Package ‘nparcomp’

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Description With this package, it is possible to compute nonparametric simultaneous confidence intervals for relative contrast effects in the unbalanced one way layout. Moreover, it computes simultaneous p-values. The simultaneous confidence intervals can be computed using multivariate normal distribution, multivariate t-distribution with a Satterthwaite Approximation of the degree of freedom or using multivariate range preserving transformations with Logit or Probit as transformation function. 2 sample comparisons can be performed with the same methods described above. There is no assumption on the underlying distribution function, only that the data have to be at least ordinal numbers. See Konietschke et al. (2015) <doi:10.18637/jss.v064.i09> for details.
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nparcomp-package

Description

With this package, it is possible to compute nonparametric simultaneous confidence intervals for relative contrast effects in the unbalanced one way layout. Moreover, it computes simultaneous p-values. The simultaneous confidence intervals can be computed using multivariate normal distribution, multivariate t-distribution with a Satterthwaite Approximation of the degree of freedom or using multivariate range preserving transformations with Logit or Probit as transformation function. 2 sample comparisons can be performed with the same methods described above. There is no assumption on the underlying distribution function, only that the data have to be at least ordinal numbers.

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Author(s)

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References


Examples

## Not run:

# two sample comparisons: Nonparametric Behrens-Fisher Problem

data(impla)
a <- npar.t.test(impla~group, data = impla, 
    method = "t.app", 
    alternative = "two.sided")
summary(a)
plot(a)

#--Analysis of relative contrast effects in different contrast settings

data(liver)

# Williams Contrast

a <- nparcomp(weight ~dosage, data=liver, asy.method = "probit", 
    type = "Williams", alternative = "two.sided", 
    plot.simci = TRUE, info = FALSE)
summary(a)

# Dunnett dose 3 is baseline

c <- nparcomp(weight ~dosage, data=liver, asy.method = "probit", 
    type = "Dunnett", control = "3",alternative = "two.sided", 
    plot.simci = TRUE, info = FALSE)
summary(c)

data(colu)
Data from one of the quality of life measurements collected from colorectal cancer patients enrolled in the North Central Cancer Treatment Group phase III trials N9741. The patient received three treatment regimens: IFL (irinotecan, bolus fluorouracil, and leucovorin), FOLFOX (infused fluorouracil, leucovorin, and ocaliplatin), and IROX (irinotecan and oxaliplatin).

The objective is to test whether there are differences between the treatment regimens in terms of different appetite scores.

Data from a fertility trial with 92 female Wistar rats: numbers of the corpora lutea in a placebo group and in 4 dose groups with an increasing dose of an active treatment.

A data frame with 92 observations on the following 2 variables.

dose  A factor with levels dose1, dose2, dose3, dose4, Placebo, where Placebo is the placebo group and dose1-dose4 are the 4 dose groups with an increasing dose.
corpora  A numeric vector containing the numbers of the corpora lutea.

The objective is to test if the active treatment influences the fertility of the rats.


Examples

```r
## Not run:
library(nparcomp)
data(appetite)

## End(Not run)
```
**gao**

*Nonparametric multiple test procedure for many-to-one comparisons*

**Description**

This function can be used to perform the nonparametric multiple tests for many-to-one comparisons by Gao et al. (2008). The multiple level is strongly controlled by the Hochberg-adjustment.

**Usage**

```r
gao(formula, data, alpha = 0.05, control = NULL, silent = FALSE)
```

**Arguments**

- `formula`: A two-sided 'formula' specifying a numeric response variable and a factor with more than two levels. If the factor contains less than 3 levels, an error message will be returned.
- `data`: A dataframe containing the variables specified in formula.
- `alpha`: The significance level (by default = 0.05).
- `control`: Character string defining the control group in Dunnett comparisons. By default it is the first group by lexicographical ordering.
- `silent`: A logical indicating more informations should be print on screen.

**Value**

- **Info**: Samples and sizes with estimated relative effects and variance estimators.

**Note**

The procedure can only be used to test hypotheses in terms of the distribution functions.

**Author(s)**

Frank Konietschke

**References**


See Also

For nonparametric all-pairs comparison see `gao_cs`.

Examples

```r
## Not run:
data(liver)
gao(weight ~dosage, data=liver, alpha=0.05)
# Control= 3
gao(weight ~dosage, data=liver, alpha=0.05, control="3")
## End(Not run)
```

### gao_cs

**Nonparametric multiple test procedure for all-pairs comparisons**

Description

This function can be used to perform the nonparametric multiple tests for all-pairs comparisons by Gao et al. (2008). This procedure is a nonparametric equivalent of Campbell and Skillings (1981) sequential test procedure.

Usage

`gao_cs(formula, data, alpha = 0.05, silent = FALSE)`

Arguments

- `formula`: A two-sided 'formula' specifying a numeric response variable and a factor with more than two levels. If the factor contains less than 3 levels, an error message will be returned.
- `data`: A dataframe containing the variables specified in formula.
- `alpha`: The significance level (by default = 0.05).
- `silent`: A logical indicating more informations should be print on screen.

Value

- `info`: Samples and sizes with estimated relative effects and variance estimators.
CS.Analysis

- Comp: Distributions being compared
- Effect: Estimated effect
- Statistic: Test-statistic
- DF: Degree of Freedom
- Quantiles: quantile
- Adj. P: adjusted p-Value
- Alpha: Significance level alpha
- Rejected: A logical indicating rejected hypotheses
- Layer: Layer of the stepwise analysis

Note

The generalized Campbell and Skillings’ analysis is performed in the CS.Analysis output. The adjusted quantiles and p-Values are reported. Due to the non-monotonicity of the adjusted quantiles, all results are checked for non-logical relations.

