Package 'nparcomp'

January 2, 2012

Type Package

Title nparcomp-package

Version 1.0-1

Date 2011-02-17

Author Frank Konietschke

Maintainer Frank Konietschke <fkoniet@gwdg.de>

Depends multcomp, mvtnorm

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.

License GPL

Repository CRAN

Date/Publication 2011-02-18 17:29:54

R topics documented:

nparcomp-package 2
colu 4
impla 5
liver 5
npar.t.test 6
nparcomp 8
weight.matrix 11

Index 13

nparcomp-package	*Nparcomp: Nonparametric relative contrast effects. With this package it is possible to compute nonparametric relative contrast effects and simultaneous confidence intervals for the effects.*

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.

Details

Package:	nparcomp
Type:	Package
Version:	1.0-1
Date:	2011-02-17
License:	GPL

Author(s)

Frank Konietschke

Maintainer: Frank Konietschke <fkoniet@gwdg.de>

References

Konietschke, F., Brunner, E., Hothorn, L.A. (2008). Nonparametric Relative Contrast Effects: Asymptotic Theory and Small Sample Approximations, Konietschke, F., Brunner, E., Hothorn, L.A. (2008). Simultaneous Confidence Intervals for Relative Effects in Dunnett Comparsisons, Munzel. U., Hothorn, L.A. (2001). A unified Approach to Simultaneous Rank Tests Procedures in the Unbalanced One-way Layout. Biometric Journal, 43, 553-569.

Examples

```
# two sample comparisons: Nonparametric Behrens-Fisher Problem
```

```
data(impla)
npar.t.test(impla~group, data = impla,
 asy.method = "t.app", p.perm = TRUE, alternative = "two.sided")

npar.t.test(impla~group, data = impla,
 asy.method = "logit", p.perm = TRUE, alternative = "two.sided")

   # no permutation test

npar.t.test(impla~group, data = impla,
 asy.method = "t.app", p.perm = FALSE, alternative = "two.sided")

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


data(liver)

 # Williams Contrast

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

 # Dunnett Contrast

nparcomp(weight ~dosage, data=liver, asy.method = "probit",
 type = "Dunnett", alternative = "two.sided",
 plot.simci = TRUE, info = TRUE)

 # Dunnett dose 3 is baseline

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



data(colu)


## Not run:

  # Tukey comparison - one sided(lower)

nparcomp(corpora ~dose, data=colu, asy.method = "mult.t",
 type = "Tukey",alternative = "lower", plot.simci = TRUE, info = TRUE)


  # Tukey comparison- one sided(greater)

nparcomp(corpora ~dose, data=colu, asy.method = "mult.t",
 type = "Tukey",alternative = "greater", plot.simci = TRUE, info = TRUE)
```

```
  # Tukey comparison- one sided(lower)

nparcomp(corpora ~dose, data=colu, asy.method = "mult.t",
 type = "Tukey",alternative = "lower", plot.simci = TRUE, info = TRUE)


## End(Not run)

  # Marcus comparison- one sided(greater)

nparcomp(corpora ~dose, data=colu, asy.method = "logit",
 type = "Marcus",alternative = "greater", plot.simci = TRUE, info = TRUE)
```

---

colu *Numbers of corpora lutea*

Description

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

Usage

```
data(colu)
```

Format

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

Details

The objective is to test if the active treatment influence the fertiliy of the rats

Source

Brunner, E., Munzel, U. (2002): Nichtparametrische Datenanalyse - Unverbundene Stichproben. Statistik und ihre Anwendungen, Springer, Berlin Heidelberg New York

Examples

```
library(nparcomp)
data(colu)
boxplot(corpora~dose,data=colu)
```

impla *Numbers of implantations*

Description

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)
```

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 influence the fertiliy of the rats

Source

Brunner, E., Munzel, U. (2002): Nichtparametrische Datenanalyse - Unverbundene Stichproben. Statistik und ihre Anwendungen, Springer, Berlin Heidelberg New York

Examples

```
library(nparcomp)
data(impla)
boxplot(impla~group,data=impla)
```

liver *Relative liver weights*

Description

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

Usage

