Package 'PropCIs'

February 23, 2018

Type Package

Title Various Confidence Interval Methods for Proportions

Version 0.3-0

Date 2018-02-22

Author Ralph Scherer

Maintainer Ralph Scherer <shearer.ra76@gmail.com>

Description
Computes two-sample confidence intervals for single, paired and independent proportions.

License GPL

URL https://github.com/shearer/PropCIs

BugReports https://github.com/shearer/PropCIs/issues

LazyLoad yes

NeedsCompilation no

Repository CRAN

Date/Publication 2018-02-23 16:49:49 UTC

R topics documented:

`PropCIs-package` *Confidence intervals for single, paired and independent proportions*

Description

Computes confidence intervals for single proportions as well as for differences in dependent and independent proportions, the odds-ratio and the relative risk in a 2x2 table. Intervals are available for independent samples and matched pairs. The functions are partly written by assistants of Alan Agresti, see website `http://www.stat.ufl.edu/~aa/cda/cda.html`.

Details

Package:	PropCIs
Type:	Package
Version:	0.3-0
Date:	2018-02-22
License:	GPL=2
LazyLoad:	yes

Author(s)

Ralph Scherer

Maintainer: Ralph Scherer <shearer.ra76@gmail.com>

References

Agresti, A., Coull, B. (1998) Approximate is better than exact for interval estimation of binomial proportions. *The American Statistician* 52, 119–126.

Agresti, A., Caffo, B.(2000) Simple and effective confidence intervals for proportions and difference of proportions result from adding two successes and two failures. *The American Statistician* 54 (4), 280–288.

Agresti, A. (2002) Categorical Data Analysis. Wiley, 2nd Edition.

Agresti, A. and Min, Y. (2005) Simple improved confidence intervals for comparing matched proportions *Statistics in Medicine* 24 (5), 729–740.

Agresti, A., Gottard, A. (2005) Randomized confidence intervals and the mid-P approach, discussion of article by C. Geyer and G. Meeden, *Statistical Science* 20, 367–371.

Altman, D. G. (1999) Practical statistics for medical research. London, Chapman & Hall.

Blaker, H. (2000). Confidence curves and improved exact confidence intervals for discrete distributions, *Canadian Journal of Statistics* 28 (4), 783–798.

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

Koopman PAR. (1985) Confidence limits for the ratio of two binomial proportions. *Biometrics* 40, 513–517.

Mee, RW. (1984) Confidence bounds for the difference between two probabilities. *Biometrics* 40, 1175–1176.

Miettinen OS, Nurminen M. (1985) Comparative analysis of two rates. *Statistics in Medicine* 4, 213–226.

Nam, J. M. (1995) Confidence limits for the ratio of two binomial proportions based on likelihood scores: Non-iterative method. *Biom. J.* 37 (3), 375–379.

Nurminen, M. (1986) Analysis of trends in proportions with an ordinally scaled determinant. *Biometrical J.* 28, 965–974.

Olivier, J. and May, W. L. (2006) Weighted confidence interval construction for binomial parameters *Statistical Methods in Medical Research* 15 (1), 37–46.

Tango T. (1998) Equivalence test and confidence interval for the difference in proportions for the paired-sample design *Statistics in Medicine* 17, 891–908.

Wilson, E. B. (1927) Probable inference, the law of succession, and statistical inference. *J. Amer. Stat. Assoc.* 22, 209–212.

`acceptbin` *internal function*

Description

computes the Blaker acceptability of p when x is observed and X is bin(n, p)

add4ci *Agresti-Coull add-4 CI for a binomial proportion*

Description

Agresti-Coull add-4 CI for a binomial proportion, based on adding 2 successes and 2 failures before computing the Wald CI. The CI is truncated, when it overshoots the boundary

Usage

```
add4ci(x, n, conf.level)
```

Arguments

x	number of successes
n	number of trials
conf.level	confidence coefficient

Value

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

conf.int	The confidence intervall for the proportion
estimate	The estimator for the proportion

References

Agresti, A., Coull, B. (1998) Approximate is better than exact for interval estimation of binomial proportions. *The American Statistician* 52, 119–126.

Agresti, A., Caffo, B.(2000) Simple and effective confidence intervals for proportions and difference of proportions result from adding two successes and two failures. *The American Statistician* 54 (4), 280–288.