Author(s)

Frank Konietschke

References


See Also

For nonparametric many-to-one comparison see gao.

Examples

```r
# Not run:
data(reaction)
gao_cs(Time ~Group, data=reaction,alpha=0.05)
# End(Not run)
```

Data from a fertility trial with 29 female Wistar rats: numbers of the implantations in a placebo group and in an active treatment group.

Usage

data(impla)
liver

Format
A data frame with 29 observations on the following 2 variables.

  group  A factor with levels Placebo, Verum, where Verum denotes the active treatment group.
  impla  A numeric vector.

Details
The objective is to test if the active treatment influences the fertility of the rats.

Source
Statistik und ihre Anwendungen, Springer-Verlag.

Examples
## Not run:
library(nparcomp)
data(impla)
boxplot(impla~group,data=impla)
## End(Not run)

liver

Relative liver weights

Description
Data from a toxicity trial with male Wistar rats: Relative liver weights in a negative control group
and in 4 dose groups with an increasing dose of an active treatment. After treatment the relative
liver weights of the rats were computed.

Usage
data(liver)

Format
A data frame with 38 observations on the following 2 variables.

  dosage  A numeric vector indicating the dose/control group.
  weight  A numeric vector containing the relative liver weights.

Details
The objective is to test if the active treatment influences the liver weight of the rats.
mctp

Nonparametric multiple contrast tests and simultaneous confidence intervals (independent samples)

Description

The function mctp computes the estimator of nonparametric relative effects based on global rankings, simultaneous confidence intervals for the effects, and adjusted p-values based on contrasts in the setting of independent samples. Contrasts include "Tukey", "Dunnett", "Sequen", "Williams", "Changepoint", "AVE", "McDermott", "Marcus", "UmbrellaWilliams", "GrandMean", and "UserDefined". The statistics are computed using multivariate normal distribution, multivariate Satterthwaite t-Approximation, and multivariate transformations (adjusted log odds or Fisher function). The function 'mctp' computes both the one-sided and two-sided simultaneous confidence intervals and adjusted p-values. The simultaneous confidence intervals can be plotted.

Usage

mctp(formula, data, type = c("Tukey", "Dunnett", "Sequen", "Williams", "Changepoint", "AVE", "McDermott", "Marcus", "UmbrellaWilliams", "GrandMean", "UserDefined"), conf.level = 0.95, alternative = c("two.sided", "less", "greater"), asy.method = c("fisher", "mult.t", "normal", "log.odds"), plot.simci = FALSE, control = NULL, info = TRUE, rounds = 3, contrast.matrix = NULL, correlation = FALSE, effect=c("unweighted","weighted"), const=1/1.702)

Arguments

formula A two-sided 'formula' specifying a numeric response variable and a factor with more than two levels. If the factor contains less than 3 levels, an error message will be returned.

data A dataframe containing the variables specified in formula.

type Character string defining the type of contrast. It should be one of "Tukey", "Dunnett", "Sequen", "Williams", "Changepoint", "AVE", "McDermott", "Marcus", "UmbrellaWilliams", "GrandMean", "UserDefined".
conf.level The confidence level for \texttt{conf.level}-confidence intervals (default is 0.95).

alternative Character string defining the alternative hypothesis, one of "two.sided", "less", or "greater".

asy.method Character string defining the asymptotic approximation method, one of "fisher" (for using the Fisher transformation function), "log.odds" (for using the adjusted log odds effect sizes), "mult.t" (for using a multivariate t-distribution with a Satterthwaite Approximation), or "normal" (for using the multivariate normal distribution), "log.odds" (for using the adjusted log odds effect sizes).

plot.simci A logical indicating whether you want a plot of the confidence intervals.

control Character string defining the control group in Dunnett comparisons. By default, it is the first group by definition of the factor variable.

info A logical whether you want a brief overview with informations about the output.

rounds Number of rounds for the numeric values of the output (default is 3).

contrast.matrix User-defined contrast matrix.

correlation A logical whether the estimated correlation matrix and covariance matrix should be printed.

effect Character string defining the type of effect, one of "unweighted" and "weighted".

const Number used for the adjustment of log odds when the "log.odds" option is chosen.

Value

\begin{itemize}
\item \texttt{Data.Info} List of samples and sample sizes and estimated effect per group.
\item \texttt{Contrast} Contrast matrix.
\item \texttt{Analysis} Estimator: Estimated relative effect, Lower: Lower limit of the simultaneous confidence interval, Upper: Upper limit of the simultaneous confidence interval, Statistic: Test statistic p.Value: Adjusted p-values for the hypothesis by the choosen approximation method.
\item \texttt{Analysis.Inf} The same as \texttt{Analysis} except that it assumes rounds = Inf.
\item \texttt{Overall} The critical value and adjusted p-value for the overall hypothesis.
\item \texttt{input} List of input arguments by user.
\item \texttt{text.Output} Character string specifying the alternative hypotheses.
\item \texttt{text.output.W} Character string specifying the weight pattern for the reference distribution.
\item \texttt{connames} Character string specifying the contrast names.
\item \texttt{AsyMethod} Character string specifying the approximation method.
\end{itemize}

Note

If the samples are completely seperated the variance estimators are Zero by construction. In these cases the Null-estimators are replaced by 0.001. Estimated relative effects with 0 or 1 are replaced with 0.001, 0.999 respectively.

