Package 'diffdepprop'

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Type Package

Title Calculates Confidence Intervals for two Dependent Proportions

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Description The package includes functions to calculate confidence intervals for the difference of dependent proportions. There are two functions implemented to edit the data (dichotomising with the help of cutpoints, counting accordance and discordance of two tests or situations). For the calculation of the confidence intervals entries of the fourfold table are needed.

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`diffdepprop-package` *Calculates Confidence Intervals for two Dependent Proportions*

Description

The package includes functions to calculate confidence intervals for the difference of dependent proportions. There are two functions implemented to edit the data (dichotomising with the help of cutpoints, counting accordance and discordance of two tests or situations). For the calculation of the confidence intervals entries of the fourfold table are needed.

Details

Package:	diffdepprop
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Author(s)

Daniela Wenzel, Antonia Zapf

Maintainer: Daniela Wenzel <dani-wenzel@gmx.net>

References

Newcombe, R.G. (1998). Improved confidence intervals for the difference between binomial proportions based on paired data. Statistics in Medicine 17. 2635-2650.

Clopper, C. and Pearson, E.S. (1934). The use of confidence or fiducial limits illustrated in the case of the binomial. Biometrika 26, 404-413.

Vollset, S.E. (1993). Confidence intervals for a binomial proportion. Statistics in Medicine 12. 809-824.

Lange, K. and Brunner, E. (2012). Sensitivity, Specificity and ROC-curves in multiple reader diagnostic trials-A unified, nonparametric approach. Statistical Methodology 9, 490-500.

Fleiss, Joseph L. et al. (2003). Statistical Methods for Rates and Proportions. Wiley.

See Also

PropCIs

Examples

```
# a=10, b=15, c=5, d=20, n=50, type I error is 0.05
wilson = wilson(10,15,5,20,50,0.05)
# b=15, c=5, n=50, type I error is 0.05
exact.cond = exact.cond(15, 5, 50, 0.05)
```

`count.fourfold` *Counts the numbers of discordance and concordance of two tests*

Description

In the case two dependent tests shall be compared a fourfold table is mostly needed. count.fourfold counts the numbers of concordance and discordance of both tests.

Usage

```
count.fourfold(data, col.test1, col.test2)
```

Arguments

`data`	name of the data
`col.test1`	number of column representing the first test
`col.test2`	number of column representing the second test

Value

A vector containing the four entries of the fourfold table, row wise listed

Author(s)

Daniela Wenzel, Antonia Zapf

Examples

```
# create a data set with zero and ones for each of both tests
v1=c(rep(1,10),rep(0,4),rep(1,8),rep(0,8))
v2=c(rep(0,10),rep(1,5),rep(0,5),rep(1,10))
n=c(seq(1,30,1))
new=cbind(n,v1,v2)
# count the number of concordance and discordance
count.fourfold(new,1,2)
```

`data.cp` *Creates binary data of a given data set*

Description

Binary data are sometimes needed to analyse these data. Data of two situation (e.g. diagnostic tests) with continous outcome are assumed to be given. With the help of the cutpoint for each test, these data can be dichotomise.

Usage

```
data.cp(dat, col.test1, col.test2, cp.test1, cp.test2)
```

Arguments

`dat`	name of the data set you want to be dichotomise
`col.test1`	number of the column of the first test in the data set, which shall be dichotomised
`col.test2`	number of the column of the second test in the data set, which shall be dichotomised
`cp.test1`	cutpoint for the first test
`cp.test2`	cutpoint for the second test

Value

A matrix containing the two tests with binary data

Author(s)

Daniela Wenzel, Antonia Zapf

Examples

```
# create a data set
v1=c(seq(1,10,0.5))
v2=c(seq(2,11,0.5))
n=c(seq(1,19,1))
new=cbind(n,v1,v2)
# cutpoint of the first test is 1.6, of the second test 2.3
result=data.cp(new,2,3,1.6,2.3)
```

`diffpci` *Calculates various confidence intervals for the difference of two dependent proportions*

Description

This function gives 12 different two-sided confidence intervals. Data are assumed to be of a fourfold table, which contains the numbers of concordance and the numbers of discordance of two dependent methods. The following intervals are listed: Wald, Wald with continuity correction, Agresti, Tango, Exact (Clopper Pearson and mid-p), Profile Likelihood, Wilson (without and with continuity corrections) and nonparametric approaches using rank methods (with normal and t-approximation).

