 
leg_text = c("Incorrect", "Different", "Unobserved", "Original")
```

Arguments

- **experiments**: A data frame, which can be initialized with `init_experiments()`, whose rownames are the predefined stages of a scientific experiments, columnnames are the names of each experiment, and cell values represent the state of each stage in each experiment (states described below).
- **custom_icons**: (optional) A list of bitmap matrices of custom icon images of length matching experiments input. Bitmap icons must be 75 x 75 pixels. See vignette for detailed instructions and specifications. Default NULL, indicating that default icons will be used.
- **stage_names**: Character vector of names of stages. Default names match Patil et. al. If set to NULL, all names will be suppressed. Use `hide_stages` (below) to suppress specific stage names.
- **hide_stages**: (optional) A character vector with the names of the stages in the scientific experiment, i.e. rownames of experiments, which the user wishes to suppress from the figure output. The default value of `hide_stages` is NULL, indicating that all stages will be displayed.
- **diff**: (optional) A Boolean flag to indicate whether the rendering of the figure should emphasize the differences between the experiments ("difference mode"). The difference mode uses a set of four symbols that are semantically close to the scenarios that they are encoding. The default value is FALSE.
- **showlegend**: Do you want the legend to be shown?
- **cols**: colors to use for the specific scenarios when `diff = T` or `custom_icons` used.
- **leg_text**: text for legend keys corresponding to the specific colors.
Note

For the parameter experiments, the four values any cell may take are: observed, different, unobserved, incorrect.

See Also

init_experiments

Examples

```r
# Initialize the default experiments data frame
exps <- init_experiments()
sci_figure(exps)
sci_figure(exps, hide_stages = c("population", "analyst"))

# Do some manual manipulation to the experiments
exps["analyst", "Exp2"] <- "different"
exps["code", c("Exp2", "Exp3")]
sci_figure(exps, showlegend = FALSE)

# Create the same figure using the difference mode
sci_figure(exps, diff=TRUE)
too_many = init_experiments(nexp = 30)

testthat::expect_warning(
  sci_figure(too_many)
), "showing the first")

exp2 = exps
exp2[,1] = "bad"
testthat::expect_error(
  sci_figure(exp2)
), "Invalid cell")
```
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