A summary and a graph can be created separately by using the functions \texttt{summary.mctp} and \texttt{plot.mctp}.

For the analysis, the R packages 'multcomp' and 'mvtnorm' are required.
Author(s)

Frank Konietschke, Kimihiro Noguchi

References


See Also

For simultaneous confidence intervals for relative contrast effects, see nparcomp.

Examples

```r
## Not run:
data(liver)

# Williams Contrast

a <- mctp(weight ~ dosage, data = liver, asy.method = "fisher",
          type = "Williams", alternative = "two.sided",
          plot.simci = TRUE, info = FALSE)
summary(a)

# Dunnett Contrast

b <- mctp(weight ~ dosage, data = liver, asy.method = "fisher",
          type = "Dunnett", alternative = "two.sided",
          plot.simci = TRUE, info = FALSE)
summary(b)

# Dunnett dose 3 is baseline

c <- mctp(weight ~ dosage, data = liver, asy.method = "log.odds",
          type = "Dunnett", control = "3", alternative = "two.sided",
          plot.simci = TRUE, info = FALSE)
summary(c)

data(colu)

# Tukey comparison- one sided (less)

a <- mctp(corpora ~ dose, data = colu, asy.method = "log.odds",
          type = "Tukey", alternative = "less",
          plot.simci = TRUE, info = FALSE)
summary(a)
```
mctp.rm

Nonparametric multiple contrast tests and simultaneous confidence intervals (repeated measures)

Description

The function mctp.rm computes the estimator of nonparametric relative effects based on global rankings, simultaneous confidence intervals for the effects, and adjusted p-values based on contrasts in the setting of a repeated measures design with n independent individuals and d repeated measures. Contrasts include "Tukey", "Dunnett", "Sequen", "Williams", "Changepoint", "AVE", "McDermott", "Marcus", "UmbrellaWilliams", "GrandMean", and "UserDefined". The statistics are computed using multivariate normal distribution, multivariate Satterthwaite t-Approximation, and multivariate transformations (adjusted log odds or Fisher function). The function 'mctp.rm' computes both the one-sided and two-sided simultaneous confidence intervals and adjusted p-values. The confidence intervals can be plotted.

Usage

mctp.rm(formula, data, type = c("Tukey", "Dunnett", "Sequen", "Williams", "Changepoint", "AVE", "McDermott", "Marcus", "UmbrellaWilliams", "GrandMean", "UserDefined"), conf.level = 0.95, alternative = c("two.sided", "less", "greater"), asy.method = c("log.odds", "fisher", "mult.t", "normal"), plot.simci = FALSE, control = NULL, info = TRUE, rounds = 3, contrast.matrix = NULL, correlation = FALSE, const=1/1.702)
Arguments

formula A two-sided 'formula' specifying a numeric response variable and a repeated measures factor with more than two levels. If the factor contains less than 3 levels, an error message will be returned.
data A dataframe containing the variables specified in formula.
type Character string defining the type of contrast. It should be one of "Tukey", "Dunnett", "Sequen", "Williams", "Changepoint", "AVE", "McDermott", "Marcus", "UmbrellaWilliams", "GrandMean", "UserDefined".
conf.level The confidence level for conf.level-confidence intervals (default is 0.95).
alternative Character string defining the alternative hypothesis, one of "two.sided", "less", or "greater".
asy.method Character string defining the asymptotic approximation method, one of "log.odds" (for using the adjusted log odds effect sizes), "mult.t" (for using a multivariate t-distribution with a Satterthwaite Approximation), "fisher" (for using the Fisher transformation function), or "normal" (for using the multivariate normal distribution).
plot.simci A logical indicating whether you want a plot of the confidence intervals.
control Character string defining the control group in Dunnett comparisons. By default, it is the first group by definition of the factor variable.
Info A logical whether you want a brief overview with informations about the output.
rounds Number of rounds for the numeric values of the output (default is 3).
contrast.matrix User-defined contrast matrix.
correlation A logical whether the estimated correlation matrix and covariance matrix should be printed.
const Number used for the adjustment of log odds when the "log.odds" option is chosen.

Value

Data.Info List of samples and sample sizes and estimated effect per repeated measures level.
Contrast Contrast matrix.
Analysis.Inf The same as Analysis except that it assumes rounds = Inf.
Overall The critical value and adjusted p-value for the overall hypothesis.
input List of input arguments by user.
text.Output Character string specifying the alternative hypotheses.
connames Character string specifying the contrast names.
AsyMethod Character string specifying the approximation method.
**Note**

Estimated relative effects with 0 or 1 are replaced with 0.001 and 0.999.

A summary and a graph can be created separately by using the functions `summary.mctp.rm` and `plot.mctp.rm`.

For the analysis, the R packages 'multcomp' and 'mvtnorm' are required.

**Author(s)**

Marius Placzek, Kimihiro Noguchi

**References**


**See Also**

To analyse simple one-way layouts with independent samples use `mctp`.

