Package 'rpsychi'

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Title Statistics for psychiatric research

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Depends gtools

Description The rpsychi offers a number of functions for psychiatry, psychiatric nursing, clinical psychology. Functions are primarily for statistical significance testing using published work. For example, you can conduct a factorial analysis of variance (ANOVA), which requires only the mean, standard deviation, and sample size for each cell, rather than the individual data. This package covers fundamental statistical tests such as t-test, chi-square test, analysis of variance, and multiple regression analysis. With some exceptions, you can obtain effect size and its confidence interval. These functions help you to obtain effect size from published work, and then to conduct a priori power analysis or meta-analysis, even if a researcher do not report effect size in a published work.

License GPL (>= 2)

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`rpsychi-package` *Statistics for psychiatric research*

Description

The rpsychi offers a number of functions for psychiatry, psychiatric nursing, clinical psychology. Functions are primarily for statistical significance testing using published work. For example, you can conduct a factorial analysis of variance (ANOVA), which requires only the mean, standard deviation, and sample size for each cell, rather than the individual data. This package covers fundamental statistical tests such as t-test, chi-square test, analysis of variance, and multiple regression analysis. With some exceptions, you can obtain effect size and its confidence interval. These functions help you to obtain effect size from published work, and then to conduct a priori power analysis or meta-analysis, even if a researcher do not report effect size in a published work.

Details

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Type:	Package
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LazyLoad:	yes

Author(s)

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References

Cohen B (2000) Calculating a factorial ANOVA from means and standard deviations. Understanding Statistics, 1, 191-203.

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Examples

```
##Kline (2004) Table 6.15
my.cont <- matrix(c(-5,-3,-1,1,3,5,
                    5,-1,-4,-4,-1,5), ncol=6, nrow=2, byrow=TRUE)
dep.oneway.second(m = c(11.77,21.39,27.5,31.02,32.58,34.2),
                  sd = c(7.6,8.44,8.95,9.21,9.49,9.62),
                  n = 137,
                  corr=lower2R(c(.77,.59,.50,.48,.46,.81,.72,.69,.68,.89,
                  .84,.8,.91,.88,.93)),
                  contr=my.cont)
```

`dep.oneway` *A one-way design with dependent samples using individual data: Reporting effect size*

Description

`dep.oneway` conducts a one-way design with dependent samples, namely one-way repeated-measures analysis of variance, using individual data.

Usage

```
dep.oneway(formula, data, block,
           contr = NULL, sig.level = 0.05, digits = 3)
```

Arguments

`formula`	two-sided formula; the left-hand-side of which gives one dependent variable containing a numeric variable, and the right-hand-side of one independent variable containing a factor with two or more levels
`data`	a data frame contains the variables in the `fomrmula` and `block`
`block`	a character string specify the blocking variable
`contr`	a matrix or vector contains the contrast weights
`sig.level`	a numeric contains the significance level (default 0.05)
`digits`	the specified number of decimal places (default 3)

Details

This function conducts a one-way design with dependent samples, namely one-way repeated-measures analysis of variance, using individual data. If you do not specify `contr`, all possible pairwise contrasts will be calculated.

Value

The returned object of `dep.oneway` contains the following components:

`anova.table`	returns a ANOVA table containing sums of squares, degrees of freedom, mean squares, F values, and a p value
`omnibus.es`	returns a omnibus effect size which is a partial η^2
`raw.contrasts`	returns raw mean differences, their confidence intervals, and standard errors
`standardized.contrasts`	returns standardized mean differences for the contrasts (Hedges's g) and their approximate confidence intervals for population standardized mean differences

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References

Kline RB (2004) Beyond significance testing: Reforming data analysis methods in behavioral research. Washington: American Psychological Association.

See Also

dep.oneway.second

Examples

```
##Kline (2004) Table 6.3
dat <- data.frame(y = c(9,12,13,15,16,
                        8,12,11,10,14,
                        10,11,13,11,15),
                  x =  rep(factor(c("a","b","c")), each=5),
                  subj = rep(paste("s", 1:5, sep=""), times=3)
                  )
dep.oneway(formula = y~x, data=dat, block="subj")


##contrast 1: a - c, contrast 2 : 1/2(a + c) - b
my.cont <- matrix(c(1,0,-1,1/2,-1,1/2), ncol=3, nrow=2, byrow=TRUE)
dep.oneway(formula = y~x, data=dat, block="subj", contr=my.cont)
```

---

dep.oneway.second — *A one-way design with dependent samples using published work: Reporting effect size*

Description

dep.oneway.second conducts a one-way design with dependent samples, namely one-way repeated-measures analysis of variance, using published work.

Usage

```
dep.oneway.second(m, sd, n, corr,
             unbiased = TRUE, contr = NULL, sig.level = 0.05, digits = 3)
```

Arguments

m	a numeric vector contains the means (length(m) >= 2)
sd	a numeric vector contains the sample/unbiased standard deviations (length(sd) >= 2)
n	a numeric contains the sample size (length(n) >= 2)
corr	a matrix or data frame contains the correlation matrix
unbiased	sd contains unbiased standard deviations (unbiased = TRUE, default) or sample standard deviations (unbiased = FALSE)
contr	a matrix or vector contains the contrast weights
sig.level	a numeric contains the significance level (default 0.05)
digits	the specified number of decimal places (default 3)

Details

This function conducts a one-way design with dependent samples, namely one-way repeated-measures analysis of variance, using published work. If you do not specify contr, all possible pairwise contrasts will be calculated.

Value

The returned object of dep.oneway.second contains the following components:

anova.table	returns a ANOVA table containing sums of squares, degrees of freedom, mean squares, F values, and a p value
omnibus.es	returns a omnibus effect size which is a partial η^2
raw.contrasts	returns raw mean differences, their confidence intervals, and standard errors
standardized.contrasts	returns standardized mean differences for the contrasts (Hedges's g) and their approximate confidence intervals for population standardized mean differences

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References

Kline RB (2004) Beyond significance testing: Reforming data analysis methods in behavioral research. Washington: American Psychological Association.

See Also

dep.oneway, lower2R

Examples

```
##Kline (2004) Table 6.3
dat <- data.frame(y = c(9,12,13,15,16,
                       8,12,11,10,14,
                       10,11,13,11,15),
                  x =  rep(factor(c("a","b","c")), each=5),
                  subj = rep(paste("s", 1:5, sep=""), times=3)
                  )
dep.oneway(formula = y~x, data=dat, block="subj")

datwide <- reshape(dat, direction="wide", idvar="subj", timevar="x")
tmp <- datwide[,-1]
dep.oneway.second(m = apply(tmp, 2, mean), apply(tmp, 2, sd), n = nrow(tmp), corr=cor(tmp))



##Kline (2004) Table 6.15
my.cont <- matrix(c(-5,-3,-1,1,3,5,
                   5,-1,-4,-4,-1,5), ncol=6, nrow=2, byrow=TRUE)
dep.oneway.second(m = c(11.77,21.39,27.5,31.02,32.58,34.2),
                  sd = c(7.6,8.44,8.95,9.21,9.49,9.62),
                  n = 137,
                  corr=lower2R(c(.77,.59,.50,.48,.46,.81,.72,.69,.68,.89,
                  .84,.8,.91,.88,.93)),
                  contr=my.cont)
```

`dep.t.test` *A t-test with dependent samples using individual data: Reporting effect size*

Description

`dep.t.test` conducts a t-test with dependent samples using individual data.

