Package 'pwr'

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Title Basic Functions for Power Analysis

Description Power analysis functions along the lines of Cohen (1988).

Imports stats, graphics

Suggests ggplot2, scales

License GPL (>= 3)

URL https://github.com/heliosdrm/pwr

NeedsCompilation no

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R topics documented:

`pwr-package` *Basic Functions for Power Analysis pwr*

Description

Power calculations along the lines of Cohen (1988) using in particular the same notations for effect sizes. Examples from the book are given.

Details

Package:	pwr
Type:	Package
Version:	1.2-0
Date:	2016-08-06
License:	GPL (>= 3)

This package contains functions for basic power calculations using effect sizes and notations from Cohen (1988) : pwr.p.test: test for one proportion (ES=h) pwr.2p.test: test for two proportions (ES=h) pwr.2p2n.test: test for two proportions (ES=h, unequal sample sizes) pwr.t.test: one sample and two samples (equal sizes) t tests for means (ES=d) pwr.t2n.test: two samples (different sizes) t test for means (ES=d) pwr.anova.test: test for one-way balanced anova (ES=f) pwr.r.test: correlation test (ES=r) pwr.chisq.test: chi-squared test (ES=w) pwr.f2.test: test for the general linear model (ES=f2) ES.h: computing effect size h for proportions tests ES.w1: computing effect size w for the goodness of fit chi-squared test ES.w2: computing effect size w for the association chi-squared test cohen.ES: computing effect sizes for all the previous tests corresponding to conventional effect sizes (small, medium, large)

Author(s)

Stephane Champely, based on previous works by Claus Ekstrom and Peter Dalgaard, with contributions of Jeffrey Gill and Stephan Weibelzahl.

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References

Cohen, J. (1988). Statistical power analysis for the behavioral sciences (2nd ed.). Hillsdale,NJ: Lawrence Erlbaum.

See Also

power.t.test,power.prop.test,power.anova.test

Examples

```
## Exercise 8.1 P. 357 from Cohen (1988)
pwr.anova.test(f=0.28,k=4,n=20,sig.level=0.05)

## Exercise 6.1 p. 198 from Cohen (1988)
pwr.2p.test(h=0.3,n=80,sig.level=0.05,alternative="greater")

## Exercise 7.3 p. 251
pwr.chisq.test(w=0.346,df=(2-1)*(3-1),N=140,sig.level=0.01)

## Exercise 6.5 p. 203 from Cohen (1988)
pwr.p.test(h=0.2,n=60,sig.level=0.05,alternative="two.sided")
```

---

cohen.ES *Conventional effects size*

Description

Give the conventional effect size (small, medium, large) for the tests available in this package

Usage

```
cohen.ES(test = c("p", "t", "r", "anov", "chisq", "f2"),
    size = c("small", "medium", "large"))
```

Arguments

`test`	The statistical test of interest
`size`	The ES : small, medium of large?

Value

The corresponding effect size

Author(s)

Stephane CHAMPELY

References

Cohen, J. (1988). Statistical power analysis for the behavioral sciences (2nd ed.). Hillsdale,NJ: Lawrence Erlbaum.

Examples

```
## medium effect size for the correlation test
cohen.ES(test="r", size="medium")

## sample size for a medium size effect in the two-sided correlation test
## using the conventional power of 0.80
pwr.r.test(r=cohen.ES(test="r",size="medium")$effect.size,
  power=0.80, sig.level=0.05, alternative="two.sided")
```

`ES.h` *Effect size calculation for proportions*

Description

Compute effect size h for two proportions

Usage

```
ES.h(p1, p2)
```

Arguments

`p1`	First proportion
`p2`	Second proportion

Details

The effect size is 2*asin(sqrt(p1))-2*asin(sqrt(p2))

Value

The corresponding effect size

Author(s)

Stephane CHAMPELY

References

Cohen, J. (1988). Statistical power analysis for the behavioral sciences (2nd ed.). Hillsdale,NJ: Lawrence Erlbaum.