Examples

```
add4ci(x = 15, n = 112, conf.level = 0.95)
```

addz2ci *Agresti-Coull CI for a binomial proportion based on adding z^2/2 successes and z^2/2 failures before computing the Wald CI*

Description

Agresti-Coull CI for a binomial proportion based on adding z^2/2 successes and z^2/2 failures before computing the Wald CI. The CI is truncated, when it overshoots the boundary.

Usage

```
addz2ci(x, n, conf.level)
```

Arguments

x	number of successes
n	number of trials
conf.level	confidence coefficient

Value

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

conf.int	The confidence intervall for the proportion
estimate	The estimator for the proportion

References

Agresti, A., Coull, B. (1998): Approximate is better than exact for interval estimation of binomial proportions. *The American Statistician* 52, 119–126.

Examples

```
addz2ci(x = 15, n = 112, conf.level = 0.95)
```

blakerci *Blaker's exact CI for a binomial proportion*

Description

Blaker's exact CI for a binomial proportion

Usage

```
blakerci(x, n, conf.level, tolerance=1e-05)
```

Arguments

x	Number of successes
n	Total sample size
conf.level	Confidence level
tolerance	default tolerance

Value

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

conf.int	The confidence intervall for the proportion

References

Blaker, H. (2000). Confidence curves and improved exact confidence intervals for discrete distributions, *Canadian Journal of Statistics* 28 (4), 783–798

---

diffci.bayes *Bayesian confidence interval for different of independent proportions*

Description

Approximate Bayesian confidence interval for different of proportions using simulation method

Usage

```
diffci.bayes(x1,n1,x2,n2,a,b,c,d,conf.level, nsim)
```

Arguments

x1	Binomial variate group 1
n1	Sample size group 1
x2	Binomial variate group 2
n2	Sample size group 2
a	beta prior for x1
b	beta prior for x2
c	beta prior for n1
d	beta prior for n2
conf.level	confidence level
nsim	number of simulations with default 10M

Value

Confidence interval with given confidence level.

References

Agresti, A. (2002) Categorical Data Analysis. Wiley, 2nd Edition.

`diffci.bayes.hpd` *Bayesian HPD confidence interval for different of independent proportions*

Description

Approximate Bayesian HPD confidence interval for different of proportions using independent priors

Usage

```
diffci.bayes.hpd(x1,n1,x2,n2,a,b,c,d,conf.level)
```

Arguments

`x1`	Binomial variate group 1
`n1`	Sample size group 1
`x2`	Binomial variate group 2
`n2`	Sample size group 2
`a`	beta prior for x1
`b`	beta prior for x2
`c`	beta prior for n1
`d`	beta prior for n2
`conf.level`	confidence level

Value

Confidence interval with given confidence level.

References

Agresti, A. (2002) Categorical Data Analysis. Wiley, 2nd Edition.

`diffpropci.mp` *Adjusted Wald interval for a difference of proportions with matched pairs*

Description

Adjusted Wald interval for a difference of proportions with matched pairs. This is the interval called Wald+2 in Agresti and Min (2005). Adds 0.5 to each cell before constructing the Wald CI

Usage

```
diffpropci.mp(b, c, n, conf.level)
```

Arguments

`b`	off-diag count
`c`	off-diag count
`n`	sample size
`conf.level`	confidence coefficient $1 - \alpha$

Details

The interval is truncated, when it overshoots the boundary

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

References

Agresti, A. and Min, Y. (2005) Simple improved confidence intervals for comparing matched proportions. *Statistics in Medicine* 24 (5), 729–740.

Examples

```
diffpropci.mp(b = 40, c = 20, n = 160, conf.level = 0.95)
```

`diffpropci.Wald.mp` *Wald interval for a difference of proportions with matched pairs*

Description

Wald interval for a difference of proportions with matched pairs.

