

Package ‘circumplex’

August 6, 2018

Type Package

Title Analysis and Visualization of Circular Data

Version 0.1.2

Description Tools for analyzing and visualizing circular data, including a generalization of the bootstrapped structural summary method from Zimmermann & Wright (2017) <doi:10.1177/1073191115621795> and functions for creating publication-ready tables and figures from the results. Future versions will include tools for circular fit and reliability analyses, as well as greatly enhanced visualization methods.

License GPL-3

URL <https://github.com/jmgirard/circumplex>

BugReports <https://github.com/jmgirard/circumplex/issues>

Depends R (>= 3.4.0)

Imports assertthat (>= 0.2.0), boot (>= 1.3.20), dplyr (>= 0.7.6), ggforce (>= 0.1.3), ggplot2 (>= 3.0.0), htmlTable (>= 1.12), magrittr (>= 1.5), purrr (>= 0.2.5), Rcpp (>= 0.12.18), rlang (>= 0.2.1), stats, tibble (>= 1.4.2), tidyr (>= 0.8.1)

LinkingTo Rcpp (>= 0.12.18), RcppArmadillo (>= 0.8.600.0.0)

RoxygenNote 6.1.0

Suggests covr (>= 3.1.0), forcats (>= 0.3.0), kableExtra (>= 0.9.0), knitr (>= 1.20), psych (>= 1.8.4), rmarkdown (>= 1.10), testthat (>= 2.0.0)

VignetteBuilder knitr

NeedsCompilation yes

Author Jeffrey Girard [aut, cre] (<<https://orcid.org/0000-0002-7359-3746>>), Johannes Zimmermann [aut] (<<https://orcid.org/0000-0001-6975-2356>>), Aidan Wright [aut] (<<https://orcid.org/0000-0002-2369-0601>>)

Maintainer Jeffrey Girard <me@jmgirard.com>

Repository CRAN

Date/Publication 2018-08-06 21:00:02 UTC

R topics documented:

circumplex-package	2
aw2009	3
html_render	4
iipsc	4
jz2017	5
octants	6
poles	6
quadrants	7
ssm_analyze	7
ssm_append	9
ssm_plot	10
ssm_plot_circle	11
ssm_plot_contrast	12
ssm_table	12
Index	14

circumplex-package	<i>Analysis and visualization of circumplex data</i>
--------------------	--

Description

circumplex provides functions for analyzing and visualizing circumplex data.

Details

Its goal is to unify, modernize, and extend existing methods of working with circumplex data. Its functions share an underlying design philosophy and grammar. The three guiding principles it aspires to are:

- **Accessibility:** zero cost, open source, libre; works on many platforms; easy to use across skill levels
- **Flexibility:** customizable by the user; extendable for other uses; plays nicely with other packages
- **Consistency:** unit-tested quality control; firm naming conventions; data flows between functions

To learn more about circumplex, start with the vignettes: `browseVignettes(package = "circumplex")`

Author(s)

Maintainer: Jeffrey Girard <me@jmgirard.com> (0000-0002-7359-3746)

Authors:

- Johannes Zimmermann (0000-0001-6975-2356)
- Aidan Wright (0000-0002-2369-0601)

See Also

Useful links:

- <https://github.com/jmgirard/circumplex>
- Report bugs at <https://github.com/jmgirard/circumplex/issues>

aw2009

Standardized octant scores on hypothetical circumplex scales

Description

A small example dataset containing standardized scores on eight hypothetical circumplex scales. Taken from Wright, Pincus, Conroy, & Hilsenroth (2009).

Usage

aw2009

Format

A data frame with 5 observations and 8 variables:

- PA** circumplex scale at displacement 90
- BC** circumplex scale at displacement 135
- DE** circumplex scale at displacement 180
- FG** circumplex scale at displacement 225
- HI** circumplex scale at displacement 270
- JK** circumplex scale at displacement 315
- LM** circumplex scale at displacement 360
- NO** circumplex scale at displacement 45

Source

<https://doi.org/10.1080/00223890902935696>

html_render	<i>Format and render data frame as HTML table</i>
-------------	---

Description

Format a data frame as an HTML table and render it to the web viewer.

Usage

```
html_render(df, caption = NULL, align = "l", ...)
```

Arguments

df	A data frame to be rendered as an HTML table.
caption	A string to be displayed above the table.
align	A string indicating the alignment of the cells (default = "l").
...	Other arguments to pass to <code>htmlTable</code> .

Value

HTML syntax for the df table.