See Also

pwr.p.test, pwr.2p.test, pwr.2p2n.test, power.prop.test

Examples

```
## Exercise 6.5 p. 203 from Cohen
h<-ES.h(0.5,0.4)
h
pwr.p.test(h=h,n=60,sig.level=0.05,alternative="two.sided")
```

ES.w1 *Effect size calculation in the chi-squared test for goodness of fit*

Description

Compute effect size w for two sets of k probabilities P0 (null hypothesis) and P1 (alternative hypothesis)

Usage

```
ES.w1(P0, P1)
```

Arguments

P0	First set of k probabilities (null hypothesis)
P1	Second set of k probabilities (alternative hypothesis)

Value

The corresponding effect size w

Author(s)

Stephane CHAMPELY

References

Cohen, J. (1988). Statistical power analysis for the behavioral sciences (2nd ed.). Hillsdale,NJ: Lawrence Erlbaum.

See Also

pwr.chisq.test

Examples

```
## Exercise 7.1 p. 249 from Cohen
P0<-rep(1/4,4)
P1<-c(0.375,rep((1-0.375)/3,3))
ES.w1(P0,P1)
pwr.chisq.test(w=ES.w1(P0,P1),N=100,df=(4-1))
```

ES.w2 *Effect size calculation in the chi-squared test for association*

Description

Compute effect size w for a two-way probability table corresponding to the alternative hypothesis in the chi-squared test of association in two-way contingency tables

Usage

```
ES.w2(P)
```

Arguments

P	A two-way probability table (alternative hypothesis)

Value

The corresponding effect size w

Author(s)

Stephane CHAMPELY

References

Cohen, J. (1988). Statistical power analysis for the behavioral sciences (2nd ed.). Hillsdale,NJ: Lawrence Erlbaum.

See Also

pwr.chisq.test

Examples

```
prob<-matrix(c(0.225,0.125,0.125,0.125,0.16,0.16,0.04,0.04),nrow=2,byrow=TRUE)
prob
ES.w2(prob)
pwr.chisq.test(w=ES.w2(prob),df=(2-1)*(4-1),N=200)
```

plot.power.htest — *Plot diagram of sample size vs. test power*

Description

Plot a diagram to illustrate the relationship of sample size and test power for a given set of parameters.

Usage

```
## S3 method for class 'power.htest'
plot(x, ...)
```

Arguments

`x`	object of class power.htest usually created by one of the power calculation functions, e.g., pwr.t.test()
`...`	Arguments to be passed to `ggplot` including xlab and ylab

Details

Power calculations for the following tests are supported: t-test (pwr.t.test(), pwr.t2n.test()), chi squared test (pwr.chisq.test()), one-way ANOVA (pwr.anova.test(), standardnormal distribution (pwr.norm.test()), pearson correlation (pwr.r.test()), proportions (pwr.p.test(), pwr.2p.test(), pwr.2p2n.test()))

Value

These functions are invoked for their side effect of drawing on the active graphics device.

Note

By default it attempts to use the plotting tools of ggplot2 and scales. If they are not installed, it will use the basic R plotting tools.

Author(s)

Stephan Weibelzahl <weibelzahl@pfh.de>

See Also

`pwr.t.test` `pwr.p.test` `pwr.2p.test` `pwr.2p2n.test` `pwr.r.test` `pwr.chisq.test` `pwr.anova.test` `pwr.t2n.test`

Examples

```
## Two-sample t-test
p.t.two <- pwr.t.test(d=0.3, power = 0.8, type= "two.sample", alternative = "two.sided")
plot(p.t.two)
plot(p.t.two, xlab="sample size per group")
```

---

pwr.2p.test *Power calculation for two proportions (same sample sizes)*

Description

Compute power of test, or determine parameters to obtain target power (similar to power.prop.test).

Usage

```
pwr.2p.test(h = NULL, n = NULL, sig.level = 0.05, power = NULL,
    alternative = c("two.sided","less","greater"))
```

Arguments

`h`	Effect size
`n`	Number of observations (per sample)
`sig.level`	Significance level (Type I error probability)
`power`	Power of test (1 minus Type II error probability)
`alternative`	a character string specifying the alternative hypothesis, must be one of "two.sided" (default), "greater" or "less"

Details

Exactly one of the parameters 'h','n', 'power' and 'sig.level' must be passed as NULL, and that parameter is determined from the others. Notice that the last one has non-NULL default so NULL must be explicitly passed if you want to compute it.

Value

Object of class '"power.htest"', a list of the arguments (including the computed one) augmented with 'method' and 'note' elements.

Note

'uniroot' is used to solve power equation for unknowns, so you may see errors from it, notably about inability to bracket the root when invalid arguments are given.