```
data(liver)
```

Format

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

`dosage` a numeric vector

`weight` a numeric vector

Details

The objective is to test if the active treatment influence the liver weight of the rats.

Source

Brunner, E., Munzel, U. (2002): Nichtparametrische Datenanalyse - Unverbundene Stichproben. Statistik und ihre Anwendungen, Springer, Berlin Heidelberg New York

Examples

```
data(liver)
boxplot(weight~dosage,data=liver)
```

---

npar.t.test *The nonparametric Behrens-Fisher problem - confidence interval for a relative effect of two groups*

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 is plotted.

Usage

```
npar.t.test(formula, data, conflevel = 0.05,
 alternative = c("two.sided", "lower", "greater"), rounds = 3,
 asy.method = c("logit", "probit", "normal", "t.app"),
 p.permu = TRUE, plot.simci = TRUE, info = TRUE)
```

Arguments

formula	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	data A dataframe containing the variables specified in formula
conflevel	conflevel The confidence level for the 1 - conflevel confidence intervals. By default it is 0.05
alternative	alternative character string defining the alternative hypothesis, one of "two.sided", "lower" or "greater"
rounds	Number of rounds for the numeric values of the output. By default it is rounds=3
asy.method	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 standard normal distribution or "t.app" for using a t-Distribution with a Satterthwaite Approximation
p.permu	p.permu A logical indicating whether you want to get the p-value of a studentized permutation test
plot.simci	plot.simci A logical indicating whether you want a plot of the confidence interval
info	info A logical whether you want a brief overview with informations about the output

Value

Data.Info	List of samples and sample sizes
relative.effects	Comparison: relative effect p(a,b) of the two samples 'a' and 'b', relative.effect: estimated relative effect, confidence.interval: confidence interval for relative effect, t.value: teststatistic p.value: p-value for the hypothesis by the choosen approximation method, p.perm : p-value of the permutation test
Wilcoxon.Test	Comparison: relative effect p(a,b) of the samples 'a' and 'b', rel.effect: estimated relative effect, p.value: p-Value of an asymptotic Wilcoxon test

Note

If the samples are completely seperated the variance estimator are Zero by construction. In these cases the Null-estimator 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.

Author(s)

Frank Konietschke

References

Brunner, E., Munzel, U. (2000). The Nonparametric Behrens-Fisher Problem: Asymptotic Theory and a Small Sample Approximation. Biometrical Journal 42, 17 -25. Neubert, K., Brunner, E., (2006). A Studentized Permutation Test for the Nonparametric Behrens-Fisher Problem. Computational Statistics and Data Analysis.

See Also

For multiple comparison procedures based on relative effects, see nparcomp

Examples

```
data(impla)
npar.t.test(impla~group, data = impla, asy.method = "t.app",
 p.perm = TRUE, alternative = "two.sided")
```

---

nparcomp *Nonparametric relative contrast effects: Simultaneous confidence intervals and p-values*

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". 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 are plotted.

Usage

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

Arguments

formula	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	data A dataframe containing the variables specified in formula

`type` type Character string defining the type of contrast. It should be one of "Tukey", "Dunnett", "Sequen", "Williams", "Changepoint", "AVE", "McDermott", "Marcus", "UmbrellaWilliams"

`control` control Character string defining the control group in Dunnett comparisons. By default it is the first group by lexicographical ordering

`conflevel` conflevel The confidence level for the 1 - conflevel confidence intervals. By default it is 0.05

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

`rounds` Number of rounds for the numeric values of the output. By default it is rounds=3

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

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

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

`contrast.matrix` optional, a user defined contrast matrix, ignored if...

Value

`weight.matrix` The weight matrix for the choosen nonparametric relative contrast effect

`Data.Info` List of samples and sample sizes

`relative.effects` Comparison: relative contrast effect , relative.effect: estimated relative contrast effect, confidence.interval: simultaneous confidence interval for relative contrast effect, t.value: teststatistic p.value: simultaneous p-values for the hypothesis by the choosen approximation method

Note

If the samples are completely seperated the variance estimators are Zero by construction. In these cases the Null-estimator are replaced by 0.001. Estimated relative effects with 0 or 1 are replaced with 0.001, 0.999 respectively. For the analysis, the R packages 'multcomp' and 'mvtnorm' are required.

Author(s)

Frank Konietschke

References

Konietschke, F., Brunner, E., Hothorn, L.A. (2008). Nonparametric Relative Contrast Effects: Asymptotic Theory and Small Sample Approximations, Konietschke, F., Brunner, E., Hothorn, L.A. (2008). Simultaneous Confidence Intervals for Relative Effects in Dunnett Comparisons, Munzel. U., Hothorn, L.A. (2001). A unified Approach to Simultaneous Rank Tests Procedures in the Unbalanced One-way Layout. Biometric Journal, 43, 553-569.

See Also

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

Examples