Usage

```
dep.t.test(formula, data, block,
                sig.level=.05, digits=3)
```

Arguments

`formula`	two-sided formula; the left-hand-side of which gives one dependent variable containing a numeric variable, and the right-hand-side of one independent variable containing a factor with two levels
`data`	a data frame contains the variables in the `fomrmula`
`block`	a character string specify the blocking variable
`sig.level`	a numeric contains the significance level (default 0.05)
`digits`	the specified number of decimal places (default 3)

Details

This function conducts a t-test with dependent samples using individual data.

Value

The returned object of `dep.t.test.second` contains the following components:

- `samp.stat` returns the means, standard deviations, sample size, and correlation
- `raw.difference` returns a raw mean difference, its' confidence interval, and standard error
- `standardized.difference` returns a standardized mean difference (Hedges's g) and its' approximate confidence interval for a population standardized mean difference

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References

Kline RB (2004) Beyond significance testing: Reforming data analysis methods in behavioral research. Washington: American Psychological Association.

See Also

`dep.t.test.second`

Examples

```
##Kline (2004) Table 4.4
dat <- data.frame(y = c(9,12,13,15,16,8,12,11,10,14),
                  x =  rep(factor(c("a","b")), each=5),
                  subj = rep(paste("s", 1:5, sep=""), times=2)
                  )
dep.t.test(y~x, block="subj", data=dat)
```

`dep.t.test.second` *A t-test with dependent samples using published work: Reporting effect size*

Description

`dep.t.test.second` conducts a t-test with dependent samples using published work.

Usage

```
dep.t.test.second(m, sd, n, corr,
        unbiased = TRUE, sig.level = 0.05, digits = 3)
```

Arguments

`m`	a numeric vector contains the means (length(`m`) = 2)
`sd`	a numeric vector contains the sample/unbiased standard deviations (length(`sd`) = 2)
`n`	a numeric contains the sample size (length(`n`) = 2)
`corr`	a numeric contains the correlation
`unbiased`	`sd` contains unbiased standard deviations (`unbiased` = TRUE, default) or sample standard deviations (`unbiased` = FALSE)
`sig.level`	a numeric contains the significance level (default 0.05)
`digits`	the specified number of decimal places (default 3)

Details

This function conducts a t-test with dependent samples using published work.

Value

The returned object of `dep.t.test.second` contains the following components:

`samp.stat`	returns the means, standard deviations, sample size, and correlation
`raw.difference`	returns a raw mean difference, its' confidence interval, and standard error
`standardized.difference`	returns a standardized mean difference (Hedges's g) and its' approximate confidence interval for a population standardized mean difference

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References

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See Also

dep.t.test

Examples

```
##Kline (2004) Table 4.4
dat <- data.frame(y = c(9,12,13,15,16,8,12,11,10,14),
                  x =  rep(factor(c("a","b")), each=5),
                  subj = rep(paste("s", 1:5, sep=""), times=2)
                  )
datwide <- reshape(dat, direction="wide", idvar="subj", timevar="x")

dep.t.test.second(m = tapply(dat$y, dat$x, mean),
                  sd = tapply(dat$y, dat$x, sd),
                  n = nlevels(dat$subj),
                  corr = cor(datwide[,2:3])[1,2]
                  )

dep.t.test.second(m = tapply(dat$y, dat$x, mean),
                  sd = tapply(dat$y, dat$x, sd),
                  n = 30,
                  corr = cor(datwide[,2:3])[1,2]
                  )
```

---

formatted — *Convert a numeric vector into a character vector with the specified number of decimal place*

Description

`formatted` convert a numeric vector into a character vector with the specified number of decimal place.

Usage

```
formatted(x, digits = 2)
```

Arguments

`x`	a numeric vector
`digits`	the specified number of decimal places (default 2)

Value

Return a character vector.

Author(s)

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Examples

```
data(infert)
x <- svar(infert$age)    #sample variance
formatted(x)
formatted(x, digits=4)
```

---

groupSummary *Compute summary statistics by group*

Description

groupSummary summarize continuous variables by providing means and sample standard deviations and categorical variables by giving numbers and percentages for each group.

Usage

```
groupSummary(data, group = NULL, digits = 3)
```

Arguments

data	a data frame contains the variables
group	a character string specify the grouping variable (default NULL)
digits	the specified number of decimal places (default 3)

Details

This function summarize continuous variables by providing means and sample standard deviations and categorical variables by giving numbers and percentages for each group. Missing values (NA) will be stripped before the computation proceeds. If you do not specify group, this function will summarize the variables for total group only.

Value

Return a data frame containing (1) means and/or numbers, (2) sample standard deviations and/or percentages, (3) numbers of available data for total and each group.

Author(s)

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See Also

ssd

Examples

```
data(infert)
infert$case <- factor(infert$case, labels=c("control", "case"))
infert$induced <- factor(infert$induced, labels=c("0","1","2 or more"))
infert$spontaneous <- factor(infert$spontaneous, labels=c("0","1","2 or more"))

#continuous and categorical variables
groupSummary(infert, group="case")

#continuous variables only
groupSummary(infert[, c(2,3,7,8, 5)], group="case")

#categorical variables only
groupSummary(infert[, c(1,4, 6, 5)],  group="case")

#total sample
groupSummary(infert[, c(1,4, 6, 5)])
```

---

ind.oneway — *A one-way design with independent samples using individual data: Reporting effect size*

Description

`ind.oneway` conducts a one-way design with independent samples, namely one-way randomized-group analysis of variance, using individual data.

Usage

```
ind.oneway(formula, data,
           contr = NULL, sig.level = 0.05, digits = 3)
```

Arguments

`formula`	two-sided formula; the left-hand-side of which gives one dependent variable containing a numeric variable, and the right-hand-side of one independent variable containing a factor with two or more levels
`data`	a data frame contains the variables in the `fomrmula`
`contr`	a matrix or vector contains the contrast weights
`sig.level`	a numeric contains the significance level (default 0.05)
`digits`	the specified number of decimal places (default 3)

Details

This function conducts a one-way design with independent samples, namely one-way randomized-group analysis of variance, using individual data. If you do not specify `contr`, all possible pairwise contrasts will be calculated. Statistical power is calculated using the following specifications:

(a) small ($\eta^2 = 0.01$), medium ($\eta^2 = 0.06$), and large ($\eta^2 = 0.14$) population effect sizes, according to the interpretive guideline for effect sizes by Cohen (1992)

(b) sample size specified by `formula` and `data`

(c) significance level specified by `sig.level`

Value

The returned object of `ind.oneway` contains the following components:

`anova.table`	returns a ANOVA table containing sums of squares, degrees of freedom, mean squares, F values
`omnibus.es`	returns a omnibus effect size which is a η^2, and its' confidence interval
`raw.contrasts`	returns raw mean differences, their confidence intervals, and standard errors
`standardized.contrasts`	returns standardized mean differences for the contrasts (Hedges's g), their approximate confidence intervals for population standardized mean differences, and standard errors
`power`	returns statistical power for detecting small ($\eta^2 = 0.01$), medium ($\eta^2 = 0.06$), and large ($\eta^2 = 0.14$) population effect sizes

Author(s)

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References

Cohen J (1992) A power primer. Psychological Bulletin, 112, 155-159.