Author(s)

Stephane Champely <champely@univ-lyon1.fr> but this is a mere copy of Peter Dalgaard work (power.t.test)

References

Cohen, J. (1988). Statistical power analysis for the behavioral sciences (2nd ed.). Hillsdale,NJ: Lawrence Erlbaum.

See Also

ES.h, pwr.2p2n.test, power.prop.test

Examples

```
## Exercise 6.1 p. 198 from Cohen (1988)
pwr.2p.test(h=0.3,n=80,sig.level=0.05,alternative="greater")
```

---

pwr.2p2n.test *Power calculation for two proportions (different sample sizes)*

Description

Compute power of test, or determine parameters to obtain target power.

Usage

```
pwr.2p2n.test(h = NULL, n1 = NULL, n2 = NULL, sig.level = 0.05, power = NULL,
    alternative = c("two.sided", "less","greater"))
```

Arguments

`h`	Effect size
`n1`	Number of observations in the first sample
`n2`	Number of observationsz in the second sample
`sig.level`	Significance level (Type I error probability)
`power`	Power of test (1 minus Type II error probability)
`alternative`	a character string specifying the alternative hypothesis, must be one of "two.sided" (default), "greater" or "less"

Details

Exactly one of the parameters 'h','n1', 'n2', 'power' and 'sig.level' must be passed as NULL, and that parameter is determined from the others. Notice that the last one has non-NULL default so NULL must be explicitly passed if you want to compute it.

Value

Object of class '"power.htest"', a list of the arguments (including the computed one) augmented with 'method' and 'note' elements.

Note

'uniroot' is used to solve power equation for unknowns, so you may see errors from it, notably about inability to bracket the root when invalid arguments are given.

Author(s)

Stephane Champely <champely@univ-lyon1.fr> but this is a mere copy of Peter Dalgaard work (power.t.test)

References

Cohen, J. (1988). Statistical power analysis for the behavioral sciences (2nd ed.). Hillsdale,NJ: Lawrence Erlbaum.

See Also

ES.h, pwr.2p.test, power.prop.test

Examples

```
## Exercise 6.3 P. 200 from Cohen (1988)
pwr.2p2n.test(h=0.30,n1=80,n2=245,sig.level=0.05,alternative="greater")

## Exercise 6.7 p. 207 from Cohen (1988)
pwr.2p2n.test(h=0.20,n1=1600,power=0.9,sig.level=0.01,alternative="two.sided")
```

`pwr.anova.test` *Power calculations for balanced one-way analysis of variance tests*

Description

Compute power of test or determine parameters to obtain target power (same as power.anova.test).

Usage

```
pwr.anova.test(k = NULL, n = NULL, f = NULL, sig.level = 0.05, power = NULL)
```

Arguments

`k`	Number of groups
`n`	Number of observations (per group)
`f`	Effect size
`sig.level`	Significance level (Type I error probability)
`power`	Power of test (1 minus Type II error probability)

Details

Exactly one of the parameters 'k','n','h','power' and 'sig.level' must be passed as NULL, and that parameter is determined from the others. Notice that the last one has non-NULL default so NULL must be explicitly passed if you want to compute it.

Value

Object of class '"power.htest"', a list of the arguments (including the computed one) augmented with 'method' and 'note' elements.

Note

'uniroot' is used to solve power equation for unknowns, so you may see errors from it, notably about inability to bracket the root when invalid arguments are given.

Author(s)

Stephane Champely <champely@univ-lyon1.fr> but this is a mere copy of Peter Dalgaard work (power.t.test)

References

Cohen, J. (1988). Statistical power analysis for the behavioral sciences (2nd ed.). Hillsdale,NJ: Lawrence Erlbaum.

See Also

power.anova.test

Examples

```
## Exercise 8.1 P. 357 from Cohen (1988)
pwr.anova.test(f=0.28,k=4,n=20,sig.level=0.05)

## Exercise 8.10 p. 391
pwr.anova.test(f=0.28,k=4,power=0.80,sig.level=0.05)
```

---

pwr.chisq.test *power calculations for chi-squared tests*

Description

Compute power of test or determine parameters to obtain target power (same as power.anova.test).