Usage

```
diffpci(a, b, c, d, n, alpha)
```

Arguments

`a`	first number of concordant paires as described above
`b`	first number of discordant paires as described above
`c`	second number of discordant paires as described above
`d`	second number of concordant paires as described above
`n`	number of observed objects
`alpha`	type I error; between zero and one

Details

Details are given for each function separately.

Value

A matrix containing the method, the difference estimator and the corresponding confidence limits.

Author(s)

Daniela Wenzel, Antonia Zapf

References

Newcombe, R.G. (1998). Improved confidence intervals for the difference between binomial proportions based on paired data. Statistics in Medicine 17. 2635-2650.

Clopper, C. and Pearson, E.S. (1934). The use of confidence or fiducial limits illustrated in the case of the binomial. Biometrika 26, 404-413.

Vollset, S.E. (1993). Confidence intervals for a binomial proportion. Statistics in Medicine 12. 809-824.

Lange, K. and Brunner, E. (2012). Sensitivity, Specificity and ROC-curves in multiple reader diagnostic trials-A unified, nonparametric approach. Statistical Methodology 9, 490-500.

Fleiss, Joseph L. et al. (2003). Statistical Methods for Rates and Proportions. Wiley.

Examples

```
# a=59, b=23, c=3, d=37, n=122, type I error is 0.05
diffpci(59,23,3,37,122,0.05)
```

`exact.cond` *Calculates an exact conditional confidence interval using a Clopper Pearson interval.*

Description

exact.cond gives a two-sided exact conditinal confidence interval for the difference of two dependent proportions. It is built of a Clopper Pearson Interval. Data are assumed to be of a fourfold table, which contains the numbers of concordance and the numbers of discordance of two dependent methods.

Usage

```
exact.cond(b, c, n, alpha)
```

Arguments

`b`	first number of discordant pairs in a fourfold table as described above
`c`	second number of discordant pairs in a fourfold table as described above
`n`	number of observed objects
`alpha`	type I error; between zero and one

Value

A list with class '"htest"' containing the following components:

`conf.int`	a confidence interval for the difference in proportions
`estimate`	estimated difference in proportions

Author(s)

Daniela Wenzel, Antonia Zapf

References

Clopper, C. and Pearson, E.S. (1934). The use of confidence or fiducial limits illustrated in the case of the binomial. Biometrika 26, 404-413.

Newcombe, R.G. (1998). Improved confidence intervals for the difference between binomial proportions based on paired data. Statistics in Medicine 17. 2635-2650.

Examples

```
# b=10, c=20, n=50, type I error is 0.05
conf.int=exact.cond(10,20,50,0.05)
```

`exact.midp` *Calculates an exact conditional confidence interval using a mid-p interval.*

Description

exact.midp gives a two-sided exact conditional confidence interval for the difference of two dependent proportions. It is built of a mid-p Interval. Data are assumed to be of a fourfold table, which contains the numbers of concordance and the numbers of discordance of two dependent methods.

Usage

```
exact.midp(b, c, n, alpha)
```

Arguments

`b`	first number of discordant pairs in a fourfold table as described above
`c`	second number of discordant pairs in a fourfold table as described above
`n`	number of observed objects
`alpha`	type I error; between zero and one

Value

A list with class '"htest"' containing the following components:

`conf.int`	a confidence interval for the difference in proportions
`estimate`	estimated difference in proportions

Author(s)

Daniela Wenzel, Antonia Zapf

References

Vollset, S.E. (1993). Confidence intervals for a binomial proportion. Statistics in Medicine 12. 809-824.

Newcombe, R.G. (1998). Improved confidence intervals for the difference between binomial proportions based on paired data. Statistics in Medicine 17. 2635-2650.