**Examples**

```r
## Not run:
data(panic)
a <- mctp.rm(CGI~week, data = panic, type = "Dunnett",
            alternative = "two.sided",
            asy.method = "log.odds", plot.simci = FALSE,
            info = FALSE, contrast.matrix = NULL)
summary(a)
plot(a)

b <- mctp.rm(CGI~week, data = panic, type = "Dunnett",
            alternative = "two.sided",
            asy.method = "mult.t", plot.simci = FALSE,
            info = FALSE, contrast.matrix = NULL)
summary(b)
plot(b)

c <- mctp.rm(CGI~week, data = panic, type = "Dunnett",
            alternative = "two.sided",
            asy.method = "fisher", plot.simci = FALSE,
            info = FALSE, contrast.matrix = NULL)
summary(c)
plot(c)

d <- mctp.rm(CGI~week, data = panic, type = "Tukey",
            alternative = "two.sided",
            asy.method = "mult.t", plot.simci = TRUE)
summary(d)

## End(Not run)
```
npar.t.test

The nonparametric Behrens-Fisher problem

Description

The function npar.t.test performs two sample tests for the nonparametric Behrens-Fisher problem, that is testing the hypothesis

\[ H_0 : p = 1/2 \]

where \( p \) denotes the relative effect of 2 independent samples and computes confidence intervals for the relative effect \( p \). The statistics are computed using standard normal distribution, Satterthwaite t-Approximation and variance stabilising transformations (Probit and Logit transformation function). For small samples there is also a studentized permutation test implemented. npar.t.test also computes one-sided and two-sided confidence intervals and p-values. The confidence interval can be plotted.

Usage

npar.t.test(formula, data, conf.level = 0.95, alternative = c("two.sided", "less", "greater"), rounds = 3, method = c("logit", "probit", "normal", "t.app", "permu"), plot.simci = FALSE, info = TRUE, nperm=10000)

Arguments

formula A two-sided 'formula' specifying a numeric response variable and a factor with two levels. If the factor contains more than two levels, an error message will be returned.
data A dataframe containing the variables specified in formula.
conf.level The confidence level (default is 0.95).
alternative Character string defining the alternative hypothesis, one of "two.sided", "less" or "greater".
rounds Number of rounds for the numeric values of the output (default is 3).
method Character string defining the (asymptotic approximation) method, one of "logit", for using the logit transformation function, "probit", for using the probit transformation function, "normal", for using the standard normal distribution or "t.app" for using a t-Distribution with a Satterthwaite Approximation. The studentized permutation test can be obtained by choosing "permu".
plot.simci A logical indicating whether you want a plot of the confidence interval.
info A logical whether you want a brief overview with informations about the output.
nperm The number of permutations for the studentized permutation test. By default it is nperm=10,000.
npar.t.test

Value

| Info       | List of samples and sample sizes. |
| Analysis   | Effect: relative effect $p(a,b)$ of the two samples 'a' and 'b', Estimator: estimated relative effect, Lower: Lower limit of the confidence interval, Upper: Upper limit of the confidence interval, T: test statistic p. Value: p-value for the hypothesis by the chosen approximation method. |
| input      | List of input by user. |

Note

If the samples are completely separated the variance estimators are Zero by construction. In these cases the Null-estimators are replaced by a replacing method as proposed in the paper from Neubert and Brunner (2006). Estimated relative effects with 0 or 1 are replaced with 0.001, 0.999 respectively.

A summary and a graph can be created separately by using the functions `summary.nparttest` and `plot.nparttest`.

Author(s)

Frank Konietschke

References


See Also

For multiple comparison procedures based on relative effects, see `nparcomp`.

Examples

```r
## Not run:

data(impla)
a<-npar.t.test(impla~group, data = impla, method = "t.app",
             alternative = "two.sided", info=FALSE)
summary(a)
plot(a)
b<-npar.t.test(impla~group, data = impla, method = "permu",
             alternative = "two.sided", info=FALSE)
summary(b)
plot(b)
```
npar.t.test.paired

A 2-sample nonparametric studentized permutation test for paired data

Description

The function npar.t.test.paired performs a two sample studentized permutation test for paired data, that is testing the hypothesis

\[ H_0 : p = \frac{1}{2} \]

where \( p \) denotes the relative effect of 2 dependent samples, and computes a confidence interval for the relative effect \( p \). In addition the Brunner-Munzel-Test accompanied by a confidence interval for the relative effect is implemented. npar.t.test.paired also computes one-sided and two-sided confidence intervals and p-values. The confidence interval can be plotted.

Usage

npar.t.test.paired(formula, data, conf.level = 0.95, alternative = c("two.sided", "less", "greater"), nperm=10000, rounds = 3, info = TRUE, plot.simci = TRUE)

Arguments

- formula: A two-sided 'formula' specifying a numeric response variable and a factor with two levels. If the factor contains more than two levels, an error message will be returned.
- data: A dataframe containing the variables specified in formula.
- conf.level: The confidence level (default is 0.95).
- alternative: Character string defining the alternative hypothesis, one of "two.sided", "less" or "greater".
- nperm: The number of permutations for the studentized permutation test. By default it is nperm=10,000.
- rounds: Number of rounds for the numeric values of the output (default is 3).
- info: A logical whether you want a brief overview with informations about the output.
- plot.simci: A logical indicating whether you want a plot of the confidence interval.

Value

- Info: List of samples and sample sizes.
- Analysis: Effect: relative effect \( p(a,b) \) of the two samples 'a' and 'b', p.hat: estimated relative effect, Lower: Lower limit of the confidence interval, Upper: Upper limit of the confidence interval, T: studentized teststatistic p.value: p-value for the hypothesis.
- input: List of input by user.
**Note**

A summary and a graph can be created separately by using the functions `summary.npar.t.test.paired` and `plot.npar.t.test.paired`.