Usage

```
pwr.chisq.test(w = NULL, N = NULL, df = NULL, sig.level = 0.05, power = NULL)
```

Arguments

`w`	Effect size
`N`	Total number of observations
`df`	degree of freedom (depends on the chosen test)
`sig.level`	Significance level (Type I error probability)
`power`	Power of test (1 minus Type II error probability)

Details

Exactly one of the parameters 'w','N','power' and 'sig.level' must be passed as NULL, and that parameter is determined from the others. Notice that the last one has non-NULL default so NULL must be explicitly passed if you want to compute it.

Value

Object of class '"power.htest"', a list of the arguments (including the computed one) augmented with 'method' and 'note' elements.

Note

'uniroot' is used to solve power equation for unknowns, so you may see errors from it, notably about inability to bracket the root when invalid arguments are given.

Author(s)

Stephane Champely <champely@univ-lyon1.fr> but this is a mere copy of Peter Dalgaard work (power.t.test)

References

Cohen, J. (1988). Statistical power analysis for the behavioral sciences (2nd ed.). Hillsdale,NJ: Lawrence Erlbaum.

See Also

ES.w1,ES.w2

Examples

```
## Exercise 7.1 P. 249 from Cohen (1988)
pwr.chisq.test(w=0.289,df=(4-1),N=100,sig.level=0.05)

## Exercise 7.3 p. 251
pwr.chisq.test(w=0.346,df=(2-1)*(3-1),N=140,sig.level=0.01)

## Exercise 7.8 p. 270
pwr.chisq.test(w=0.1,df=(5-1)*(6-1),power=0.80,sig.level=0.05)
```

`pwr.f2.test` *Power calculations for the general linear model*

Description

Compute power of test or determine parameters to obtain target power (same as power.anova.test).

Usage

```
pwr.f2.test(u = NULL, v = NULL, f2 = NULL, sig.level = 0.05, power = NULL)
```

Arguments

`u`	degrees of freedom for numerator
`v`	degrees of freedomfor denominator
`f2`	effect size
`sig.level`	Significance level (Type I error probability)
`power`	Power of test (1 minus Type II error probability)

Details

Exactly one of the parameters 'u','v','f2','power' and 'sig.level' must be passed as NULL, and that parameter is determined from the others. Notice that the last one has non-NULL default so NULL must be explicitly passed if you want to compute it.

Value

Object of class '"power.htest"', a list of the arguments (including the computed one) augmented with 'method' and 'note' elements.

Note

'uniroot' is used to solve power equation for unknowns, so you may see errors from it, notably about inability to bracket the root when invalid arguments are given.

Author(s)

Stephane Champely <champely@univ-lyon1.fr> but this is a mere copy of Peter Dalgaard work (power.t.test)

References

Cohen, J. (1988). Statistical power analysis for the behavioral sciences (2nd ed.). Hillsdale,NJ: Lawrence Erlbaum.

Examples

```
## Exercise 9.1 P. 424 from Cohen (1988)
pwr.f2.test(u=5,v=89,f2=0.1/(1-0.1),sig.level=0.05)
```

`pwr.norm.test` *Power calculations for the mean of a normal distribution (known variance)*

Description

Compute power of test or determine parameters to obtain target power (same as power.anova.test).

Usage

```
pwr.norm.test(d = NULL, n = NULL, sig.level = 0.05, power = NULL,
    alternative = c("two.sided","less","greater"))
```

Arguments

`d`	Effect size d=mu-mu0
`n`	Number of observations
`sig.level`	Significance level (Type I error probability)
`power`	Power of test (1 minus Type II error probability)
`alternative`	a character string specifying the alternative hypothesis, must be one of "two.sided" (default), "greater" or "less"

Details

Exactly one of the parameters 'd','n','power' and 'sig.level' must be passed as NULL, and that parameter is determined from the others. Notice that the last one has non-NULL default so NULL must be explicitly passed if you want to compute it.

Value

Object of class '"power.htest"', a list of the arguments (including the computed one) augmented with 'method' and 'note' elements.

Note

'uniroot' is used to solve power equation for unknowns, so you may see errors from it, notably about inability to bracket the root when invalid arguments are given.

Author(s)

Stephane Champely <champely@univ-lyon1.fr> but this is a mere copy of Peter Dalgaard work (power.t.test)

References

Cohen, J. (1988). Statistical power analysis for the behavioral sciences (2nd ed.). Hillsdale,NJ: Lawrence Erlbaum.