See Also

Other table functions: [ssm_append](#), [ssm_table](#)

iipsc	<i>Normative data for IIP-SC</i>
-------	----------------------------------

Description

Means and standard deviations for the octant scales of the Inventory of Interpersonal Problems - Short Circumplex (IIP-SC). Norms correspond to data from 872 college students. Taken from Hopwood, Pincus, DeMoor, & Koonce (2008).

Usage

```
iipsc
```

Format

A data frame with 8 observations and 5 variables:

Scale Text description (name) of the scale

Abbrev Text abbreviation of the scale name

Angle Angular displacement of the scale (in degrees)

M Normative mean for the scale

SD Normative standard deviation for the scale

Source

<https://doi.org/10.1080/00223890802388665>

jz2017

Raw octant scores on real circumplex scales with covariates

Description

A large example dataset containing gender, raw mean scores on the Inventory of Interpersonal Problems - Short Circumplex (IIP-SC), and raw scores on the Personality Diagnostic Questionnaire (PDQ-4). Taken from Zimmermann & Wright (2017).

Usage

jz2017

Format

A data frame with 1166 observations and 19 variables:

Gender Self-reported Gender

PA Domineering Problems (IIP-SC) 90 degrees

BC Vindictive Problems (IIP-SC) 135 degrees

DE Cold Problems (IIP-SC) 180 degrees

FG Socially Avoidant Problems (IIP-SC) 225 degrees

HI Nonassertive Problems(IIP-SC) 270 degrees

JK Easily Exploited Problems (IIP-SC) 315 degrees

LM Overly Nurturant Problems (IIP-SC) 360 degrees

NO Intrusive Problems (IIP-SC) 45 degrees

PARPD Paranoid PD Symptoms (PDQ-4)

SCZPD Schizoid PD Symptoms (PDQ-4)

SZTPD Schizotypal PD Symptoms (PDQ-4)

ASPD Antisocial PD Symptoms (PDQ-4)

BORPD Borderline PD Symptoms (PDQ-4)
HISPD Histrionic PD Symptoms (PDQ-4)
NARPD Narcissistic PD Symptoms (PDQ-4)
AVPD Avoidant PD Symptoms (PDQ-4)
DPNPD Dependent PD Symptoms (PDQ-4)
OCPD Obsessive-Compulsive PD Symptoms (PDQ-4)

Source

<https://doi.org/10.1177/1073191115621795>

octants	<i>Angular displacements for octant circumplex scales</i>
---------	---

Description

Return a vector of angular displacements, in degrees, for eight equally spaced circumplex scales corresponding to the circumplex octants. Can be passed to the `angles` parameter of other functions in this package.

Usage

```
octants()
```

Value

A numeric vector with eight elements, each corresponding to the angular displacement (in degrees) of a subscale, in the following order: PA, BC, DE, FG, HI, JK, LM, NO.

Examples

```
octants()
```

poles	<i>Angular displacements for pole circumplex scales</i>
-------	---

Description

Return a vector of angular displacements, in degrees, for four equally spaced circumplex scales corresponding to the circumplex poles. Can be passed to the `angles` parameter of other functions in this package.

Usage

```
poles()
```

Value

A numeric vector with four elements, each corresponding to the angular displacement (in degrees) of a subscale, in the following order: PA, DE, HI, LM.

Examples

```
poles()
```

quadrants

Angular displacements for quadrant circumplex scales

Description

Return a vector of angular displacements, in degrees, for four equally spaced circumplex scales corresponding to the circumplex quadrants. Can be passed to the `angles` parameter of other functions in this package.

Usage

```
quadrants()
```

Value

A numeric vector with eight elements, each corresponding to the angular displacement (in degrees) of a subscale, in the following order: BC, FG, JK, NO.

Examples

```
quadrants()
```

ssm_analyze

Perform analyses using the Structural Summary Method

Description

Calculate SSM parameters with bootstrapped confidence intervals for a variety of different analysis types. Depending on what arguments are supplied, either mean-based or correlation-based analyses will be performed, one or more groups will be used to stratify the data, and contrasts between groups or measures will be calculated.