Make sure that your dataset is ordered by subjects before applying `npar.t.test.paired`.

**Author(s)**

Frank Konietschke

**References**


**See Also**

For multiple comparison procedures based on relative effects, see `nparcomp`.

**Examples**

```r
## Not run:
data(PGI)
a<-npar.t.test.paired(PGIscore~timepoint, data = PGI,
                      alternative = "two.sided", info=FALSE, plot.simci=FALSE)
summary(a)
plot(a)

## End(Not run)
```

**nparcomp**

*Nonparametric relative contrast effects*

**Description**

The function `nparcomp` computes the estimator of nonparametric relative contrast effects, simultaneous confidence intervals for the effects and simultaneous p-values based on special contrasts like "Tukey", "Dunnett", "Sequen", "Williams", "Changepoint", "AVE", "McDermott", "Marcus", "UmbrellaWilliams", "UserDefined". The statistics are computed using multivariate normal distribution, multivariate Satterthwaite t-Approximation and multivariate transformations (Probit and Logit transformation function). The function 'nparcomp' also computes one-sided and two-sided confidence intervals and p-values. The confidence intervals can be plotted.
Usage

nparcomp(formula, data, type = c("Tukey", "Dunnett", "Sequen", "Williams", "Changepoint", "AVE", "McDermott", "Marcus", "UmbrellaWilliams", "UserDefined"), control = NULL, conf.level = 0.95, alternative = c("two.sided", "less", "greater"), rounds = 3, correlation = FALSE, asy.method = c("logit", "probit", "normal", "mult.t"), plot.simci = FALSE, info = TRUE, contrast.matrix=NULL, weight.matrix=FALSE)

Arguments

formula A two-sided 'formula' specifying a numeric response variable and a factor with more than two levels. If the factor contains less than 3 levels, an error message will be returned.
data A dataframe containing the variables specified in formula.
type Character string defining the type of contrast. It should be one of "Tukey", "Dunnett", "Sequen", "Williams", "Changepoint", "AVE", "McDermott", "Marcus", "UmbrellaWilliams", "UserDefined".
control Character string defining the control group in Dunnett comparisons. By default it is the first group by definition of the dataset.
conf.level The confidence level for the confidence intervals (default is 0.95).
alternative Character string defining the alternative hypothesis, one of "two.sided", "less" or "greater".
rounds Number of rounds for the numeric values of the output. By default it is rounds=3.
correlation A logical whether the estimated correlation matrix and covariance matrix should be printed.
asy.method Character string defining the asymptotic approximation method, one of "logit", for using the logit transformation function, "probit", for using the probit transformation function, "normal", for using the multivariate normal distribution or "mult.t" for using a multivariate t-distribution with a Satterthwaite Approximation.
plot.simci A logical indicating whether you want a plot of the confidence intervals.
info A logical whether you want a brief overview with informations about the output.
contrast.matrix User defined contrast matrix.
weight.matrix A logical indicating whether the weight matrix should be printed.

Value

Data.Info List of samples and sample sizes.
Contrast Contrast matrix.
Analysis


input

List of input by user.

Note

If the samples are completely separated the variance estimators are Zero by construction. In these cases the Null-estimators are replaced by 0.001. Estimated relative effects with 0 or 1 are replaced with 0.001, 0.999 respectively.

A summary and a graph can be created separately by using the functions `summary.nparcomp` and `plot.nparcomp`.

For the analysis, the R packages 'multcomp' and 'mvtnorm' are required.

Author(s)

Frank Konietschke

References


See Also

For two-sample comparisons based on relative effects, see `npar.t.test`.

Examples

```r
## Not run:
data(liver)

# Williams Contrast

a<-nparcomp(weight ~dosage, data=liver, asy.method = "probit",
           type = "Williams", alternative = "two.sided",
           plot.simci = TRUE, info = FALSE, correlation=TRUE)
summary(a)

# Dunnett dose 3 is baseline

c<-nparcomp(weight ~dosage, data=liver, asy.method = "probit",
           type = "Dunnett", control = "3",
```
alternative = "two.sided", info = FALSE)
summary(c)
plot(c)

data(colu)

# Tukey comparison- one sided(lower)
a<-nparcomp(corpora~ dose, data=colu, asy.method = "mult.t",
type = "Tukey",alternative = "less",
plot.simci = TRUE, info = FALSE)
summary(a)

# Tukey comparison- one sided(greater)
b<-nparcomp(corpora~ dose, data=colu, asy.method = "mult.t",
type = "Tukey",alternative = "greater",
plot.simci = TRUE, info = FALSE)
summary(b)

### End(Not run)

---

**panic**  

*Clinical Global Impression (CGI) Scores*

**Description**

Scores for the clinical global impression (CGI) measured on an ordinal scale (ranging from 2 to 8) during eight weeks for 16 patients with panic disorder attacks in a psychiatric clinical trial.

**Usage**

```r
data(panic)
```

**Format**

A data frame with 80 observations on the following 2 variables.

- **CGI**: A numeric vector containing the CGI score.
- **week**: A numeric vector indicating the week (0,2,4,6,8) of measurement.