Usage

```
diffpropci.Wald.mp(b, c, n, conf.level)
```

Arguments

`b`	off-diag count
`c`	off-diag count
`n`	sample size
`conf.level`	confidence coefficient

Details

The interval is truncated, when it overshoots the boundary

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 c-b/n

References

D. G. Altman (1999) Practical statistics for medical research. London, Chapman & Hall

Examples

```
diffpropci.Wald.mp(b = 3, c = 9, n = 32, conf.level = 0.95)
```

`diffscoreci` *Score interval for difference of proportions*

Description

Score interval for difference of proportions and independent samples (p1 - p2)

Usage

```
diffscoreci(x1, n1, x2, n2, conf.level)
```

Arguments

`x1`	success counts in sample 1
`n1`	sample size in sample 1
`x2`	success counts in sample 2
`n2`	sample size in sample 2
`conf.level`	confidence coefficient

Value

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

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

References

Agresti, A. (2002) Categorical Data Analysis. Wiley, 2nd Edition.

Mee, RW. (1984) Confidence bounds for the difference between two probabilities. *Biometrics* 40, 1175–1176.

Miettinen OS, Nurminen M. (1985) Comparative analysis of two rates. *Statistics in Medicine* 4, 213–226.

Nurminen, M. (1986) Analysis of trends in proportions with an ordinally scaled determinant. *Biometrical J.* 28, 965–974

exactci *Clopper-Pearson exact CI*

Description

Clopper-Pearson exact CI

Usage

```
exactci(x, n, conf.level)
```

Arguments

x	Number of successes
n	Total sample size
conf.level	Confidence level

Value

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

conf.int	a confidence interval for the proportion

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.

limit *internal function*

Description

internal function of orscoreci

midPci *mid-P confidence interval adaptation of the Clopper-Pearson interval*

Description

mid-P confidence interval adaptation of the Clopper-Pearson interval

Usage

```
midPci(x, n, conf.level)
```

Arguments

x	number of successes
n	number of trials
conf.level	confidence coefficient

Value

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

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

References

Agresti, A., Gottard, A. (2005) Randomized confidence intervals and the mid-P approach, discussion of article by C. Geyer and G. Meeden, *Statistical Science* 20, 367–371.

Examples

```
midPci(x = 15, n = 112, conf.level = 0.95)
```

oddsratioci.mp *Adapted binomial score confidence interval for the subject-specific odds ratio with matched pairs*

Description

Adapted binomial score confidence interval for the subject-specific odds ratio with matched pairs. This uses the Wilson score CI for a binomial parameter with the off-diagonal counts.

Usage

```
oddsratioci.mp(b, c, conf.level)
```

Arguments

b	off-diagonal count
c	off-diagonal count
conf.level	confidence coefficient

Value

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

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

References

A. Agresti and Y. Min, (2005) Simple improved confidence intervals for comparing matched proportions. *Statistics in Medicine* 24 (5), 729–740.

Examples

```
oddsratioci.mp(b = 40, c = 20, conf.level = 0.95)
```

---

orci.bayes *Bayesian tail confidence interval for an odds ratio*

Description

Approximate Bayesian tail confidence interval for an odds ratio using simulation method

Usage

```
orci.bayes(x1,n1,x2,n2,a,b,c,d,conf.level, nsim)
```

Arguments

x1	Binomial variate group 1
n1	Sample size group 1
x2	Binomial variate group 2
n2	Sample size group 2
a	beta prior for x1
b	beta prior for x2
c	beta prior for n1
d	beta prior for n2
conf.level	confidence level
nsim	number of simulations with default 10M

Value

Confidence interval for an odds ratio with given confidence level.

References

Agresti, A. (2002) Categorical Data Analysis. Wiley, 2nd Edition.

`orscoreci` *score confidence interval for an odds ratio in a 2x2 table [p1(1-p1)/(p2(1-p2))]*

Description

score confidence interval for an odds ratio in a 2x2 table [p1(1-p1)/(p2(1-p2))]

Usage

```
orscoreci(x1, n1, x2, n2, conf.level)
```

Arguments

`x1`	number of successes in sample 1
`n1`	sample size in sample 1
`x2`	number of successes in sample 2
`n2`	sample size in sample 2
`conf.level`	confidence coefficient $1 - \alpha$

Value

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

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

References

Cornfield, J. (1956) A statistical problem arising from retrospective studies. In Neyman J. (ed.), *Proceedings of the third Berkeley Symposium on Mathematical Statistics and Probability* 4, pp. 135–148.

Miettinen O. S., Nurminen M. (1985) Comparative analysis of two rates. *Statistics in Medicine* 4, 213–226.

Agresti, A. 2002. Categorical Data Analysis. Wiley, 2nd Edition.