Kline RB (2004) Beyond significance testing: Reforming data analysis methods in behavioral research. Washington: American Psychological Association.

See Also

ind.oneway.second, samplesize.etasq

Examples

```
##Kline (2004) Table 6.3
dat <- data.frame(y = c(9,12,13,15,16,
                        8,12,11,10,14,
                        10,11,13,11,15),
                  x =  rep(factor(c("a","b","c")), each=5)
                  )
ind.oneway(formula = y~x, data=dat, sig.level=.05, digits=3)


##contrast 1: a - c, contrast 2: 1/2(a + c) - b
my.cont <- matrix(c(1,0,-1,1/2,-1,1/2), ncol=3, nrow=2, byrow=TRUE)
ind.oneway(formula = y~x, data=dat, contr=my.cont, sig.level=.05, digits=3)
```

---

ind.oneway.second *A one-way design with independent samples using published work: Reporting effect size*

Description

`ind.oneway.second` conducts a one-way design with independent samples, namely one-way randomized-group analysis of variance, using published work.

Usage

```
ind.oneway.second(m, sd, n,
             unbiased = TRUE, contr = NULL, sig.level = 0.05, digits = 3)
```

Arguments

m	a numeric vector contains the means (length(m) >= 2)
sd	a numeric vector contains the sample/unbiased standard deviations (length(sd) >= 2)
n	a numeric contains the sample size (length(n) >= 2)
unbiased	sd contains unbiased standard deviations (unbiased = TRUE, default) or sample standard deviations (unbiased = FALSE)
contr	a matrix or vector contains the contrast weights
sig.level	a numeric contains the significance level (default 0.05)
digits	the specified number of decimal places (default 3)

Details

This function conducts a one-way design with independent samples, namely one-way randomized-group analysis of variance, using published work. If you do not specify `contr`, all possible pairwise contrasts will be calculated. Statistical power is calculated using the following specifications:

(a) small ($\eta^2 = 0.01$), medium ($\eta^2 = 0.06$), and large ($\eta^2 = 0.14$) population effect sizes, according to the interpretive guideline for effect sizes by Cohen (1992)

(b) sample size specified by `n`

(c) significance level specified by `sig.level`

Value

The returned object of `ind.oneway.second` contains the following components:

`anova.table` returns a ANOVA table containing sums of squares, degrees of freedom, mean squares, F values

`omnibus.es` returns a omnibus effect size which is a η^2, and its' confidence interval

`raw.contrasts` returns raw mean differences, their confidence intervals, and standard errors

`standardized.contrasts` returns standardized mean differences for the contrasts (Hedges's g), their approximate confidence intervals for population standardized mean differences, and standard errors

`power` returns statistical power for detecting small ($\eta^2 = 0.01$), medium ($\eta^2 = 0.06$), and large ($\eta^2 = 0.14$) population effect sizes

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References

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Cohen J (1992) A power primer. Psychological Bulletin, 112, 155-159.

Kline RB (2004) Beyond significance testing: Reforming data analysis methods in behavioral research. Washington: American Psychological Association.

See Also

`ind.oneway`, `samplesize.etasq`

Examples

```
##Kline (2004) Table 6.3
dat <- data.frame(y = c(9,12,13,15,16,
                        8,12,11,10,14,
                        10,11,13,11,15),
                  x =  rep(factor(c("a","b","c")), each=5)
                  )

##contrast 1: a - c, contrast 2: 1/2(a + c) - b
my.cont <- matrix(c(1,0,-1,1/2,-1,1/2), ncol=3, nrow=2, byrow=TRUE)


ind.oneway.second(m = tapply(dat$y, dat$x, mean),
                  sd = tapply(dat$y, dat$x, sd),
                  n= tapply(dat$y, dat$x, length))

ind.oneway.second(m = tapply(dat$y, dat$x, mean),
                  sd = tapply(dat$y, dat$x, sd),
                  n= tapply(dat$y, dat$x, length),
                  contr = my.cont)
```

`ind.prop` *A Z test for the equality of two proportions using individual data: Reporting effect size*

Description

`ind.prop` conducts a Z test for the equality of two proportions using individual data.

Usage

```
ind.prop(formula, data, sig.level=.05, digits=3, lev.count=2, ref.ind=1)
```

Arguments

`formula`	two-sided formula; the left-hand-side of which gives one dependent variable containing a factor with two levels, and the right-hand-side of one independent variable containing a factor with two levels
`data`	a data frame contains the variables in the `fomrmula`
`sig.level`	a numeric contains the significance level (default 0.05)
`digits`	the specified number of decimal places (default 3)
`lev.count`	a numeric contains the level to be counted (default 2)
`ref.ind`	the reference for the independent variable (default 1)

Details

This function conducts a Z test for the equality of two proportions using individual data. Statistical power is calculated using the following specifications:

(a) small ($h = 0.20$), medium ($h = 0.50$), and large ($h = 0.80$) population effect sizes, according to the interpretive guideline for effect sizes by Cohen (1992)

(b) sample size specified by `n`

(c) significance level specified by `sig.level`

Value

The returned object of `ind.prop` contains the following components:

`samp.stat`	returns the proportions, sample sizes, and a effect size index (Cohen's h)
`risk.difference`	returns a risk difference, its' confidence interval, and standard error
`risk.ratio`	returns a risk ratio, its' confidence interval, and a standard error of a log-transformed risk ratio
`odds.ratio`	returns a odds ratio, its' confidence interval, and a standard error of a log-transformed odds ratio
`power`	returns statistical power for detecting small ($h = 0.20$), medium ($h = 0.50$), and large ($h = 0.80$) population effect sizes

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References

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Kline RB (2004) Beyond significance testing: Reforming data analysis methods in behavioral research. Washington: American Psychological Association.

See Also

`ind.prop.second`, `samplesize.h`

Examples

```
##Kline (2004) Chapter 5
x1 <- c("relapsed", "not relapsed")
y1 <- c("control", "treatment")

dat <- data.frame(y =
```

```
factor(c(rep(x1, c(60, 40)), rep(x1, c(40, 60))), levels=x1),
x = factor(rep(y1, each=100), levels=y1)
)
tab <- xtabs(~x+y, data=dat)
tab
ind.prop(y~x, data=dat, lev.count=2, ref.ind=1)   #Odds for not relapse is higher in treatment than control condi
ind.prop(y~x, data=dat, lev.count=1, ref.ind=1)   #Odds for relapse is lower in treatment than control condition
ind.prop(y~x, data=dat, lev.count=2, ref.ind=2)   #Odds for not relapse is lower in control than treatment condit
ind.prop(y~x, data=dat, lev.count=1, ref.ind=2)   #Odds for relapse is higher in control than treatment conditio
```

`ind.prop.second` *A Z test for the equality of two proportions using published workc*

Description

`ind.prop.second` conducts a Z test for the equality of two proportions using published work.