Examples

```
## Power at mu=105 for H0:mu=100 vs. H1:mu>100 (sigma=15) 20 obs. (alpha=0.05)
sigma<-15
c<-100
mu<-105
d<-(mu-c)/sigma
pwr.norm.test(d=d,n=20,sig.level=0.05,alternative="greater")

## Sample size of the test for power=0.80
pwr.norm.test(d=d,power=0.8,sig.level=0.05,alternative="greater")

## Power function of the same test
mu<-seq(95,125,l=100)
d<-(mu-c)/sigma
plot(d,pwr.norm.test(d=d,n=20,sig.level=0.05,alternative="greater")$power,
    type="l",ylim=c(0,1))
abline(h=0.05)
abline(h=0.80)

## Power function for the two-sided alternative
plot(d,pwr.norm.test(d=d,n=20,sig.level=0.05,alternative="two.sided")$power,
    type="l",ylim=c(0,1))
abline(h=0.05)
abline(h=0.80)
```

`pwr.p.test` *Power calculations for proportion tests (one sample)*

Description

Compute power of test or determine parameters to obtain target power (same as power.anova.test).

Usage

```
pwr.p.test(h = NULL, n = NULL, sig.level = 0.05, power = NULL,
    alternative = c("two.sided","less","greater"))
```

Arguments

`h`	Effect size
`n`	Number of observations
`sig.level`	Significance level (Type I error probability)

`power`	Power of test (1 minus Type II error probability)
`alternative`	a character string specifying the alternative hypothesis, must be one of "two.sided" (default), "greater" or "less"

Details

These calculations use arcsine transformation of the proportion (see Cohen (1988))

Exactly one of the parameters 'h','n','power' and 'sig.level' must be passed as NULL, and that parameter is determined from the others. Notice that the last one has non-NULL default so NULL must be explicitly passed if you want to compute it.

Value

Object of class '"power.htest"', a list of the arguments (including the computed one) augmented with 'method' and 'note' elements.

Note

'uniroot' is used to solve power equation for unknowns, so you may see errors from it, notably about inability to bracket the root when invalid arguments are given.

Author(s)

Stephane Champely <champely@univ-lyon1.fr> but this is a mere copy of Peter Dalgaard work (power.t.test)

References

Cohen, J. (1988). Statistical power analysis for the behavioral sciences (2nd ed.). Hillsdale,NJ: Lawrence Erlbaum.

See Also

ES.h

Examples

```
## Exercise 6.5 p. 203 from Cohen
h<-ES.h(0.5,0.4)
h
pwr.p.test(h=h,n=60,sig.level=0.05,alternative="two.sided")

## Exercise 6.8 p. 208
pwr.p.test(h=0.2,power=0.95,sig.level=0.05,alternative="two.sided")
```

pwr.r.test *Power calculations for correlation test*

Description

Compute power of test or determine parameters to obtain target power (same as power.anova.test).

Usage

```
pwr.r.test(n = NULL, r = NULL, sig.level = 0.05, power = NULL,
    alternative = c("two.sided", "less","greater"))
```

Arguments

`n`	Number of observations
`r`	Linear correlation coefficient
`sig.level`	Significance level (Type I error probability)
`power`	Power of test (1 minus Type II error probability)
`alternative`	a character string specifying the alternative hypothesis, must be one of "two.sided" (default), "greater" or "less"

Details

These calculations use the Z' transformation of correlation coefficient : Z'=arctanh(r)+r/(2*(n-1)) (see Cohen (1988) p.546).

Exactly one of the parameters 'r','n','power' and 'sig.level' must be passed as NULL, and that parameter is determined from the others. Notice that the last one has non-NULL default so NULL must be explicitly passed if you want to compute it.

Value

Object of class '"power.htest"', a list of the arguments (including the computed one) augmented with 'method' and 'note' elements.

Note

'uniroot' is used to solve power equation for unknowns, so you may see errors from it, notably about inability to bracket the root when invalid arguments are given.

Author(s)

Stephane Champely <champely@univ-lyon1.fr> but this is a mere copy of Peter Dalgaard work (power.t.test)

References

Cohen, J. (1988). Statistical power analysis for the behavioral sciences (2nd ed.). Hillsdale,NJ: Lawrence Erlbaum.