**Details**

Note that the first observation in each week corresponds to the first patient, the second one to the second patient, and so on. There are 5 repeated measures per patient.
Source


Examples

```r
## Not run:
data(panic)
boxplot(cgi~week,data=panic)

## End(Not run)
```

---

**PGI**

*Patient Rated Global Impression (PGI) Scores*

Description

Scores for the patient rated global impression (PGI) measured on an ordinal scale (ranging from 1 to 6) being observed at baseline and after 4 weeks of treatment. The lower the score, the better the clinical impression.

Usage

```r
data(PGI)
```

Format

A data frame with 30 observations on the following 3 variables.

- **patient** A numeric vector indicating the patients.
- **timepoint** A numeric vector indicating the week (0,2,4,6,8) of measurement.
- **PGIscore** A numeric vector containing the PGI score.

Source


Examples

```r
## Not run:
data(PGI)
boxplot(PGIscore~timepoint,data=PGI)

## End(Not run)
```
plot.mctp

Visualizing the result of \texttt{mctp}

\textbf{Description}

This function takes an object of class "mctp" and creates a plot of the confidence intervals for the estimated effects.

\textbf{Usage}

\begin{verbatim}
## S3 method for class 'mctp'
plot(x,...)
\end{verbatim}

\textbf{Arguments}

\begin{itemize}
\item \textbf{x} 
\hspace*{1em} An object of class "mctp", i.e. the result when applying \texttt{mctp} to a dataset. Otherwise an error will occur.
\item \textbf{...} 
\hspace*{1em} Arguments to be passed to methods.
\end{itemize}

\textbf{Details}

It is not possible to change any parameter set in the \texttt{mctp}-statement.

Since plot.mctp is a S3 method it suffices to use plot(x) as long as x is of class "mctp". It will be interpreted as plot.mctp(x).

\textbf{Value}

plot.mctp returns a graph that contains a confidence interval for the estimated effect of each contrast. It just visualizes the result of the \texttt{mctp}-statement.

\textbf{Note}

It is possible to create a graphical result of the multiple comparison test procedure directly by setting plot.simci=TRUE in the \texttt{mctp}-statement.

To get a complete result summary of \texttt{mctp} the function \texttt{summary.mctp} can be used.

\textbf{Author(s)}

Frank Konietschke, Kimihiro Noguchi

\textbf{References}


\textbf{See Also}

For further information on the usage of mctp, see \texttt{mctp}. 
**Examples**

```r
data(liver)
a <- mctp(weight ~ dosage, data=liver, asy.method = "fisher",
         type = "Dunnett", alternative = "two.sided", plot.simci = FALSE,
         info = FALSE)
plot(a)
```

---

**Description**

This function takes an object of class "mctp.rm" and creates a plot of the confidence intervals for the estimated effects.

**Usage**

```r
## S3 method for class 'mctp.rm'
plot(x, ...)
```

**Arguments**

- `x`  
  An object of class "mctp.rm", i.e. the result when applying `mctp.rm` to a dataset. Otherwise an error will occur.
- `...`  
  Arguments to be passed to methods.

**Details**

It is not possible to change any parameter set in the `mctp.rm`-statement.

Since `plot.mctp.rm` is a S3 method it suffices to use `plot(x)` as long as `x` is of class "mctp.rm". It will be interpreted as `plot.mctp.rm(x)`.

**Value**

`plot.mctp.rm` returns a graph that contains a confidence interval for the estimated effect of each contrast. It just visualizes the result of the `mctp.rm`-statement.

**Note**

It is possible to create a graphical result of the multiple comparison test procedure directly by setting `plot.simci=TRUE` in the `mctp.rm`-statement.

To get a complete result summary of `mctp.rm` the function `summary.mctp.rm` can be used.

**Author(s)**

Marius Placzek, Kimihiro Noguchi
plot.nparcomp

References

See Also
For further information on the usage of mctp.rm, see mctp.rm.

Examples
## Not run:
data(panic)
a<-mctp.rm(CGI~week, data=panic, type = "Dunnett",
            alternative = "two.sided",
            asy.method = "fisher", contrast.matrix = NULL)
plot(a)
## End(Not run)

plot.nparcomp Visualizing the result of nparcomp

Description
This function takes an object of class "nparcomp" and creates a plot of the confidence intervals for the estimated nonparametric contrast effects.

Usage
## S3 method for class 'nparcomp'
plot(x,...)

Arguments
x An object of class "nparcomp", i.e. the result when applying nparcomp to a dataset. Otherwise an error will occur.
... Arguments to be passed to methods.

Details
It is not possible to change any parameter set in the nparcomp-statement.
Since plot.nparcomp is a S3 method it suffices to use plot(x) as long as x is of class "nparcomp". It will be interpreted as plot.nparcomp(x).
Value
plot.nparcomp returns a graph that contains a confidence interval for the estimated nonparametric contrast effect of each contrast. It just visualizes the result of the `nparcomp`-statement.

Note
It is possible to create a graphical result directly by setting `plot.simci=TRUE` in the `nparcomp`-statement.

Author(s)
Frank Konietschke

References

See Also
For further information on the usage of nparcomp, see `nparcomp`.

Examples
```r
## Not run:
data(liver)
a <- nparcomp(weight ~ dosage, data=liver, asy.method = "probit",
              type = "Williams", alternative = "two.sided",
              plot.simci = FALSE, info = FALSE)
plot(a)
## End(Not run)
```
Arguments

x  x An object of class "nparttest", i.e. the result when applying \texttt{npar.t.test} to a dataset. Otherwise an error will occur.

...  ... Arguments to be passed to methods.

Details

It is not possible to change any parameter set in the \texttt{npar.t.test}-statement.