Usage

```
ind.prop.second(x, n, sig.level = 0.05, digits = 3, ref.ind=1)
```

Arguments

`x`	a numeric vector (length(x) = 2) contains the counts of successes
`n`	a numeric vector (length(n) = 2) contains the sample sizes
`sig.level`	a numeric contains the significance level (default 0.05)
`digits`	the specified number of decimal places (default 3)
`ref.ind`	the reference for the independent variable (default 1)

Details

This function conducts a Z test for the equality of two proportions using published work. Statistical power is calculated using the following specifications:

(a) small ($h = 0.20$), medium ($h = 0.50$), and large ($h = 0.80$) population effect sizes, according to the interpretive guideline for effect sizes by Cohen (1992)

(b) sample size specified by `n`

(c) significance level specified by `sig.level`

Value

The returned object of `ind.prop.second` contains the following components:

`samp.stat`	returns the proportions, sample sizes, and a effect size index (Cohen's h)
`risk.difference`	returns a risk difference, its' confidence interval, and standard error

`risk.ratio` returns a risk ratio, its' confidence interval, and a standard error of a log-transformed risk ratio

`odds.ratio` returns a odds ratio, its' confidence interval, and a standard error of a log-transformed odds ratio

`power` returns statistical power for detecting small ($h = 0.20$), medium ($h = 0.50$), and large ($h = 0.80$) population effect sizes

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References

Cohen J (1992) A power primer. Psychological Bulletin, 112, 155-159.

Kline RB (2004) Beyond significance testing: Reforming data analysis methods in behavioral research. Washington: American Psychological Association.

See Also

`ind.prop`, `samplesize.h`

Examples

```
##Kline (2004) Chapter 5
x1 <- c("relapsed", "not relapsed")
y1 <- c("control", "treatment")

dat <- data.frame(y =
factor(c(rep(x1, c(60, 40)), rep(x1, c(40, 60))), levels=x1),
x = factor(rep(y1, each=100), levels=y1)
)
tab <- xtabs(~x+y, data=dat)
tab
ind.prop.second(x=tab[,1], n = rowSums(tab))          #Risk for relapse is lower in treatment than control condi
ind.prop.second(x=tab[,1], n = rowSums(tab), ref.ind=2)  #Risk for relapse is higher in control than treatment co
```

`ind.t.test` *A t-test with independent samples using individual data: Reporting effect size*

Description

`ind.t.test` conducts a t-test with independent samples using individual data.

Usage

```
ind.t.test(formula, data, correct=TRUE,
                sig.level = 0.05, digits = 3)
```

Arguments

`formula`	two-sided formula; the left-hand-side of which gives one dependent variable containing a numeric variable, and the right-hand-side of one independent variable containing a factor with two levels
`data`	a data frame contains the variables in the `fomrmula`
`correct`	a logical indicating whether to compute an unbiased standardized mean difference ($delta$) or not (`correct` = TRUE)
`sig.level`	a numeric contains the significance level (default 0.05)
`digits`	the specified number of decimal places (default 3)

Details

This function conducts a t-test with independent samples using individual data. Statistical power is calculated using the following specifications:

(a) small ($d = 0.20$), medium ($d = 0.50$), and large ($d = 0.80$) population effect sizes, according to the interpretive guideline for effect sizes by Cohen (1992)

(b) sample size specified by `formula` and `data`

(c) significance level specified by `sig.level`

Value

The returned object of `ind.t.test` contains the following components:

`samp.stat`	returns the means, standard deviations, and sample sizes
`raw.difference`	returns a raw mean difference, its' confidence interval, and standard error
`standardized.difference`	returns a standardized mean difference (Hedges's g), its' approximate confidence interval for population standardized mean difference, and standard error
`power`	returns statistical power for detecting small ($d = 0.20$), medium ($d = 0.50$), and large ($d = 0.80$) population effect sizes

Author(s)

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References

Cohen J (1992) A power primer. Psychological Bulletin, 112, 155-159.

Kline RB (2004) Beyond significance testing: Reforming data analysis methods in behavioral research. Washington: American Psychological Association.

See Also

ind.t.test.second, samplesize.d

Examples

```
##Kline (2004) Table 4.4
dat <- data.frame(y = c(9,12,13,15,16,8,12,11,10,14),
                  x =  rep(factor(c("a","b")), each=5)
                  )
ind.t.test(y~x, data=dat, correct=FALSE)
```

`ind.t.test.second` *A t-test with independent samples using published work: Reporting effect size*

Description

`ind.t.test.second` conducts a t-test with independent samples using published work.

Usage

```
ind.t.test.second(m, sd, n,
         unbiased = TRUE, correct=TRUE, sig.level = 0.05, digits = 3)
```

Arguments

`m`	a numeric vector contains the means (length(`m`) = 2)
`sd`	a numeric vector contains the sample/unbiased standard deviations (length(`sd`) = 2)
`n`	a numeric contains the sample size (length(`n`) = 2)
`unbiased`	`sd` contains unbiased standard deviations (`unbiased` = TRUE, default) or sample standard deviations (`unbiased` = FALSE)
`correct`	a logical indicating whether to compute an unbiased standardized mean difference ($delta$) or not (`correct` = TRUE)
`sig.level`	a numeric contains the significance level (default 0.05)
`digits`	the specified number of decimal places (default 3)

Details

This function conducts a t-test with independent samples using published work. Statistical power is calculated using the following specifications:

(a) small ($d = 0.20$), medium ($d = 0.50$), and large ($d = 0.80$) population effect sizes, according to the interpretive guideline for effect sizes by Cohen (1992)

(b) sample size specified by `n`

(c) significance level specified by `sig.level`

Value

The returned object of `ind.t.test.second` contains the following components:

- `samp.stat` — returns the means, standard deviations, and sample sizes
- `raw.difference` — returns a raw mean difference, its' confidence interval, and standard error
- `standardized.difference` — returns a standardized mean difference (Hedges's g), its' approximate confidence interval for population standardized mean difference, and standard error
- `power` — returns statistical power for detecting small ($d = 0.20$), medium ($d = 0.50$), and large ($d = 0.80$) population effect sizes

Author(s)

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References

Cohen J (1992) A power primer. Psychological Bulletin, 112, 155-159.

Kline RB (2004) Beyond significance testing: Reforming data analysis methods in behavioral research. Washington: American Psychological Association.