Examples

```
## Exercise 3.1 p. 96 from Cohen (1988)
pwr.r.test(r=0.3,n=50,sig.level=0.05,alternative="two.sided")
pwr.r.test(r=0.3,n=50,sig.level=0.05,alternative="greater")

## Exercise 3.4 p. 208
pwr.r.test(r=0.3,power=0.80,sig.level=0.05,alternative="two.sided")
pwr.r.test(r=0.5,power=0.80,sig.level=0.05,alternative="two.sided")
pwr.r.test(r=0.1,power=0.80,sig.level=0.05,alternative="two.sided")
```

---

pwr.t.test — *Power calculations for t-tests of means (one sample, two samples and paired samples)*

Description

Compute power of tests or determine parameters to obtain target power (similar to power.t.test).

Usage

```
pwr.t.test(n = NULL, d = NULL, sig.level = 0.05, power = NULL,
    type = c("two.sample", "one.sample", "paired"),
    alternative = c("two.sided", "less", "greater"))
```

Arguments

`n`	Number of observations (per sample)
`d`	Effect size
`sig.level`	Significance level (Type I error probability)
`power`	Power of test (1 minus Type II error probability)
`type`	Type of t test : one- two- or paired-samples
`alternative`	a character string specifying the alternative hypothesis, must be one of "two.sided" (default), "greater" or "less"

Details

Exactly one of the parameters 'd','n','power' and 'sig.level' must be passed as NULL, and that parameter is determined from the others. Notice that the last one has non-NULL default so NULL must be explicitly passed if you want to compute it.

Value

Object of class '"power.htest"', a list of the arguments (including the computed one) augmented with 'method' and 'note' elements.

Note

'uniroot' is used to solve power equation for unknowns, so you may see errors from it, notably about inability to bracket the root when invalid arguments are given.

Author(s)

Stephane Champely <champely@univ-lyon1.fr> but this is a mere copy of Peter Dalgaard work (power.t.test)

References

Cohen, J. (1988). Statistical power analysis for the behavioral sciences (2nd ed.). Hillsdale,NJ: Lawrence Erlbaum.

See Also

power.prop.test

Examples

```
## One sample (power)
## Exercise 2.5 p. 47 from Cohen (1988)
pwr.t.test(d=0.2,n=60,sig.level=0.10,type="one.sample",alternative="two.sided")

## Paired samples (power)
## Exercise p. 50 from Cohen (1988)
d<-8/(16*sqrt(2*(1-0.6)))
pwr.t.test(d=d,n=40,sig.level=0.05,type="paired",alternative="two.sided")

## Two independent samples (power)
## Exercise 2.1 p. 40 from Cohen (1988)
d<-2/2.8
pwr.t.test(d=d,n=30,sig.level=0.05,type="two.sample",alternative="two.sided")

## Two independent samples (sample size)
## Exercise 2.10 p. 59
pwr.t.test(d=0.3,power=0.75,sig.level=0.05,type="two.sample",alternative="greater")
```

pwr.t2n.test — *Power calculations for two samples (different sizes) t-tests of means*

Description

Compute power of tests or determine parameters to obtain target power (similar to as power.t.test).

Usage

```
pwr.t2n.test(n1 = NULL, n2= NULL, d = NULL, sig.level = 0.05, power = NULL,
 alternative = c("two.sided",
        "less","greater"))
```

Arguments

`n1`	Number of observations in the first sample
`n2`	Number of observations in the second sample
`d`	Effect size
`sig.level`	Significance level (Type I error probability)
`power`	Power of test (1 minus Type II error probability)
`alternative`	a character string specifying the alternative hypothesis, must be one of "two.sided" (default), "greater" or "less"

Details

Exactly one of the parameters 'd','n1','n2','power' and 'sig.level' must be passed as NULL, and that parameter is determined from the others. Notice that the last one has non-NULL default so NULL must be explicitly passed if you want to compute it.

Value

Object of class '"power.htest"', a list of the arguments (including the computed one) augmented with 'method' and 'note' elements.

Note

'uniroot' is used to solve power equation for unknowns, so you may see errors from it, notably about inability to bracket the root when invalid arguments are given.

Author(s)

Stephane Champely <champely@univ-lyon1.fr> but this is a mere copy of Peter Dalgaard work (power.t.test)

References

Cohen, J. (1988). Statistical power analysis for the behavioral sciences (2nd ed.). Hillsdale,NJ: Lawrence Erlbaum.

Examples

```
## Exercise 2.3 p. 437 from Cohen (1988)
pwr.t2n.test(d=0.6,n1=90,n2=60,alternative="greater")
```

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