Package ‘pairwiseComparisons’

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Type Package

Title Multiple Pairwise Comparison Tests

Version 1.0.0

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Description Multiple pairwise comparison tests on tidy data for one-way analysis of variance for both between-subjects and within-subjects designs. Currently, it supports only the most common types of statistical analyses and tests: parametric (Welch's and Student's t-test), nonparametric (Durbin-Conover test Dunn test), robust (Yuen's trimmed means test), and Bayes Factor (Student's t-test).

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BugReports https://github.com/IndrajeetPatil/pairwiseComparisons/issues

Depends R (>= 3.6.0)

Imports broomExtra, dplyr, dunn.test, forcats, ipmisc, Matrix, PMCMRplus, purrr, rlang, stats, tidyBF, tidyr, utils, WRS2

Suggests knitr, rmarkdown, spelling, testthat

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Language en-US

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RoxygenNote 7.1.0.9000

NeedsCompilation no

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| bugs_long | Tidy version of the "Bugs" dataset. |

Description

Tidy version of the "Bugs" dataset.

Usage

`bugs_long`

Format

A data frame with 372 rows and 6 variables

- subject. Dummy identity number for each participant.
- gender. Participant’s gender (Female, Male).
- region. Region of the world the participant was from.
- education. Level of education.
- condition. Condition of the experiment the participant gave rating for (LDLF: low freighteningness and low disgustingness; LFHD: low freighteningness and high disgustingness; HFHD: high freighteningness and low disgustingness; HFHD: high freighteningness and high disgustingness).
- desire. The desire to kill an arthropod was indicated on a scale from 0 to 10.

Details

This data set, "Bugs", provides the extent to which men and women want to kill arthropods that vary in freighteningness (low, high) and disgustingness (low, high). Each participant rates their attitudes towards all anthropods. Subset of the data reported by Ryan et al. (2013).

Source

**iris_long**

*Edgar Anderson’s Iris Data in long format.*

**Description**

Edgar Anderson’s Iris Data in long format.

**Usage**

`iris_long`

**Format**

A data frame with 600 rows and 5 variables

- id. Dummy identity number for each flower (150 flowers in total).
- Species. The species are *Iris setosa*, *versicolor*, and *virginica*.
- attribute. What attribute is being measured ("Sepal" or "Pepal").
- measure. What aspect of the attribute is being measured ("Length" or "Width").
- value. Value of the measurement.

**Details**

This famous (Fisher’s or Anderson’s) iris data set gives the measurements in centimeters of the variables sepal length and width and petal length and width, respectively, for 50 flowers from each of 3 species of iris. The species are Iris setosa, versicolor, and virginica.

This is a modified dataset from datasets package.

**Examples**

```r
dim(iris_long)
head(iris_long)
dplyr::glimpse(iris_long)
```
movies_long

Movie information and user ratings from IMDB.com (long format).

Description

Movie information and user ratings from IMDB.com (long format).

Usage

movies_long

Format

A data frame with 1,579 rows and 8 variables

- title. Title of the movie.
- year. Year of release.
- budget. Total budget (if known) in US dollars
- length. Length in minutes.
- rating. Average IMDB user rating.
- votes. Number of IMDB users who rated this movie.
- mpaa. MPAA rating.
- genre. Different genres of movies (action, animation, comedy, drama, documentary, romance, short).

Details

Modified dataset from ggplot2movies package.


Movies were are identical to those selected for inclusion in movies_wide but this dataset has been constructed such that every movie appears in one and only one genre category.

Source

https://CRAN.R-project.org/package=ggplot2movies

Examples

dim(movies_long)
head(movies_long)
dplyr::glimpse(movies_long)
Description

Movie information and user ratings from IMDB.com (wide format).

Usage

movies_wide

Format

A data frame with 1,579 rows and 13 variables

- title. Title of the movie.
- year. Year of release.
- budget. Total budget in millions of US dollars
- length. Length in minutes.
- rating. Average IMDB user rating.
- votes. Number of IMDB users who rated this movie.
- mpaa. MPAA rating.
- action, animation, comedy, drama, documentary, romance, short. Binary variables representing if movie was classified as belonging to that genre.
- NumGenre. The number of different genres a film was classified in an integer between one and four

Details

Modified dataset from ggplot2movies package.


Movies were selected for inclusion if they had a known length and had been rated by at least one imdb user. Small categories such as documentaries and NC-17 movies were removed.

Source

https://CRAN.R-project.org/package=ggplot2movies

Examples

dim(movies_wide)
head(movies_wide)
dplyr::glimpse(movies_wide)
pairwise_caption  

Expression containing details about pairwise comparison test

Description

This returns an expression containing details about the pairwise comparison test and the \( p \)-value adjustment method. These details are typically included in `ggstatsplot` package plots as a caption.

Usage

```r
pairwise_caption(caption, test.description, p.adjust.method)
```

Arguments

- **caption** Additional text to be included in the plot.
- **test.description** Text describing the details of the test.
- **p.adjust.method** Adjustment method for \( p \)-values for multiple comparisons. Possible methods are: "holm" (default), "hochberg", "hommel", "bonferroni", "BH", "BY", "fdr", "none".