Since \texttt{plot.nparttest} is a S3 method it suffices to use \texttt{plot(x)} as long as \texttt{x} is of class "nparttest". It will be interpreted as \texttt{plot.nparttest(x)}.

Value

\texttt{plot.npar.t.test} returns a graph that contains a confidence interval for the estimated effect of the nonparametric t-test. It just visualizes the result of the \texttt{npar.t.test}-statement.

Note

It is possible to create a graphical result of the nonparametric t-test directly by setting \texttt{plot.simci=TRUE} in the \texttt{npar.t.test}-statement.

Author(s)

Frank Konietschke

References


See Also

For further information on the usage of npar.t.test, see \texttt{npar.t.test}.

Examples

```r
## Not run:
data(impla)
a<-npar.t.test(impla~group, data = impla, method = "t.app",
               alternative = "two.sided", plot.simci=FALSE)
plot(a)

## End(Not run)
```
Description

This function takes an object of class "nparttestpaired" and creates a plot of the confidence intervals for the estimated effect resulting from the studentized permutation test and the Brunner-Munzel test.

Usage

## S3 method for class 'nparttestpaired'
plot(x,...)

Arguments

- **x**: An object of class "nparttestpaired", i.e. the result when applying `npar_t.test.paired` to a dataset. Otherwise an error will occur.
- **...**: Arguments to be passed to methods.

Details

It is not possible to change any parameter set in the `npar_t.test.paired`-statement.

Since plot.nparttestpaired is a S3 method it suffices to use `plot(x)` as long as `x` is of class "nparttestpaired". It will be interpreted as `plot.nparttestpaired(x)`.

Value

`plot.npar.t.test` returns a graph that contains a confidence interval for the estimated effect of the nonparametric studentized permutation test as well as. It just visualizes the result of the `npar_t.test.paired`-statement.

Note

It is possible to create a graphical result of the nonparametric studentized permutation test directly by setting `plot.simci=TRUE` in the `npar_t.test.paired`-statement.

Author(s)

Frank Konietschke

References

reaction

See Also

For further information on the usage of npar.t.test.paired, see npar.t.test.paired.

Examples

```R
## Not run:
data(PGI)
a <- npar.t.test.paired(PGIscore~timepoint, data = PGI,
                        alternative = "two.sided", info=TRUE, plot.simci=FALSE)
plot(a)
## End(Not run)
```

---

<table>
<thead>
<tr>
<th>reaction</th>
<th>Reaction times of mice [sec]</th>
</tr>
</thead>
</table>

Description

Data from a toxicity trial with 40 mice.

Usage

data(reaction)

Format

A data frame with 40 observations on the following 2 variables.

Group  A numeric vector indicating the group.
Time  A numeric vector containing the reaction times.

Details

The objective is to test if the active treatment influences the reaction time of the mice.

Source


References

Examples

```r
## Not run:
library(nparcomp)
data(reaction)
boxplot(Time~Group,data=reaction)
## End(Not run)
```

### summary.mctp

**Description**

The function `summary.mctp` produces a result summary of `mctp`. It can only be applied to objects of class "mctp".

**Usage**

```r
## S3 method for class 'mctp'
summary(object,...)
```

**Arguments**

- `object` An object of class "mctp", i.e. the result when applying `mctp` to a dataset. Otherwise an error will occur.
- `...` Arguments to be passed to methods.

**Details**

Since `summary.mctp` is a S3 method it suffices to use `summary(x)` as long as `x` is of class "mctp". It will be interpreted as `summary.mctp(x)`.

**Value**

The function produces a summary of the result of `mctp` starting with some global information: alternative hypothesis, estimation method, type of contrast, confidence level. This is followed by:

- Data.Info List of samples and sample sizes and estimated effect per group.
- Contrast Contrast matrix.

**Note**

It is possible to create a graphical result of the multiple comparison test procedure by using the function `plot.mctp`.

### Examples

```r
## Not run:
library(nparcomp)
data(reaction)
boxplot(Time~Group,data=reaction)
## End(Not run)
```
Author(s)
Frank Konietschke

References

See Also
For further information on the usage of mctp, see mctp.

Examples
## Not run:
data(liver)
a<-mctp(weight ~dosage, data=liver, asy.method = "fisher",
  type = "Dunnett", alternative = "two.sided", plot.simci = FALSE,
  info = FALSE)
summary(a)
## End(Not run)

________________________________________________________________________
summary.mctp.rm   Summary of mctp.rm

Description
The function summary.mctp.rm produces a result summary of mctp.rm. It can only be applied to objects of class "mctp.rm".

Usage
## S3 method for class 'mctp.rm'
summary(object,...)

Arguments
object An object of class "mctp.rm", i.e. the result when applying mctp.rm to a dataset. Otherwise an error will occur.
... Arguments to be passed to methods.

Details
Since summary.mctp.rm is a S3 method it suffices to use summary(x) as long as x is of class "mctp.rm". It will be interpreted as summary.mctp.rm(x).
**Value**

The function produces a summary of the result of `mctp.rm` starting with some global information: alternative hypothesis, estimation method, type of contrast, confidence level. This is followed by:

- **Data.Info**: List of samples and sample sizes and estimated effect per group.
- **Contrast**: Contrast matrix.

**Note**

It is possible to create a graphical result of the multiple comparison test procedure by using the function `plot.mctp.rm`.