```
data(liver)

  # Williams Contrast

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

 # Dunnett Contrast

nparcomp(weight ~dosage, data=liver, asy.method = "probit",
 type = "Dunnett", alternative = "two.sided", plot.simci = TRUE, info = TRUE)

 # Dunnett dose 3 is baseline

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


data(colu)


## Not run:

 # Tukey comparison- one sided(lower)

nparcomp(corpora ~dose, data=colu, asy.method = "mult.t",
 type = "Tukey",alternative = "lower", plot.simci = TRUE, info = TRUE)

 # Tukey comparison- one sided(greater)

nparcomp(corpora ~dose, data=colu, asy.method = "mult.t",
 type = "Tukey",alternative = "greater", plot.simci = TRUE, info = TRUE)

  # Tukey comparison- one sided(lower)

nparcomp(corpora ~dose, data=colu, asy.method = "mult.t",
 type = "Tukey",alternative = "lower", plot.simci = TRUE, info = TRUE)
```

```
## End(Not run)


 # Marcus comparison- one sided(greater)

nparcomp(corpora ~dose, data=colu, asy.method = "logit",
 type = "Marcus",alternative = "greater", plot.simci = TRUE, info = TRUE)
```

`weight.matrix` *Nonparametric relative contrast effects: the weight matrix*

Description

The function weight.matrix computes the weight matrix for a given contrast with which the estimator for the relative contrast effect is comupted

Usage

```
weight.matrix(n, type = c("UserDefined", "Tukey", "AVE",
 "Dunnett", "Sequen", "Changepoint", "Marcus", "McDermott",
 "Williams", "UmbrellaWilliams"), base = 1, contrast.matrix = NULL)
```

Arguments

`n`	`n` vector of sample sizes
`type`	`type` Character string defining the type of contrast. It should be one of "Tukey", "Dunnett", "Sequen", "Williams", "Changepoint", "AVE", "McDermott", "Marcus"
`base`	`base` Number of the basline values in Dunnett Comparisons. By default it is base = 1
`contrast.matrix`	optional, a user-defined `contrast.matrix` ...

Details

The function needs the R-function 'contrMat' from the R-package 'multcomp'.

Value

The function returns the weight matrix which can be used to compute the estimator of the relative contrast effect

Note

For the analysis, the R-package 'multcomp' is required.

Author(s)

Frank Konietschke

References

Konietschke, F., Brunner, E., Hothorn, L.A. (2008). Nonparametric Relative Contrast Effects: Asymptotic Theory and Small Sample Approximations, Konietschke, F., Brunner, E., Hothorn, L.A. (2008). Simultaneous Confidence Intervals for Relative Effects in Dunnett Comparsisons.

See Also

`contrMat` in package **multcomp** for contrast matrices

Examples

```
n<-c(10,20,30,40)
weight.matrix(n, "Tukey") # result: identity matrix by construction
weight.matrix(n, "Dunnett", base = 3) # Weight matrix for Dunnett comparison - 3rd group is baseline
weight.matrix(n, "Changepoint") # weight matrix for relative changepoint  effect

# For comparison, see the contrasts matrices
# available in the multcomp package:

library(multcomp)
n<-c(10,10,20,30,40)
contrMat(n, "Changepoint") # Contrast matrix for Changepoint comparisons
```

Index

∗Topic **datasets**
colu, 4
impla, 5
liver, 5
∗Topic **htest**
npar.t.test, 6
nparcomp, 8
nparcomp-package, 2
weight.matrix, 11
∗Topic **package**
nparcomp-package, 2

colu, 4

impla, 5

liver, 5

npar.t.test, 6, *10*
nparcomp, 8, *8*
nparcomp-package, 2

weight.matrix, 11