Usage

```
ssm_analyze(.data, scales, angles, measures = NULL, grouping = NULL,
  contrast = "none", boots = 2000, interval = 0.95,
  listwise = TRUE)
```

Arguments

<code>.data</code>	Required. A data frame containing at least circumplex scales.
<code>scales</code>	Required. The variable names or column numbers for the variables in <code>.data</code> that contain circumplex scales to be analyzed.
<code>angles</code>	Required. A numeric vector containing the angular displacement of each circumplex scale included in <code>scales</code> (in degrees).
<code>measures</code>	Optional. The variable names or column numbers for one or more variables in <code>.data</code> to be correlated with the circumplex scales and analyzed using correlation-based SSM analyses. To analyze the circumplex scales using mean-based analyses, simply omit this argument or set it to <code>NULL</code> (default = <code>NULL</code>).
<code>grouping</code>	Optional. The variable name or column number for the variable in <code>.data</code> that indicates the group membership of each observation. To analyze all observations in a single group, simply omit this argument or set it to <code>NULL</code> (default = <code>NULL</code>).
<code>contrast</code>	Optional. A string indicating what type of contrast to run. Current options are "none" for no contrast, "model" to find SSM parameters for the difference scores, or "test" to find the difference between the SSM parameters. Note that only two groups or measures can be contrasted at a time (default = "none").
<code>boots</code>	Optional. A single positive integer indicating how many bootstrap resamples to use when estimating the confidence intervals (default = 2000).
<code>interval</code>	Optional. A single positive number between 0 and 1 (exclusive) that indicates what confidence level to use when estimating the confidence intervals (default = 0.95).
<code>listwise</code>	Optional. A logical indicating whether missing values should be handled by listwise deletion (<code>TRUE</code>) or pairwise deletion (<code>FALSE</code>). Note that pairwise deletion may result in different missing data patterns in each bootstrap resample and is slower to compute (default = <code>TRUE</code>).

Value

A list containing the results and description of the analysis.

<code>results</code>	A tibble with the SSM parameter estimates
<code>details</code>	A list with the number of bootstrap resamples (<code>boots</code>), the confidence interval percentage level (<code>interval</code>), and the angular displacement of scales (<code>angles</code>)
<code>call</code>	A language object containing the function call that created this object
<code>scores</code>	A tibble containing the mean scale scores
<code>type</code>	A string indicating what type of SSM analysis was done

See Also

Other ssm functions: [ssm_append](#), [ssm_plot](#), [ssm_table](#)

Examples

```

# Load example data
data("jz2017")

# Single-group mean-based SSM
ssm_analyze(jz2017, scales = PA:NO, angles = octants())

# Single-group correlation-based SSM
ssm_analyze(jz2017, scales = PA:NO, angles = octants(),
  measures = c(NARPD, ASPD))

# Multiple-group mean-based SSM
ssm_analyze(jz2017, scales = PA:NO, angles = octants(), grouping = Gender)

# Multiple-group mean-based SSM with contrast
ssm_analyze(jz2017, scales = PA:NO, angles = octants(), grouping = Gender,
  contrast = "model")

# Single-group correlation-based SSM with contrast
ssm_analyze(jz2017, scales = PA:NO, angles = octants(),
  measures = c(NARPD, ASPD), contrast = "test")

# Multiple-group correlation-based SSM
ssm_analyze(jz2017, scales = PA:NO, angles = octants(), measures = NARPD,
  grouping = Gender)

# Multiple-group correlation-based SSM with contrast
ssm_analyze(jz2017, scales = PA:NO, angles = octants(), measures = NARPD,
  grouping = Gender, contrast = "test")

```

ssm_append

Combine SSM tables

Description

Combine SSM tables by appending them as rows.

Usage

```
ssm_append(.ssm_table, ..., caption = NULL, render = TRUE)
```

Arguments

<code>.ssm_table</code>	A data frame from the <code>ssm_table()</code> function to be the first row(s) of the combined table.
<code>...</code>	One or more additional data frames from the <code>ssm_table()</code> function to be appended to <code>.ssm_table</code> in the order of input.

caption	A string to be displayed above the table if rendered.
render	A logical indicating whether the table should be displayed in the RStudio viewer or web browser (default = TRUE).

Value

A tibble containing the information for the HTML table. As a side-effect, may also output the HTML table to the web viewer.

See Also

Other ssm functions: [ssm_analyze](#), [ssm_plot](#), [ssm_table](#)

Other table functions: [html_render](#), [ssm_table](#)

Examples

```
data("jz2017")
res1 <- ssm_analyze(jz2017, PA:NO, octants())
res2 <- ssm_analyze(jz2017, PA:NO, octants(), grouping = Gender)
tab1 <- ssm_table(res1, render = FALSE)
tab2 <- ssm_table(res2, render = FALSE)
ssm_append(tab1, tab2)
```

ssm_plot

Create a figure from SSM results

Description

Take in the results of an SSM analysis function and create figure from it.

Usage

```
ssm_plot(.ssm_object, fontsize = 12, ...)
```

Arguments

.ssm_object	Required. The results output of ssm_analyze .
fontsize	Optional. A single positive number indicating the font size of text in the figure, in points (default = 12).
...	Additional arguments to pass on to the plotting function.