Examples

```
# b=10, c=20, n=50, type I error is 0.05
conf.int=exact.midp(10,20,50,0.05)
```

np.nv *Calculates a rank-based confidence interval*

Description

np.nv gives a two-sided rank-based confidence interval with normal approximation for the difference of two dependent proportions. Data are assumed to be of a fourfold table, which contains the numbers of concordance and the numbers of discordance of two dependent methods.

Usage

```
np.nv(a, b, c, d, n, alpha)
```

Arguments

a	first number of concordant paires as described above
b	first number of discordant paires as described above
c	second number of discordant paires as described above
d	second number of concordant paires as described above
n	number of observed objects
alpha	type I error; between zero and one

Details

The normal approximation is used for the critical value for the interval.

Value

A list with class '"htest"' containing the following components:

conf.int	a confidence interval for the difference in proportions
estimate	estimated difference in proportions

Author(s)

Daniela Wenzel, Antonia Zapf

References

Lange, K. and Brunner, E. (2012). Sensitivity, Specificity and ROC-curves in multiple reader diagnostic trials-A unified, nonparametric approach. Statistical Methodology 9, 490-500.

Examples

```
# a=10, b=15, c=5, d=20, n=50, type I error is 0.05
conf.int=np.nv(10,15,5,20,50,0.05)
```

np.t *Calculates a rank-based confidence interval*

Description

np.t gives a two-sided rank-based confidence interval with t- approximation for the difference of two dependent proportions. Data are assumed to be of a fourfold table, which contains the numbers of concordance and the numbers of discordance of two dependent methods.

Usage

```
np.t(a, b, c, d, n, alpha)
```

Arguments

a	first number of concordant paires as described above
b	first number of discordant paires as described above
c	second number of discordant paires as described above
d	second number of concordant paires as described above
n	number of observed objects
alpha	type I error; between zero and one

Details

The t-approximation is used for the critical value for the interval.

Value

A list with class '"htest"' containing the following components:

conf.int	a confidence interval for the difference in proportions
estimate	estimated difference in proportions

Author(s)

Daniela Wenzel, Antonia Zapf

References

Lange, K. and Brunner, E. (2012). Sensitivity, Specificity and ROC-curves in multiple reader diagnostic trials-A unified, nonparametric approach. Statistical Methodology 9, 490-500.

Examples

```
# a=10, b=15, c=5, d=20, n=50, type I error is 0.05
conf.int=np.t(10,15,5,20,50,0.05)
```

uncond *Calculates an unconditional true profile likelihood confidence interval.*

Description

uncond gives a two-sided true profile likelihood confidence interval for the difference of two dependent proportions. It is built by the solution of an inequality. Data are assumed to be of a fourfold table, which contains the number of concordance and the number of discordance of two dependent methods.

Usage

```
uncond(a, b, c, d, n, alpha)
```

Arguments

a	first number of concordant paires as described above
b	first number of discordant paires as described above
c	second number of discordant paires as described above
d	second number of concordant paires as described above
n	number of observed objects
alpha	type I error; between zero and one

Details

The true profile likelihood confidence interval has as lower limit the minimum of the solutions for the inequality of the maximum likelihood function and the quantile of the normal distribution. The upper limit is defined as the maximum solution of this inequality.

Value

A list with class '"htest"' containing the following components:

conf.int	a confidence interval for the difference in proportions
estimate	estimated difference in proportions

Author(s)

Daniela Wenzel, Antonia Zapf

References

Newcombe, R.G. (1998). Improved confidence intervals for the difference between binomial proportions based on paired data. Statistics in Medicine 17. 2635-2650.

Examples

```
# a=10, b=15, c=5, d=20, n=50, type I error is 0.05
conf.int=uncond(10,15,5,20,50,0.05)
```

`wald.cc` *Calculates a Wald confidence interval with continuity correction*

Description

wald.cc gives a two-sided Wald confidence interval with continuity correction for the difference of two dependent proportions. The continuity correction factor is $\frac{1}{n}$. Data are assumed to be of a fourfold table, which contains the numbers of concordance and the numbers of discordance of two dependent methods.

