

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](https://doi.org/10.1007/BF02289723)> and Liu & Wang (in prep).

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Suggests knitr, rmarkdown

VignetteBuilder knitr

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Contents

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

Index	7
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f.star.test	<i>f.star.test</i>
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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	<i>induce.cfe</i>
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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

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
```

 lw.f.star

lw.f.star

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

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

rec.mean.var

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

```
# 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)
```

threeganova.sim	<i>threeganova.sim</i>
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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
```

Index

f.star.test, 2

induce.cfe, 2

lw.f.star, 3

lw.t.test, 4

rec.mean.var, 4

threeganova.sim, 5