Examples

```r
library(pairwiseComparisons)
pairwise_caption("my caption", "Student's t-test", "holm")
```

pairwise_comparisons  

Multiple pairwise comparison tests with tidy data

Description

Calculate parametric, non-parametric, and robust pairwise comparisons between group levels with corrections for multiple testing.

Usage

```r
pairwise_comparisons(
  data,
  x,
  y,
  type = "parametric",
  paired = FALSE,
  var.equal = FALSE,
  tr = 0.1,
```
pairwise_p(
  data,
  x,
  y,
  type = "parametric",
  paired = FALSE,
  var.equal = FALSE,
  tr = 0.1,
  bf.prior = 0.707,
  p.adjust.method = "holm",
  k = 2,
  ...
)

Arguments

data A dataframe (or a tibble) from which variables specified are to be taken. A matrix or tables will not be accepted.

x The grouping variable from the dataframe data.

y The response (a.k.a. outcome or dependent) variable from the dataframe data.

type Type of statistic expected ("parametric" or "nonparametric" or "robust" or "bayes"). Corresponding abbreviations are also accepted: "p" (for parametric), "np" (nonparametric), "r" (robust), or "bf" resp.

paired Logical that decides whether the experimental design is repeated measures/within-subjects or between-subjects. The default is FALSE.

var.equal a logical variable indicating whether to treat the two variances as being equal. If TRUE then the pooled variance is used to estimate the variance otherwise the Welch (or Satterthwaite) approximation to the degrees of freedom is used.

tr Trim level for the mean when carrying out robust tests. If you get error stating "Standard error cannot be computed because of Winsorized variance of 0 (e.g., due to ties). Try to decrease the trimming level.", try to play around with the value of tr, which is by default set to 0.1. Lowering the value might help.

bf.prior A number between 0.5 and 2 (default 0.707), the prior width to use in calculating Bayes factors.

p.adjust.method Adjustment method for p-values for multiple comparisons. Possible methods are: "holm" (default), "hochberg", "hommel", "bonferroni", "BH", "BY", "fdr", "none".

k Number of digits after decimal point (should be an integer) (Default: k = 2L).

... Current ignored.
**Value**

A tibble dataframe containing two columns corresponding to group levels being compared with each other (group1 and group2) and p.value column corresponding to this comparison. The dataframe will also contain a p.value.label column containing a label for this p-value, in case this needs to be displayed in geom_ggsignif. In addition to these common columns across the different types of statistics, there will be additional columns specific to the type of test being run.

The significance column asterisks indicate significance levels of p-values in the American Psychological Association (APA) mandated format:

- • ns : > 0.05
- • * : < 0.05
- • ** : < 0.01
- • *** : < 0.001

**Examples**

```r
# for reproducibility
set.seed(123)
library(pairwiseComparisons)

#------------------- between-subjects design ----------------------------
# parametric
# if `var.equal = TRUE`, then Student's t-test will be run
pairwise_comparisons(
  data = mtcars,
  x = cyl,
  y = wt,
  type = "parametric",
  var.equal = TRUE,
  paired = FALSE,
  p.adjust.method = "none"
)

# if `var.equal = FALSE`, then Games-Howell test will be run
pairwise_comparisons(
  data = mtcars,
  x = cyl,
  y = wt,
  type = "parametric",
  var.equal = FALSE,
  paired = FALSE,
  p.adjust.method = "bonferroni"
)

# non-parametric (Dunn test)
pairwise_comparisons(
  data = mtcars,
  x = cyl,
  y = wt,
  type = "nonparametric",
  var.equal = FALSE,
  paired = FALSE,
  p.adjust.method = "holm"
)
```

```r
data = mtcars,
x = cyl,
y = wt,
type = "robust",
paired = FALSE,
p.adjust.method = "fdr"
)

# Bayes Factor (Student's t-test)
pairwise_comparisons(
  data = mtcars,
  x = cyl,
  y = wt,
  type = "bayes",
paired = FALSE
)

#------------------- within-subjects design ----------------------------

# parametric (Student's t-test)
pairwise_comparisons(
  data = bugs_long,
  x = condition,
  y = desire,
  type = "parametric",
paired = TRUE,
p.adjust.method = "BH"
)

# non-parametric (Durbin-Conover test)
pairwise_comparisons(
  data = bugs_long,
  x = condition,
  y = desire,
  type = "nonparametric",
paired = TRUE,
p.adjust.method = "BY"
)

# robust (Yuen's trimmed means t-test)
pairwise_comparisons(
  data = bugs_long,
  x = condition,
  y = desire,
type = "robust",
```
paired = TRUE,
p.adjust.method = "hommel"
)

# Bayes Factor (Student's t-test)
pairwise_comparisons(
  data = bugs_long,
  x = condition,
  y = desire,
  type = "bayes",
  paired = TRUE,
  bf.prior = 0.80
)

---

p_adjust_text

**Preparation text to describe which p-value adjustment method was used**

**Description**

Preparing text to describe which p-value adjustment method was used

**Usage**

p_adjust_text(p.adjust.method)

**Arguments**

p.adjust.method

Adjustment method for p-values for multiple comparisons. Possible methods are: "holm" (default), "hochberg", "hommel", "bonferroni", "BH", "BY", "fdr", "none".

**Value**

Standardized text description for what method was used.

**Examples**

library(pairwiseComparisons)
p_adjust_text("none")p_adjust_text("BY")
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