**Author(s)**

Marius Placzek

**References**


**See Also**

For further information on the usage of mctp.rm, see `mctp.rm`.

**Examples**

```r
## Not run: 
data(panic)
a <- mctp.rm(CGI~week, data=panic, type = "Dunnett", alternative = "two.sided", asy.method = "fisher", contrast.matrix = NULL) summary(a) 
## End(Not run)
```
**summary.nparcomp**

**Summary of nparcomp**

**Description**

The function summary.nparcomp produces a result summary of `nparcomp`. It can only be applied to objects of class "nparcomp".

**Usage**

```r
## S3 method for class 'nparcomp'
summary(object,...)
```

**Arguments**

- `object` An object of class "nparcomp", i.e. the result when applying `nparcomp` to a dataset. Otherwise an error will occur.
- `...` Arguments to be passed to methods.

**Details**

Since `summary.nparcomp` is a S3 method it suffices to use `summary(x)` as long as `x` is of class "nparcomp". It will be interpreted as `summary.nparcomp(x)`.

**Value**

The function produces a summary of the result of `nparcomp` starting with some global information: alternative hypothesis, estimation method, type of contrast, confidence level, method, interpretation. This is followed by:

- **Data.Info** List of samples and sample sizes.
- **Contrast** Contrast matrix.
- **Analysis** Comparison: relative contrast effect, relative.effect: estimated relative contrast effect, Estimator: Estimated relative contrast effect, Lower: Lower limit of the simultaneous confidence interval, Upper: Upper limit of the simultaneous confidence interval, Statistic: Teststatistic p.Value: Adjusted p-values for the hypothesis by the chosen approximation method.
- **Overall** Overall p-value and critical value.

**Note**

It is possible to create a graphical result of the nonparametric test procedure `nparcomp` by using the function `plot.nparcomp`.

**Author(s)**

Frank Konietschke
References


See Also

For further information on the usage of nparcomp, see nparcomp.

Examples

```r
## Not run:
data(liver)
a <- nparcomp(weight ~ dosage, data = liver, asy.method = "probit", type = "Williams", alternative = "two.sided", plot.simci = FALSE, info = FALSE)
summary(a)
## End(Not run)
```

summary.nparttest  Summary of npar.t.test

Description

The function summary.npar.t.test produces a result summary of npar.t.test. It can only be applied to objects of class "nparttest".

Usage

```r
## S3 method for class 'nparttest'
summary(object,...)
```

Arguments

- `object`  An object of class "npartest", i.e. the result when applying npar.t.test to a dataset. Otherwise an error will occur.
- `...`  Arguments to be passed to methods.

Details

Since summary.nparttest is a S3 method it suffices to use summary(x) as long as x is of class "npartest". It will be interpreted as summary.nparttest(x).
Value

The function produces a summary of the result of `npar.t.test` starting with some global information: alternative hypothesis, confidence level, interpretation. This is followed by:

**Info**

List of samples and sample sizes.

**Analysis**

Effect: relative effect \(p(a,b)\) of the two samples 'a' and 'b', Estimator: estimated relative effect, Lower: Lower limit of the confidence interval, Upper: Upper limit of the confidence interval, \(T\): test statistic, \(p.Value\): p-value for the hypothesis by the chosen approximation method.

**Permutation_Test**

Result of the studentized permutation test.

Note

You can create a graphical result of the nonparametric t-test by using the function `plot.nparttest`.

Author(s)

Frank Konietschke

References


See Also

For further information on the usage of `npar.t.test`, see `npar.t.test`.

Examples

```r
## Not run:
data(impla)
a <- npar.t.test(impla ~ group, data = impla, method = "t.app",
              alternative = "two.sided",
              plot.simci = FALSE, info = FALSE)
summary(a)

## End(Not run)
```
Summary of \texttt{npar.t.test}

### Description

The function \texttt{summary.nparttestpaired} produces a result summary of \texttt{npar.t.test.paired}. It can only be applied to objects of class "nparttestpaired".

### Usage

```r
## S3 method for class 'nparttestpaired'
summary(object,...)
```

### Arguments

- `object`: An object of class "nparttestpaired", i.e. the result when applying \texttt{npar.t.test.paired} to a dataset. Otherwise an error will occur.
- `...`: Arguments to be passed to methods.

### Details

Since \texttt{summary.nparttestpaired} is a S3 method it suffices to use \texttt{summary(x)} as long as \texttt{x} is of class "nparttestpaired". It will be interpreted as \texttt{summary.nparttestpaired(x)}.

### Value

The function produces a summary of the result of \texttt{npar.t.test.paired} starting with some global information: alternative hypothesis, confidence level, interpretation. This is followed by:

- **Info**: List of samples and sample sizes.
- **Analysis**: Effect: relative effect \( p(a,b) \) of the two samples 'a' and 'b', \( p.hat \): estimated relative effect, Lower: Lower limit of the confidence interval, Upper: Upper limit of the confidence interval, T: teststatistic, p.value: p-value for the hypothesis by the choosen approximation method.

### Note

You can create a graphical result of the nonparametric paired t-test by using the function \texttt{plot.nparttestpaired}.

### Author(s)

Frank Konietschke
References


See Also

For further information on the usage of npar.t.test.paired, see npar.t.test.paired.

Examples

```r
## Not run:
data(PGI)
a<-npar.t.test.paired(PGIscore~timepoint, data = PGI,
alternative = "two.sided", info=FALSE, plot.simci=FALSE)
summary(a)

## End(Not run)
```
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