Package ‘DACF’

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Title Data Analysis with Ceiling and/or Floor Data

Version 1.0.0

Description An implementation of data analytic methods in R for analyses for data with ceiling/floor effects. The package currently includes functions for mean/variance estimation and mean comparison tests. Implemented methods are from Aitkin (1964) <doi:10.1007/BF02289723> and Liu & Wang (in prep).

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Suggests knitr, rmarkdown

VignetteBuilder knitr

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f.star.test

Description

conduct a Brown-Forsythe F star test

Usage

f.star.test(means, variances, ns)

Arguments

means a (non-empty) numeric vector of the group means
variances a (non-empty) numeric vector of the group variances
ns a (non-empty) numeric vector of sample sizes per group

Value

statistic the value of the adjusted Brown-Forsythe F star statistic
p.value the p-value for the test
est.f.squared effect size estimate as in Cohen's f squared

Examples

# a f star test for three-group mean comparison
f.star.test(c(-.2,0,.2),c(1,1,1),c(100,100,100))
f.star.test(c(0,0,1),c(2,1,3),c(100,100,100))

induce.cfe

Description

inducing ceiling/floor effects in data

Usage

induce.cfe(floor.perc, ceiling.perc, y)
lw.f.star

Arguments

floor.perc a (non-empty) numeric value from 0 to 1 denoting the desired percentage of floor effects

ceiling.perc a (non-empty) numeric value from 0 to 1 denoting the desired percentage of ceiling effects

y a (non-empty) numeric vector of data

Value

y scores with induced ceiling/floor effects

Examples

x=rnorm(1000,0,1) #simulate "healthy data"
x.c20=induce.cfe(0,.2,x) #induce 20% ceiling effects into the data
sum(x.c20==max(x.c20))/length(x.c20) #check ceiling percentage
x.f20=induce.cfe(.2,0,x) #induce 20% floor effects into the data
sum(x.f20==min(x.f20))/length(x.f20) #check ceiling percentage

Description

conduct an F star with for data with ceiling/floor effects

Usage

lw.f.star(data, formula, method_type)

Arguments

data a dataframe of data with ceiling/floor effects and corresponding group variables in wide format

formula a formula denoting the dependent and independent variable, e.g., y~group

method_type a character string specifying the preferred method type. "a" uses the original sample size and "b" uses after-truncation sample size.

Value

statistic the value of the Brown-Forsythe F star statistics

p.value the p-value for the test

est.f.squared effect size estimate in Cohen’s f squared
Examples

dat = threeganova.sim(1000, 16, 1)
dat[dat$group == 1, 3] = induce.cfe(0, .15, dat[dat$group == 1, 3])
lw.f.star(dat, y ~ group, "a") # using truncated n
lw.f.star(dat, y ~ group, "b") # using original n

lw.t.test

Description

conduct a t test adjusting for ceiling and/or floor effects

Usage

lw.t.test(x1, x2, method_type)

Arguments

x1 a (non-empty) numeric vector of data values for group 1 with floor/ceiling effects
x2 a (non-empty) numeric vector of data values for group 2 with floor/ceiling effects
method_type a character string specifying the preferred method type. "a" uses the original sample size and "b" uses after-truncation sample size.

Value

statistic the value of the adjusted t test statistics
p.value the p-value for the test
est.d effect size estimate as in Cohen’s d
conf.int 95% confidence interval

Examples

x1.c = induce.cfe(0, .3, rnorm(1000, 20, 5)) # group 1 scores with 30% ceiling data
x2.c = induce.cfe(.15, 0, rnorm(1000, 30, 5)) # group 2 scores with 15% floor data
lw.t.test(x1.c, x2.c, "a") # using truncated n
lw.t.test(x1.c, x2.c, "b") # using original n
rec.mean.var

Description
recovery mean and variance of the data with ceiling/floor effects

Usage
rec.mean.var(y)

Arguments
y a (non-empty) numeric vector of data with ceiling/floor effects

Value
ceiling.percentage
the percentage of ceiling values in the data

floor.percentage
the percentage of floor values in the data

est.mean
estimated mean of the true scores

est.var
estimated variance of the true scores

Examples
# simulate normally distributed true scores
x=rnorm(1000,2,4)
mean(x); var(x)
# induce 20% floor effects
# and estimate the true mean variance from the floor data
x.f=induce.cfe(.2,0,x)
rec.mean.var(x.f)
# induce 20% ceiling effects
# and estimate the true mean and variance from the ceiling data
x.c=induce.cfe(0,.2,x)
rec.mean.var(x.c)
# induce 20% and 10% of floor and ceiling effects, respectively
# and estimate the true mean and variance from the data with floor and ceiling effects
x.cf=induce.cfe(.2,.1,x)
rec.mean.var(x.cf)
Description
simulate three-group anova data

Usage
threeganova.sim(group_n, f_sqr, sd.1)

Arguments
  group_n       a (non-empty) numeric value of desired sample size per group
  f_sqr         a (non-empty) numeric value of desired Cohen’s f squared value
  sd.1          a (non-empty) numeric value of desired standard deviation ratio

Value
  a dataframe containing scores “y”, grouping factor “group”, and residual errors.

Examples
  sample.3g=threeganova.sim(1000,.16,5) #data of n=1000, sd1=sd3=1 and sd2=5, and f^2=.16
  colnames(sample.3g) #examine the column names
  dim(sample.3g) #examine the data structure
  aggregate(sample.3g$y,sd,by=list(sample.3g$group)) #check group standard deviations
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