

Package ‘ratPASTA’

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Type Package

Title Processing Acoustic Startle Experimental Data

Version 0.1.2

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Description Used for processing data obtained from behaviour experiments studying acoustic startle response, a reflex to a loud sound, modulated by several brain regions. The input data is generated with PASTA (Platform for Acoustic STArtle), a DIY device made from a kitchen scale that measures the twitch of an animal standing on the device and records it as time-series data. The function of this package is to import all data, process it in accordance with default or custom metadata describing the experiment protocol, calculate measurements and visualize the results. The PASTA solution and this package are described in Virag et al. (2020) <doi:10.1101/2020.04.10.035766>.

Depends R (>= 3.5.0)

License GPL-3

Encoding UTF-8

LazyData true

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Imports dplyr, ggplot2, ggpubr, ggsci, hms, lubridate, magrittr, plyr, rjson, stats, stringr, tidyr

Suggests knitr, rmarkdown, testthat, covr

VignetteBuilder knitr

URL <https://github.com/ikodvanj/ratPASTA>

BugReports <https://github.com/ikodvanj/ratPASTA/issues>

NeedsCompilation no

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basicStartlePlot	<i>Basic Startle Plot</i>
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Description

Returns a simple time series plot.

Usage

```
basicStartlePlot(df, filter_groups, n_col)
```

Arguments

df	A dataframe returned by loadStartleData function.
filter_groups	An optional argument, a vector of strings used for filtering the data and displaying only wished groups on plots.
n_col	An optional argument, defines number of graph columns.

Value

Returns a time series plot.

Examples

```
# Load example data
df <- ratpasta_demo

# running basicStartlePlot
basicStartlePlot(df)
```

datasummary	<i>global variables</i>
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Description

defining global variables

latencyPlot	<i>Latency plot</i>
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Description

Returns two plots displaying latency in a list. Latency refers to the reaction of the test subject to the startling sound. It is time period from the startling sound to the time stamp of maximal values recorded.

Usage

```
latencyPlot(df, addhead)
```

Arguments

df	A dataframe returned by loadStartleData function.
addhead	Optional argument. If this argument is used in loadStartleData, set addhead to the value

Value

List with two plots

Examples

```
# Load data provided with example
df <- ratpasta_demo

# running examples
l <- latencyPlot(df, addhead = 0.1)
```

loadStartleData *Load Startle Data*

Description

This function is used for loading and processing all data related to startle experiments. All data generated with PASTA, Platform for Acoustic STARle experiments, should be placed in a single folder. Navigate to this folder, set it as working directory, and call this function. All data will be loaded, processed and assigned to a chosen variable that can be passed on other functions.

Usage

```
loadStartleData(
  auto_import = TRUE,
  data,
  mass,
  addhead,
  addtail,
  metadata,
  correction = TRUE,
  synchronise = FALSE
)
```

Arguments

auto_import	An argument with default value TRUE. If set to TRUE it will load all .pasta files from the working directory and merge them appropriately. If set to FALSE, a user must specify group_names.
data	An argument used only if auto_import = FALSE. A list. A list containing data frames with data from .pasta files.
mass	An argument used only if auto_import = FALSE. A dataframe, in first column are names of animals, second their mass. Names in first column must correspond to the names of the elements in list used as an data argument.
addhead	Optional argument. Adds a number of seconds to the duration of the impulse. Accounts for the lag of the animal.
addtail	Optional argument. Adds a number of seconds to the duration of the impulse. Accounts for the lag of the animal.
metadata	Optional argument. For a custom made pulse protocol.
correction	Argument with default value TRUE. If set to TRUE, values will be corrected for the animal mass.
synchronise	Argument with default value FALSE. If set to TRUE, timestamps will be corrected based on the synchroniseTime.csv in the working directory.

Value

A dataframe with all startle data

Examples

```
# Creating random experiment data
data <- list("CTR 1" = data.frame(x = seq(1, 210881, by=12), y = runif(17574, min=-30, max=30)),
            "CTR 2" = data.frame(x = seq(1, 210881, by=12), y = runif(17574, min=-30, max=30)),
            "EXP 1" = data.frame(x = seq(1, 210881, by=12), y = runif(17574, min=-30, max=30)),
            "EXP 2" = data.frame(x = seq(1, 210881, by=12), y = runif(17574, min=-30, max=30)))
mass <- data.frame("group" = c("CTR 1", "CTR 2", "EXP 1", "EXP 2"), "mass" = c(300, 350, 280, 330))

# Running an example of loadStartleData with auto_import set to FALSE
df <- loadStartleData(auto_import=FALSE, data = data, mass = mass, addhead=0.1, addtail=1)
```

map	<i>metadata</i>
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Description

A metadata for identification of pulses

Usage

```
map
```

Format

```
dataframe
```

ratpasta_demo	<i>Sample</i>
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Description

A sample data for example. A small part of data used in vignette.

Usage

```
ratpasta_demo
```

Format

```
dataframe
```

`startlePlot`*Startle Plot*

Description

Returns several types of plots, based on the type argument. Type 1 returns a dot plot portraying mean values during the pulse and between pulses for tested groups; type 2, returns a similar result as type 1, but as a boxplot; type 3 displays only values pertaining to pulse period; type 4 displays distribution of values as violin plots; type 5 is a time-series plot with all startle tries overlapped, color indicates whether prepulse was used; type 6 is a boxplot displaying ratio of values recorded during pulse and in between pulses.

Usage

```
startlePlot(df, type, filter_major_groups, yrange, n_col)
```

Arguments

<code>df</code>	A dataframe returned by <code>loadStartleData</code> function.
<code>type</code>	Obligatory argument. A number 1, 2 or 3 that specifies which plot will be returned. For more information see the vignette.
<code>filter_major_groups</code>	An optional argument, a vector of strings used for filtering the data and displaying only wished major groups on plots.
<code>yrange</code>	An optional argument used for zooming in. Should be defined as a vector with min and max y axis values (e.g. <code>c(0,10)</code> - y axis will have min value of 0 and max value of 10)
<code>n_col</code>	An optional argument, defines number of graph columns.

Value

Returns several types of plots based on type.

Examples

```
# Load example data
df <- ratpasta_demo

# running examples
startlePlot(df, type = 1)
startlePlot(df, type = 2)
startlePlot(df, type = 3)
```

summariseStartle	<i>Summarise Startle</i>
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Description

Returns a mathematical summary of the startle data. Returned list with two data frames. First contains calculated median, interquartile range, mean and standard deviation for values pertaining to the period of the pulse and in between pulses. The second contains the results of the desired statistical test, by default Wilcoxon is used. User can specify which test will be used with method argument.

Usage

```
summariseStartle(df, method = "wilcox.test")
```

Arguments

df	A dataframe returned by loadStartleData function.
method	A parameter defining what type of statistical testing will be used.

Value

A mathematical summary in a list.

Examples

```
# Load example data
df <- ratpasta_demo

# running examples
summariseStartle(df)
```

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