Usage

```
wald.cc(b, c, n, alpha)
```

Arguments

`b`	first number of discordant pairs in a fourfold table as described above
`c`	second number of discordant pairs in a fourfold table as described above
`n`	number of observed objects
`alpha`	type I error; between zero and one

Value

A list with class '"htest"' containing the following components:

`conf.int`	a confidence interval for the difference in proportions
`estimate`	estimated difference in proportions

Author(s)

Daniela Wenzel, Antonia Zapf

References

Fleiss, Joseph L. et al. (2003). Statistical Methods for Rates and Proportions. Wiley.

Examples

```
# b=10, c=20, n=50, type I error is 0.05
conf.int=wald.cc(10,20,50,0.05)
```

`wilson` *Calculates a Wilson confidence interval*

Description

wilson gives a two-sided Wilson confidence interval for the difference of two dependent proportions. There is no continuity correction performed. Data are assumed to be of a fourfold table, which contains the numbers of concordance and the numbers of discordance of two dependent methods.

Usage

```
wilson(a, b, c, d, n, alpha)
```

Arguments

`a`	first number of concordant paires as described above
`b`	first number of discordant paires as described above
`c`	second number of discordant paires as described above
`d`	second number of concordant paires as described above
`n`	number of observed objects
`alpha`	type I error; between zero and one

Value

A list with class '"htest"' containing the following components:

`conf.int`	a confidence interval for the difference in proportions
`estimate`	estimated difference in proportions

Author(s)

Daniela Wenzel, Antonia Zapf

References

Newcombe, R.G. (1998). Improved confidence intervals for the difference between binomial proportions based on paired data. Statistics in Medicine 17. 2635-2650.

Examples

```
# a=10, b=15, c=5, d=20, n=50, type I error is 0.05
conf.int=wilson(10,15,5,20,50,0.05)
```

`wilson.cc` *Calculates a Wilson confidence interval with continuity correction*

Description

wilson.cc gives a two-sided Wilson confidence interval with continuity correction for the difference of two dependent proportions. The continuity correction is performed to the score limits. Data are assumed to be of a fourfold table, which contains the numbers of concordance and the numbers of discordance of two dependent methods.

Usage

```
wilson.cc(a, b, c, d, n, alpha)
```

Arguments

`a`	first number of concordant paires as described above
`b`	first number of discordant paires as described above
`c`	second number of discordant paires as described above
`d`	second number of concordant paires as described above
`n`	number of observed objects
`alpha`	type I error; between zero and one

Value

A list with class '"htest"' containing the following components:

`conf.int`	a confidence interval for the difference in proportions
`estimate`	estimated difference in proportions

Author(s)

Daniela Wenzel, Antonia Zapf

References

Newcombe, R.G. (1998). Improved confidence intervals for the difference between binomial proportions based on paired data. Statistics in Medicine 17. 2635-2650.

Examples

```
# a=10, b=15, c=5, d=20, n=50, type I error is 0.05
conf.int=wilson.cc(10,15,5,20,50,0.05)
```

`wilson.phi` *Calculates a Wilson confidence interval with continuity correction*

Description

wilson.phi gives a two-sided Wilson confidence interval with continuity correction for the difference of two dependent proportions. Data are assumed to be of a fourfold table, which contains the numbers of concordance and the numbers of discordance of two dependent methods. The continuity correction is performed to the estimated phi which is calculated by the entries of the fourfold table.

Usage

```
wilson.phi(a, b, c, d, n, alpha)
```

Arguments

`a`	first number of concordant paires as described above
`b`	first number of discordant paires as described above
`c`	second number of discordant paires as described above
`d`	second number of concordant paires as described above
`n`	number of observed objects
`alpha`	type I error; between zero and one

Value

A list with class '"htest"' containing the following components:

`conf.int`	a confidence interval for the difference in proportions
`estimate`	estimated difference in proportions

Author(s)

Daniela Wenzel, Antonia Zapf

References

Newcombe, R.G. (1998). Improved confidence intervals for the difference between binomial proportions based on paired data. Statistics in Medicine 17. 2635-2650.

Examples

```
# a=10, b=15, c=5, d=20, n=50, type I error is 0.05
conf.int=wilson.phi(10,15,5,20,50,0.05)
```

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