Package 'ultrapolaRplot'

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Type Package

Title Plotting Ultrasound Tongue Traces

Version 0.1.1

Imports RColorBrewer, tibble, rjson, ggplot2, Cairo, plyr, purrr, readr, stringr

Description Plots traced ultrasound tongue imaging data according to a polar coordinate system. There is currently support for plotting means and standard deviations of each category's trace; Smoothing Splines Analysis of Variance (SSANOVA) could be implemented as well. The origin of the polar coordinates may be defined manually or automatically determined based on different algorithms. Currently 'ultrapolaRplot' supports ultrasound tongue imaging trace data from 'UltraTrace' (<https://github.com/SwatPhonLab/UltraTrace>). 'UltraTrace' is capable of importing data from Articulate Instruments AAA. 'read_textgrid.R' is required for opening TextGrids to determine category and alignment information of ultrasound traces.

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NeedsCompilation no

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Contents

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loadTraces   *Processes metadata and TextGrids*

Description

Processes layers, tiers, and categories within TextGrids. Extracts x and y coordinate data from metadata.

Usage

```
loadTraces(directory_name, tiernameAll = c(""), categoriesAll = list(c()),
layersAll = c(""), mergeCategories = c(FALSE))
```

Arguments

directory_name   a (readable binary-mode) [connection](#) or a character string giving the name of the folder containing metadata and textgrid files to load (when [tilde expansion](#) is done).

tiernameAll   respective tiers (if applicable) within layers. If none specified, all tiers are checked. Accepts either string or list of respective tiers.

categoriesAll   respective categories of segments to extract within tiers. If respective tiername and categories specified as "" and c(""), textgrids will not be checked and coordinates will be extracted from metadata without labeling segment. If all categories specified through c(), all labeled segments from respective layers and tiers will be extracted.

layersAll   list of layers within metadata to extract x and y coodinate data from. Defaults to 'tongue' layer. Accepts either string or list of layers.

mergeCategories
                 boolean or boolean array, as to whether to merge respective categories.

Value

Returns dataframe of filename, specific annotation number, segment, x-coordinate, y-coordinate.

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makeTracesPolar   *Converts to polar coordinates*

Description

Converts raw coordinate data from loadTraces into polar coordinates. Options available to specify the x-coodrindate of origin tranducer, including algorithms for BottomMean and BottomMiddle. Sample interval degrees of ray can be specified as well.

Usage

```
makeTracesPolar(rawTraces, origin.algorithm = "BottomMiddle", origin.x = NA,
scaling.factor = 800/600)
```

Arguments

rawTraces   data frame returned from loadTraces()

origin.algorithm

               takes list of all extracted x-coordinates and sets

origin.x   override x coordinate of origin

scaling.factor   default 800/600

Value

Returns a list of matrices. Each item within the list is labelled by its respective segment, such as 'e', 'i' and 'o'. Each segment is respectively further labeled by the trace number such as 'e[[1]]' and for example up to 'e[[11]]', if there are 11 traces for segment 'e'. There is a matrix for each trace within a segment. The column number represents the individual point along that trace, and the row values contain 1) x-coordinate, 2) y-coordinate, 3) angle in radians from origin (0,0), and 4) radius, for that point.

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  plotTraces   *Plots ultrasound polar coordinate data*

Description

Plots extracted segments with means and standard deviation bands calculated through use of polar coordinates.

Usage

```
plotTraces(rawTraces, polarTraces, interval = 1, mean.lines =
                TRUE, points.display = FALSE, palette = c(),
                bands.lines = FALSE, bands.fill = TRUE,
                legend.position = "topleft", means.styles = c(),
                standard.deviation.styles = "l", plot.ticks = FALSE,
                plot.labels = FALSE, legend.size = 3, transparency =
                0.37, pdf.filename = c(), bands.linewidth = 0.3,
                png.filename = c(), legend.linewidth = 5,
                means.linewidth = 3, tick.size = 2, maskCategories =
                c())
```

Arguments

`rawTraces`	data frame returned from loadTraces()
`polarTraces`	returned from makeTracesPolar()
`bands.fill`	boolean, whether or not to show standard deviation bands
`bands.lines`	boolean, whether or not to show lines on edges of standard deviation bands
`bands.linewidth`	
	line thickness of standard deviation bands
`interval`	sampling interval, in degrees, for finding intersections with existing traces (default = '1')
`mean.lines`	boolean, whether or not to display mean lines
`means.styles`	array to override default solid line (sequentially in order of categories)
`means.linewidth`	
	size of mean lines
`standard.deviation.styles`	
	line type for standard deviation upper and low bands, (default = "l")
`transparency`	transparency of standard deviation bands (default = 0.37)
`palette`	array to override default colour palette
`pdf.filename`	pdf file name, saves in current directory
`png.filename`	png file name, saves in current directory
`plot.labels`	boolean, whether or not to show labels
`plot.ticks`	boolean, whether or not to show tick marks
`tick.size`	size of label scaling on axes
`points.display`	boolean, whether or not to show original annotated points
`labels`	array to override labels
`legend.position`	
	default "center", with an option of "topleft", "bottomright"
`legend.size`	size of legend (default = 0.6)
`legend.linewidth`	
	size of displayed legend lines
`maskCategories`	array to override current segment labels

Value

Returns a plot. User can additionally export plot to a pdf or png.

ultrapolaRplot	*ultrapolaRplot*

Description

The ultrapolaRplot library for R is designed for plotting traced ultrasound tongue imaging data according to a polar coordinate system. There is currently support for plotting means and standard deviations of each category's trace; SSANOVA could be implemented as well. The origin of the polar coordinates may be defined manually or automatically determined based on different algorithms. Currently ultrapolaRplot supports ultrasound tongue imaging trace data from UltraTrace (<https://github.com/SwatPhonLab/UltraTrace>). UltraTrace is capable of importing data from Articulate Instruments AAA.

Examples

```
library(ultrapolaRplot)
filepath <- system.file("extdata", package = "ultrapolaRplot")
rawTraces <- loadTraces(filepath, categoriesAll = c("o", "i"))
polarTraces <- makeTracesPolar(rawTraces, origin.algorithm = "BottomMean")
plotTraces(rawTraces, polarTraces)
```

Index