See Also

`ind.t.test`, `samplesize.d`

Examples

```
##Kline (2004) Table 4.4
dat <- data.frame(y = c(9,12,13,15,16,8,12,11,10,14),
                  x =  rep(factor(c("a","b")), each=5)
                  )
ind.t.test.second(m = tapply(dat$y, dat$x, mean),
                  sd = tapply(dat$y, dat$x, sd),
                  n = tapply(dat$y, dat$x, length), correct=FALSE
                  )
```

```
ind.t.test.second(m = tapply(dat$y, dat$x, mean),
                  sd = tapply(dat$y, dat$x, sd),
                  n = tapply(dat$y, dat$x, length), correct=TRUE
                  )     #approximate unbiased estimator of delta
```

---

ind.twoway *A two-way design with independent samples using individual data*

Description

ind.twoway conducts a two-way design with independent samples, namely two-way randomized-group analysis of variance, using individual data.

Usage

```
ind.twoway(formula, data, sig.level=.05, digits=3)
```

Arguments

formula	two-sided formula; the left-hand-side of which gives one dependent variable containing a numeric variable, and the right-hand-side of two independent variables containing a factor with two or more levels
data	a data frame contains the variables in the fomrmula
sig.level	a numeric contains the significance level (default 0.05)
digits	the specified number of decimal places (default 3)

Details

This function conducts a two-way design with independent samples, namely two-way randomized-group analysis of variance, using individual data. The main effect of the first independent variable will be shown in "(row)" section, and the main effect of the second one will be shown in "(col)" section. Always the interaction effect of the two independent variables will be calculated. Statistical power is calculated using the following specifications:

(a) small ($\eta^2 = 0.01$), medium ($\eta^2 = 0.06$), and large ($\eta^2 = 0.14$) population effect sizes, according to the interpretive guideline for effect sizes by Cohen (1992)

(b) sample size specified by formula and data

(c) significance level specified by sig.level

Value

The returned object of ind.oneway contains the following components:

anova.table	returns a ANOVA table containing sums of squares, degrees of freedom, mean squares, F values
omnibus.es	returns a omnibus effect sizes which is a partial η^2, and its' confidence interval for each main and interaction effect
power	returns statistical power for detecting small ($\eta^2 = 0.01$), medium ($\eta^2 = 0.06$), and large ($\eta^2 = 0.14$) population effect sizes

Author(s)

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References

Cohen B (2000) Calculating a factorial ANOVA from means and standard deviations. Understanding Statistics, 1, 191-203.

Cohen J (1992) A power primer. Psychological Bulletin, 112, 155-159.

Kline RB (2004) Beyond significance testing: Reforming data analysis methods in behavioral research. Washington: American Psychological Association.

See Also

`ind.twoway.second`

Examples

```
##Kline (2004) Table 7.5
dat <- data.frame(
          y = c(2,3,4,1,3,1,3,4,5,5,6,6,6,7),
          A = factor(c(rep("A1",5), rep("A2", 9))),
          B = factor(c(rep("B1",3), rep("B2",2), rep("B1",2), rep("B2",7)))
          )

ind.twoway(y~A*B, data=dat)
```

`ind.twoway.second` *A two-way design with independent samples using published work*

Description

`ind.twoway.second` conducts a two-way design with independent samples, namely two-way randomized-group analysis of variance, using published work.

Usage

```
ind.twoway.second(m, sd, n,
        unbiased = TRUE, sig.level = 0.05, digits = 3)
```

Arguments

`m`	a matrix contains the means
`sd`	a matrix contains the sample/unbiased standard deviations
`n`	a matrix contains the sample size
`unbiased`	`sd` contains unbiased standard deviations (`unbiased` = TRUE, default) or sample standard deviations (`unbiased` = FALSE)
`sig.level`	a numeric contains the significance level (default 0.05)
`digits`	the specified number of decimal places (default 3)

Details

This function conducts a two-way design with independent samples, namely two-way randomized-group analysis of variance, using published work. Statistical power is calculated using the following specifications:

(a) small ($\eta^2 = 0.01$), medium ($\eta^2 = 0.06$), and large ($\eta^2 = 0.14$) population effect sizes, according to the interpretive guideline for effect sizes by Cohen (1992)

(b) sample size specified by `n`

(c) significance level specified by `sig.level`

Value

The returned object of `ind.oneway.second` contains the following components:

`anova.table`	returns a ANOVA table containing sums of squares, degrees of freedom, mean squares, F values
`omnibus.es`	returns a omnibus effect sizes which is a partial η^2, and its' confidence interval for each main and interaction effect
`power`	returns statistical power for detecting small ($\eta^2 = 0.01$), medium ($\eta^2 = 0.06$), and large ($\eta^2 = 0.14$) population effect sizes

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References

Cohen B (2000) Calculating a factorial ANOVA from means and standard deviations. Understanding Statistics, 1, 191-203.

Cohen J (1992) A power primer. Psychological Bulletin, 112, 155-159.

Kline RB (2004) Beyond significance testing: Reforming data analysis methods in behavioral research. Washington: American Psychological Association.

Tabachnick BG, Fidell LS (2007) Experimental designs using ANOVA. Belmont, CA: Thomson.

See Also

ind.twoway

Examples

```
##Cohen (2000) Table 1
m.mat  <- matrix(c(37.13, 39.31, 39.22, 32.71), ncol=2) #2 * 2
sd.mat <- matrix(c(13.82, 9.42, 9.43, 9.62), ncol=2)
n.mat <- matrix(c(9, 13, 8, 14), ncol=2)

ind.twoway.second(m = m.mat, sd = sd.mat, n = n.mat)


##Tabachnick and Fidell (2007)
#5.7 Complete example of two-way randomized-groups ANOVA (p.221-236)
m.mat <- matrix(c(837.9, 573.6, 354.9, 699.0, 112.0,
      852.2, 781.6, 683.3, 1193.9, 130.0), ncol=2)    #5 * 2
sd.mat <- matrix(c(189.87449, 61.31195, 147.93351, 128.51891, 43.36922,
      227.17042, 104.81221, 116.25934, 198.36692, 37.64158), ncol=2) #5 * 2
n.mat <- matrix(rep(10, 10), ncol=2)

ind.twoway.second(m = m.mat, sd = sd.mat, n = n.mat)


##Kline (2004) Table 7.5
dat <- data.frame(
           y = c(2,3,4,1,3,1,3,4,5,5,6,6,6,7),
           A = factor(c(rep("A1",5), rep("A2", 9))),
           B = factor(c(rep("B1",3), rep("B2",2), rep("B1",2), rep("B2",7)))
           )
ind.twoway.second(m = tapply(dat$y, list(dat$A,dat$B), mean),
                  sd = tapply(dat$y, list(dat$A,dat$B), sd),
                  n = tapply(dat$y, list(dat$A,dat$B), length)
                    )
```

---

lower2R — *Convert a vector containing correlations into a correlation matrix*

Description

lower2R converts a vector containing correlations into a correlation matrix.