`riskscoreci` *score confidence interval for the relative risk in a 2x2 table*

Description

score confidence interval for the relative risk in a 2x2 table

Usage

```
riskscoreci(x1, n1, x2, n2, conf.level)
```

Arguments

`x1`	number of successes in sample 1
`n1`	sample size in sample 1
`x2`	number of successes in sample 2
`n2`	sample size in sample 2
`conf.level`	confidence coefficient $1 - \alpha$

Value

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

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

References

Nam, J. M. (1995) Confidence limits for the ratio of two binomial proportions based on likelihood scores: Non-iterative method. *Biom. J.* 37 (3), 375–379.

Koopman PAR. (1985) Confidence limits for the ratio of two binomial proportions. *Biometrics* 40, 513–517.

Miettinen OS, Nurminen M. (1985) Comparative analysis of two rates. *Statistics in Medicine* 4, 213–226.

Nurminen, M. (1986) Analysis of trends in proportions with an ordinally scaled determinant. *Biometrical J* 28, 965–974

Agresti, A. (2002) Categorical Data Analysis. Wiley, 2nd Edition.

rrci.bayes *Bayesian tail confidence interval for the relative risk*

Description

Approximate Bayesian tail confidence interval for the relative risk using simulation method

Usage

```
rrci.bayes(x1,n1,x2,n2,a,b,c,d,conf.level, nsim)
```

Arguments

x1	Binomial variate group 1
n1	Sample size group 1
x2	Binomial variate group 2
n2	Sample size group 2
a	beta prior for x1
b	beta prior for x2
c	beta prior for n1
d	beta prior for n2
conf.level	confidence level
nsim	number of simulations with default 10M

Value

Confidence interval for the relative risk with given confidence level.

References

Agresti, A. (2002) Categorical Data Analysis. Wiley, 2nd Edition.

scoreci *Wilson's confidence interval for a single proportion*

Description

Wilson's confidence interval for a single proportion. Score CI based on inverting the asymptotic normal test using the null standard error

Usage

```
scoreci(x, n, conf.level)
```

Arguments

x	Number of successes
n	Total sample size
conf.level	Confidence level

Value

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

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

References

Wilson, E.B. (1927) Probable inference, the law of succession, and statistical inference *J. Amer. Stat. Assoc* 22, 209–212

---

scoreci.mp *Tango's score confidence interval for a difference of proportions with matched pairs*

Description

Tango's score confidence interval for a difference of proportions with matched pairs

Usage

```
scoreci.mp(b, c, n, conf.level)
```

Arguments

b	off-diagonal count
c	off-diagonal count
n	sample size
conf.level	confidence coefficient

Value

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

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

References

Agresti, A. and Min, Y. (2005) Simple improved confidence intervals for comparing matched proportions *Statistics in Medicine* 24 (5), 729–740.

Tango T. (1998) Equivalence test and confidence interval for the difference in proportions for the paired-sample design *Statistics in Medicine* 17, 891–908

Examples

```
scoreci.mp(b = 40, c = 20, n = 160, conf.level = 0.95)
```

`wald2ci` *Wald interval with the possibility to adjust according to Agresti, Caffo (2000) for difference in proportions and independent samples.*

Description

Wald interval with the possibility to adjust according to Agresti, Caffo (2000) for difference in proportions and independent samples. The Agresti-Caffo interval adds 1 to x1 and x2 and adds 2 to n1 and n2.

Usage

```
wald2ci(x1, n1, x2, n2, conf.level, adjust)
```

Arguments

`x1`	success counts in sample 1
`n1`	sample size in sample 1
`x2`	success counts in sample 2
`n2`	sample size in sample 2
`conf.level`	confidence coefficient
`adjust`	option to adjust the Wald interval to the Agresti-Caffo interval for better performance

Details

If `adjust=AC` is chosen, the standard Wald interval is modified to the Agresti-Caffo adjusted CI (American Statistician, 2000)

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

References

Agresti, A. (2002) Categorical Data Analysis. Wiley, 2nd Edition. Agresti, A., Caffo, B.(2000) Simple and effective confidence intervals for proportions and difference of proportions result from adding two successes and two failures. *The American Statistician* 54 (4), 280–288.

`z2stat` *internal function*

Description

internal function of diffscoreci

Index