Package ‘DACF’

October 12, 2022

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).

License GPL-2

Encoding UTF-8

LazyData true

RoxygenNote 6.0.1

Suggests knitr, rmarkdown

VignetteBuilder knitr

NeedsCompilation no

Author Qimin Liu [aut, cre],
        Lijuan Wang [aut]

Maintainer Qimin Liu <qliu6@nd.edu>

Repository CRAN

Date/Publication 2018-02-06 09:37:26 UTC

R topics documented:

  f.star.test ......................................................... 2
  induce.cfe .......................................................... 2
  lw.f.star ............................................................ 3
  lw.t.test ............................................................ 4
  rec.mean.var ......................................................... 4
  threeganova.sim ..................................................... 5

Index 7
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)

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
lw.f.star

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
**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**

```r
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
```

---

**Description**

recover 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

```r
# 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

```r
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

```r
sample.3g = threeanova.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
```
Index

f.star.test, 2
induce.cfe, 2
lw.f.star, 3
lw.t.test, 4
rec.mean.var, 4
threeganova.sim, 5