Usage

```
lower2R(x, varname=NULL)
```

Arguments

x	a numeric vector contains the correlations
varname	a character vector contains the row and column names

Details

This function converts a vector containing correlations into a correlation matrix. `x` contains the elements that consist of the lower triangle of the correlation matrix. The length of `varname` should be equal to the number of rows and columns in the correlation matrix.

Value

Return a matrix containing the correlation matrix.

Author(s)

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References

Kline RB (2004) Beyond significance testing: Reforming data analysis methods in behavioral research. Washington: American Psychological Association.

See Also

svar, ssd, svar, ssd2sd, r2cov

Examples

```
lower2R(c(1:15))

##Kline (2004) Table 6.15
lower2R(c(.77,.59,.50,.48,.46,.81,.72,.69,.68,.89,
        .84,.8,.91,.88,.93))

lower2R(c(.77,.59,.50,.48,.46,.81,.72,.69,.68,.89,
        .84,.8,.91,.88,.93),
        varname=paste("trial", 1:6, sep=""))
```

---

md.pattern2 *Display missing-data patterns*

Description

`md.pattern2` displays missing-data patterns

Usage

```
md.pattern2(x)
```

Arguments

x a data frame

Details

This function displays missing-data patterns. `md.pattern` in library(mice) is extended to sort variables.

Value

Return a matrix with `ncol(x) + 1` columns, in which each row corresponds to a missing data pattern (1 = observed, 0 = missing). Rows and columns are sorted in increasing amounts of the sample sizes. The last column and row contain row and column counts, respectively. The row name contains the sample sizes in the specific missing data patterns.

Author(s)

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References

Iwasaki M (2002) Foundations of incomplete data analysis (in Japanese) Tokyo: EconomistSha Publishing.

Examples

```
##Iwasaki (2002)
dat <- data.frame(matrix(c(
71   ,  68,  72,  72,  90,  72,  77,  76,  84,  77,
1850,2000,2100,1700,  NA,2200,2150,  NA,  NA,  NA,
136 , 139, 147, 142,  NA, 150, 156,  NA, 152,  NA,
34   , 45 ,  50,  38,  NA,  41,  43,  52,  57,  48
), ncol=4))
md.pattern2(dat)


#sample sizes in the specific pattern
#^
#^               numbers of missing data in each pattern
#|                ^
#|                |
#    X2 X3 X4 X1 NA
#6    1  1  1  1  0
#2    0  0  1  1  2
#1    0  0  0  1  3
#1    0  1  1  1  1
#Sum  4  3  1  0  8 --> numbers of missing data in each variable
```

`multreg` *A multiple regression analysis using individual data*

Description

`multreg` conducts a multiple regression analysis using individual data.

Usage

```
multreg(formula, data, sig.level = 0.05, digits = 3)
```

Arguments

`formula`	two-sided formula; the left-hand-side of which gives one dependent variable containing a numeric variable, and the right-hand-side of several independent variables containing a numeric variable
`data`	a data frame contains the variables in the `fomrmula`
`sig.level`	a numeric contains the significance level (default 0.05)
`digits`	the specified number of decimal places (default 3)

Details

This function conducts a multiple regression analysis using individual data. The dependent variable and independent variables should be a numeric vector. In this function, you cannot specify any interaction nor any curvilinear effect. Statistical power is calculated using the following specifications:

(a) small ($R^2 = 0.02$), medium ($R^2 = 0.13$), and large ($R^2 = 0.26$) population effect sizes, according to the interpretive guideline for effect sizes by Cohen (1992)

(b) sample size specified by `data`

(c) significance level specified by `sig.level`

(d) numbers of independent variable specified by `formula`

Value

`samp.stat`	returns the means and unbiased standard deviations
`corr.partial.corr`	returns a product-moment correlation matrix (lower triangle) and a partial correlation matrix given all remaining variables (upper triangle)
`corr.confidence`	returns lower and upper confidence limits (lower and upper triangles, respectively)
`omnibus.es`	returns a coefficient of determination and its' confidence interval

raw.estimates — returns partial regression coefficients, their confidence intervals, and standard errors

standardized.estimates — returns standardized partial regression coefficients, their confidence intervals, and standard errors

power — returns statistical power for detecting small ($R^2 = 0.02$), medium ($R^2 = 0.13$), and large ($R^2 = 0.26$) population effect sizes

Author(s)

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References

Cohen J (1992) A power primer. Psychological Bulletin, 112, 155-159.

Cohen J, Cohen P, Aiken LS (2003) Applied multiple regression/correlation analysis for the behavioral sciences (3rd ed). Mahwah, NJ: Erlbaum.

Smithson M (2001) Correct confidence intervals for various regression effect sizes and parameters: The importance of noncentral distributions in computing intervals, 61, 605-632.

See Also

multreg.second, samplesize.rsq

Examples

```
##Cohen (2003) Table 3.5.1
dat <- data.frame(
salary = c(51876, 54511, 53425, 61863, 52926, 47034, 66432, 61100, 41934,
  47454, 49832, 47047, 39115, 59677, 61458, 54528, 60327, 56600,
  52542, 50455, 51647, 62895, 53740, 75822, 56596, 55682, 62091,
  42162, 52646, 74199, 50729, 70011, 37939, 39652, 68987, 55579,
  54671, 57704, 44045, 51122, 47082, 60009, 58632, 38340, 71219,
  53712, 54782, 83503, 47212, 52840, 53650, 50931, 66784, 49751,
  74343, 57710, 52676, 41195, 45662, 47606, 44301, 58582),
pubs  = c(18, 3, 2, 17, 11, 6, 38, 48, 9, 22, 30, 21,
  10, 27, 37, 8, 13, 6, 12, 29, 29, 7, 6, 69, 11, 9,
  20, 41, 3, 27, 14, 23, 1, 7, 19, 11, 31, 9, 12, 32,
  26, 12, 9, 6, 39, 16, 12, 50, 18, 16, 5, 20, 50,
  6, 19, 11, 13, 3, 8, 11, 25, 4),
cits = c(50, 26, 50, 34, 41, 37, 48, 56, 19, 29,
    28, 31, 25, 40, 61, 32, 36, 69, 47, 29, 35,
    35, 18, 90, 60, 30, 27, 35, 14, 56, 50, 25,
    35, 1, 69, 69, 27, 50, 32, 33, 45, 54, 47, 29,
    69, 47, 43, 55, 33, 28, 42, 24, 31, 27,
    83, 49, 14, 36, 34, 70, 27, 28)
```

```
)
multreg(salary~ pubs + cits, data=dat)
```

`multreg.second` *A multiple regression analysis using published work*

Description

`multreg.second` conducts a multiple regression analysis using published work.