Value

A ggplot2 object representing the figure

See Also

ggsave Function for saving plots to image files.

Other ssm functions: [ssm_analyze](#), [ssm_append](#), [ssm_table](#)

Examples

```
# Load example data
data("jz2017")

# Plot profile results
res <- ssm_analyze(jz2017, scales = PA:NO, angles = octants(),
  measures = c(NARPD, ASPD))
p <- ssm_plot(res)

# Plot contrast results
res <- ssm_analyze(jz2017, scales = PA:NO, angles = octants(),
  measures = c(NARPD, ASPD), contrast = "test")
p <- ssm_plot(res)
```

ssm_plot_circle

Create a Circular Plot of SSM Results

Description

Take in the results of a Structural Summary Method analysis and plot the point and interval estimate for each row (e.g., group or measure) in a circular space quantified by displacement and amplitude.

Usage

```
ssm_plot_circle(.ssm_object, amax = NULL, fontsize = 12,
  lowfit = FALSE)
```

Arguments

.ssm_object	The output of <code>ssm_profiles()</code> or <code>ssm_measures()</code> .
amax	A positive real number corresponding to the radius of the circle. It is used to scale the amplitude values and will determine which amplitude labels are drawn.
fontsize	A positive real number corresponding to the size (in pt) of the text labels (default = 12).
lowfit	A logical determining whether profiles with low model fit ($<.70$) should be plotted (default = FALSE).

Value

A ggplot variable containing a completed circular plot.

ssm_plot_contrast *Create a Difference Plot of SSM Contrast Results*

Description

Take in the results of a Structural Summary Method analysis with pairwise contrasts and plot the point and interval estimates for each parameter's contrast (e.g., between groups or measures).

Usage

```
ssm_plot_contrast(.ssm_object, axislabel = "Difference", xy = TRUE,
  color = "red", linesize = 1.25, fontsize = 12)
```

Arguments

.ssm_object	Required. The results output of ssm_analyze.
axislabel	Optional. A string to label the y-axis (default = "Difference").
xy	A logical determining whether the X-Value and Y-Value parameters should be included in the plot (default = TRUE).
color	Optional. A string corresponding to the color of the point range (default = "red").
linesize	Optional. A positive number corresponding to the size of the point range elements in mm (default = 1.5).
fontsize	Optional. A positive number corresponding to the size of the axis labels, numbers, and facet headings in pt (default = 12).

Value

A ggplot variable containing difference point-ranges faceted by SSM parameter. An interval that does not contain the value of zero has $p < .05$.

ssm_table *Create HTML table from SSM results or contrasts*

Description

Take in the results of an SSM analysis and return an HTML table with the desired formatting.

Usage

```
ssm_table(.ssm_object, caption = NULL, xy = TRUE, render = TRUE)
```

Arguments

<code>.ssm_object</code>	The output of <code>ssm_profiles()</code> or <code>ssm_measures()</code>
<code>caption</code>	A string to be displayed above the table (default = NULL).
<code>xy</code>	A logical indicating whether the x-value and y-value parameters should be included in the table as columns (default = TRUE).
<code>render</code>	A logical indicating whether the table should be displayed in the RStudio viewer or web browser (default = TRUE).

Value

A tibble containing the information for the HTML table. As a side-effect, may also output the HTML table to the web viewer.

See Also

Other ssm functions: [ssm_analyze](#), [ssm_append](#), [ssm_plot](#)

Other table functions: [html_render](#), [ssm_append](#)

Examples

```
# Load example data
data("jz2017")

# Create table of profile results
res <- ssm_analyze(jz2017, scales = PA:NO, angles = octants(),
  measures = c(NARPD, ASPD))
ssm_table(res)

# Create table of contrast results
res <- ssm_analyze(jz2017, scales = PA:NO, angles = octants(),
  measures = c(NARPD, ASPD), contrast = "test")
ssm_table(res)
```

Index

*Topic **datasets**

aw2009, [3](#)

iipsc, [4](#)

jz2017, [5](#)

aw2009, [3](#)

circumplex (circumplex-package), [2](#)

circumplex-package, [2](#)

html_render, [4](#), [10](#), [13](#)

iipsc, [4](#)

jz2017, [5](#)

octants, [6](#)

poles, [6](#)

quadrants, [7](#)

ssm_analyze, [7](#), [10](#), [11](#), [13](#)

ssm_append, [4](#), [8](#), [9](#), [11](#), [13](#)

ssm_plot, [8](#), [10](#), [10](#), [13](#)

ssm_plot_circle, [11](#)

ssm_plot_contrast, [12](#)

ssm_table, [4](#), [8](#), [10](#), [11](#), [12](#)