Usage

```
multreg.second(formula, corr, n,
            m = NULL, sd = NULL, sig.level = 0.05, digits = 3)
```

Arguments

`formula`	two-sided formula; the left-hand-side of which gives one dependent variable containing a numeric variable, and the right-hand-side of several independent variables containing a numeric variable
`corr`	a matrix or data frame contains the correlation matrix
`n`	a numeric contains the sample size
`m`	a numeric vector contains the means (default NULL)
`sd`	a numeric vector contains the sample/unbiased standard deviations (default NULL)
`sig.level`	a numeric contains the significance level (default 0.05)
`digits`	the specified number of decimal places (default 3)

Details

This function conducts a multiple regression analysis using published work. The dependent variable and independent variables should be a numeric vector. In this function, you cannot specify any interaction nor any curvilinear effect. If you do not specify `m` and `sd`, `raw.estimates` will not be obtained. Statistical power is calculated using the following specifications:

(a) small ($R^2 = 0.02$), medium ($R^2 = 0.13$), and large ($R^2 = 0.26$) population effect sizes, according to the interpretive guideline for effect sizes by Cohen (1992)

(b) sample size specified by `data`

(c) significance level specified by `sig.level`

(d) numbers of independent variable specified by `formula`

Value

`corr.partial.corr`
: returns a product-moment correlation matrix (lower triangle) and a partial correlation matrix given all remaining variables (upper triangle)

`corr.confidence`
: returns lower and upper confidence limits (lower and upper triangles, respectively)

`omnibus.es`
: returns a coefficient of determination and its' confidence interval

`raw.estimates`
: returns partial regression coefficients, their confidence intervals, and standard errors

`standardized.estimates`
: returns standardized partial regression coefficients, their confidence intervals, and standard errors

`power`
: returns statistical power for detecting small ($R^2 = 0.02$), medium ($R^2 = 0.13$), and large ($R^2 = 0.26$) population effect sizes

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References

Cohen J (1992) A power primer. Psychological Bulletin, 112, 155-159.

Cohen J, Cohen P, Aiken LS (2003) Applied multiple regression/correlation analysis for the behavioral sciences (3rd ed). Mahwah, NJ: Erlbaum.

Smithson M (2001) Correct confidence intervals for various regression effect sizes and parameters: The importance of noncentral distributions in computing intervals, 61, 605-632.

See Also

multreg, samplesize.rsq

Examples

```
##Cohen (2003) Table 3.5.1
dat <- data.frame(
salary = c(51876, 54511, 53425, 61863, 52926, 47034, 66432, 61100, 41934,
  47454, 49832, 47047, 39115, 59677, 61458, 54528, 60327, 56600,
  52542, 50455, 51647, 62895, 53740, 75822, 56596, 55682, 62091,
  42162, 52646, 74199, 50729, 70011, 37939, 39652, 68987, 55579,
  54671, 57704, 44045, 51122, 47082, 60009, 58632, 38340, 71219,
  53712, 54782, 83503, 47212, 52840, 53650, 50931, 66784, 49751,
  74343, 57710, 52676, 41195, 45662, 47606, 44301, 58582),
pubs  = c(18, 3, 2, 17, 11, 6, 38, 48, 9, 22, 30, 21,
```

```
  10, 27, 37, 8, 13, 6, 12, 29, 29, 7, 6, 69, 11, 9,
  20, 41, 3, 27, 14, 23, 1, 7, 19, 11, 31, 9, 12, 32,
  26, 12, 9, 6, 39, 16, 12, 50, 18, 16, 5, 20, 50,
  6, 19, 11, 13, 3, 8, 11, 25, 4),
cits = c(50, 26, 50, 34, 41, 37, 48, 56, 19, 29,
    28, 31, 25, 40, 61, 32, 36, 69, 47, 29, 35,
    35, 18, 90, 60, 30, 27, 35, 14, 56, 50, 25,
    35, 1, 69, 69, 27, 50, 32, 33, 45, 54, 47, 29,
    69, 47, 43, 55, 33, 28, 42, 24, 31, 27,
    83, 49, 14, 36, 34, 70, 27, 28)   )

multreg.second(salary~ pubs + cits, corr=cor(dat), n= nrow(dat))
multreg.second(salary~ pubs + cits, corr=cor(dat), n= nrow(dat),
        m = apply(dat, 2, mean), sd=apply(dat, 2, sd))
```

---

r2cov *Convert correlation matrix into covariance matrix*

Description

r2cov converts correlation matrix and sample/unbiased standard deviation into sample/unbiased covariance matrix.

Usage

```
r2cov(sd, R)
```

Arguments

sd	a numeric vector contains the sample/unbiased standard deviations
R	a matrix or data frame contains the correlation matrix

Details

This function converts correlation matrix and sample/unbiased standard deviation into sample/unbiased covariance matrix using the following equation: $S = D^{1/2}RD^{1/2}$, where S is a sample/unbiased covariance matrix, R is a correlation matrix, and $D^{1/2}$ is a square matrix with sd on the main diagonal and 0's elsewhere. The length of sd should be equal to the number of rows and columns in R.

Value

Return a matrix containing the sample/unbiased covariance matrix.

Author(s)

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References

Toyoda H (1998) Introduction to structural equation modeling (in Japanese) Tokyo: Asakura Publishing.

See Also

svar, ssd, svar, ssd2sd, lower2R

Examples

```
##data(iris)
x <- iris[,1:4]
cov(x)
r2cov(apply(x, 2, sd), cor(x))


##Toyoda (1998) p.34
r2cov(sd = sqrt(c(.862, 1.089, 0.606)),
      R = lower2R(c(.505, -0.077, -.233)))
```

---

samplesize.d — *Sample size estimation in the t test for means*

Description

samplesize.d determines the sample size, when specified the effect size to be detected, desired statistical power, and significance level. samplesize.d always specifies two-sided test.

Usage

```
samplesize.d(delta, power = 0.8, sig.level = 0.05)
```

Arguments

delta	a numeric contains the effect size (Cohen's d) to be detected
power	a numeric contains the desired statistical power (default 0.80)
sig.level	a numeric contains the significance level (default 0.05)

Value

Return a numeric containing the appropriate sample size in each group.

Author(s)

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References

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

See Also

ind.t.test, ind.t.test.second

Examples

```
##Cohen (1988) ex.2.9
samplesize.d(delta=.20, power=.95, sig.level=.05)
```

---

samplesize.etasq — *Sample size estimation in the analysis of variance*

Description

samplesize.etasq determines the sample size, when specified the number of group, effect size to be detected, desired statistical power, and significance level.

Usage

```
samplesize.etasq(k, delta, power=.80, sig.level=.05)
```

Arguments

k	a numeric contains the number of group
delta	a numeric contains the effect size (η^2) to be detected
power	a numeric contains the desired statistical power (default 0.80)
sig.level	a numeric contains the significance level (default 0.05)

Value

Return a numeric containing the appropriate sample size in each group.

Author(s)

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References

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

See Also

ind.oneway, ind.oneway.second

Examples

```
##Cohen (1988) ex.8.10
f <- .25
samplesize.etasq(k=4, delta= f^2/(1+f^2), power=.80, sig.level=.05)
```

---

samplesize.h — *Sample size estimation in the differences between proportions*

Description

samplesize.h determines the sample size, when specified the effect size to be detected, desired statistical power, and significance level. samplesize.h always specifies two-sided test.

Usage

```
samplesize.h(delta, power = 0.8, sig.level = 0.05)
```

Arguments

delta	a numeric contains the effect size (Cohen's h) to be detected
power	a numeric contains the desired statistical power (default 0.80)
sig.level	a numeric contains the significance level (default 0.05)

Value

Return a numeric containing the appropriate sample size in each group.

Author(s)

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References

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

See Also

`ind.prop`, `ind.prop.second`

Examples

```
##Cohen (1988) ex.6.7
samplesize.h(delta=.20, power=.90, sig.level=.01)

##Cohen (1988) ex.6.8
samplesize.h(delta=.2828, power=.95, sig.level=.05)
```

---

samplesize.r — *Sample size estimation in the significance testing of a product moment correlation*

Description

`samplesize.r` determines the sample size, when specified the effect size to be detected, desired statistical power, and significance level. `samplesize.r` always specifies two-sided test.

Usage

```
samplesize.r(delta, power = 0.8, sig.level = 0.05)
```

Arguments

`delta`	a numeric contains the effect size (product moment correlation) to be detected
`power`	a numeric contains the desired statistical power (default 0.80)
`sig.level`	a numeric contains the significance level (default 0.05)

Value

Return a numeric containing the appropriate sample size.

Author(s)

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References

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

See Also

zero.r.test, zero.r.test.second

Examples

```
##Cohen (1988) ex.3.4
samplesize.r(delta=.3, power=.8, sig.level=.05)
```

---

samplesize.rsq — *Sample size estimation in the F tests of variance proportions*

Description

`samplesize.rsq` determines the sample size, when specified the effect size to be detected, desired statistical power, and significance level.

Usage

```
samplesize.rsq(delta, n.ind, power = 0.8, sig.level = 0.05)
```

Arguments

`delta`	a numeric contains the effect size (Cohen's R^2) to be detected
`n.ind`	a numeric contains the number of independent variables
`power`	a numeric contains the desired statistical power (default 0.80)
`sig.level`	a numeric contains the significance level (default 0.05)

Value

Return a numeric containing the appropriate sample size.

Author(s)

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References

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

See Also

multreg, multreg.second

Examples

```
##Cohen (1988) ex.9.18
samplesize.rsq(delta=.16, n.ind=20, power = .90, sig.level=.05)
```

---

ssd *Compute sample standard deviation*

Description

ssd computes a sample standard deviation.

Usage

```
ssd(x, na.rm = TRUE)
```

Arguments

x	a numeric vector
na.rm	missing values (NA) will be stripped before the computation proceeds (na.rm = TRUE, default)

Value

Return a numeric containing a sample standard deviation.

Author(s)

Yasuyuki Okumura
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See Also

r2cov, svar, svar, ssd2sd, lower2R

Examples

```
data(infert)
ssd(infert$age)     #sample standard deviation
sd(infert$age)      #unbiased standard deviation
```

---

ssd2sd — *Convert sample standard deviation into unbiased one*

Description

ssd2sd converts a sample standard deviation into unbiased one.

Usage

```
ssd2sd(n, ssd)
```

Arguments

n	a numeric contains the sample size
ssd	a numeric contains the sample standard deviation

Value

Return a numeric containing the unbiased standard deviation.

Author(s)

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See Also

r2cov, svar, ssd, svar, lower2R

Examples

```
data(infert)
ssd2sd(nrow(infert), ssd(infert$age))
sd(infert$age)
```

svar — *Compute sample variance*

Description

`svar` computes a sample variance.

Usage

```
svar(x, na.rm = TRUE)
```

Arguments

`x`	a numeric vector
`na.rm`	missing values (NA) will be stripped before the computation proceeds (`na.rm` = TRUE, default)

Value

Return a numeric containing a sample variance.

Author(s)

Yasuyuki Okumura
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See Also

`r2cov`, `svar`, `ssd`, `ssd2sd`, `lower2R`

Examples

```
data(infert)
svar(infert$age)    #sample variance
var(infert$age)     #unbiased variance
```

zero.r.test — *A significance testing of a product moment correlation using individual data*

Description

`zero.r.test` conducts a significance testing of a product moment correlation using individual data

Usage

```
zero.r.test(formula, data, sig.level = 0.05, digits = 3)
```

Arguments

`formula`	two-sided formula; the left-hand-side of which gives one dependent variable containing a numeric variable, and the right-hand-side of one independent variable containing a numeric variable
`data`	a data frame contains the variables in the `fomrmula`
`sig.level`	a numeric contains the significance level (default 0.05)
`digits`	the specified number of decimal places (default 3)

Details

This function conducts a significance testing of a product moment correlation using individual data. Statistical power is calculated using the following specifications:

(a) small ($r = 0.10$), medium ($r = 0.30$), and large ($r = 0.50$) population effect sizes, according to the interpretive guideline for effect sizes by Cohen (1992)

(b) sample size specified by `data`

(c) significance level specified by `sig.level`

Value

The returned object of `zero.r.test` contains the following components:

`samp.stat`	returns the means and unbiased standard deviations
`correlation`	returns a product moment correlation, its' approximate confidence interval for population correlation, and standard error
`power`	returns statistical power for detecting small ($r = 0.10$), medium ($r = 0.30$), and large ($r = 0.50$) population effect sizes

Author(s)

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References

Cohen J (1992) A power primer. Psychological Bulletin, 112, 155-159.

See Also

`zero.r.test.second`, `samplesize.r`

Examples

```
dat <- data.frame(x = c(44.4, 45.9, 41.9, 53.3, 44.7, 44.1, 50.7, 45.2, 60.1),
                  y = c( 2.6,  3.1,  2.5,  5.0,  3.6,  4.0,  5.2,  2.8,  3.8))
zero.r.test(y~x, data=dat)
```

`zero.r.test.second` *A significance testing of a product moment correlation using published work*

Description

`zero.r.test.second` conducts a significance testing of a product moment correlation using published work.

Usage

```
zero.r.test.second(r, n, sig.level = 0.05, digits = 3)
```

Arguments

`r`	a numeric contains the product moment correlation
`n`	a numeric contains the sample size
`sig.level`	a numeric contains the significance level (default 0.05)
`digits`	the specified number of decimal places (default 3)

Details

This function conducts a significance testing of a product moment correlation using published work. Statistical power is calculated using the following specifications:

(a) small ($r = 0.10$), medium ($r = 0.30$), and large ($r = 0.50$) population effect sizes, according to the interpretive guideline for effect sizes by Cohen (1992)

(b) sample size specified by `n`

(c) significance level specified by `sig.level`

Value

The returned object of `zero.r.test` contains the following components:

- `correlation` returns a product moment correlation, its' approximate confidence interval for population correlation, and standard error
- `power` returns statistical power for detecting small ($r = 0.10$), medium ($r = 0.30$), and large ($r = 0.50$) population effect sizes

Author(s)

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References

Cohen J (1992) A power primer. Psychological Bulletin, 112, 155-159.

See Also

`zero.r.test`, `samplesize.r`

Examples

```
zero.r.test.second(r = 0.571, n = 9)
```

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