Package 'lamme'

October 7, 2018

Title Log-Analytic Methods for Multiplicative Effects

Version 0.0.1

Description Log-analytic methods intended for testing multiplicative effects.

Depends R (>= 3.4.0)

License GPL-3

Encoding UTF-8

LazyData true

RoxygenNote 6.1.0.9000

Suggests knitr, rmarkdown

VignetteBuilder knitr

NeedsCompilation no

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Repository CRAN

Date/Publication 2018-10-06 23:00:06 UTC

R topics documented:

abc *the ABC procedure for model selection*

Description

the AIC comparison with Modified Box-Cox Transformation (ABC) is a diagnostic procedure to help select among various additive and multiplicative models

Usage

```
abc(y, g, x = 0)
```

Arguments

y	the raw posttest scores of a continuous outcome variable.
g	the categorical variable that denotes the group membership.
x	(optional) the raw pretest scores of a continuous outcome variable.

Details

When only ‘y‘ and ‘g‘ are specified, the ABC procedure compares LANOVA and ANOVA models. When ‘x‘ is also specified, the ABC procedure compares LANCOVA, ANCOVA, ANCOHET, and ANCOVA with log-transformed y.

Value

AIC results of different models. The model with smallest AIC is preferred.

Examples

```
data("schoene")
attach(schoene)
abc(post_HRT,group,pre_HRT)
abc(post_HRT,group)
```

boot.es *Boostrapped CI for Effect Size measures*

Description

Compute the bias-corrected and expanded percentile boostrapped confidence intervals for effect size estimates zetas and the overall signal-to-noise ratio. Additionally, if pretest scores are provided, boostrapped CI on beta is also given.

Usage

```
boot.es(y, g, x = 0, nrep = 1000, alpha = 0.05)
```

Arguments

y	the raw posttest scores of a continuous outcome variable.
g	the categorical variable that denotes the group membership.
x	(optional) the raw pretest scores of a continuous outcome variable.
nrep	the number of boostrapped samples. (default=1000)
alpha	the significance level (default=.05)

Value

a table of lower and upper limit from bias-corrected and accelerated and expanded percentile boostrapped confidence interval. The first row is on the geometric mean of the control group (default group of comparison). After that, zeta estimates are given of the each respective group versus the control group (default group of comparison). Then, if pretest scores are given, CI on the beta estimate is given. Lastly, CI on the signal-to-noise ratio, an overall effect size measure, is provided.

BCa LL	the lower limit of the Bias-Corrected and accelerated boostrapped Confidence Interval
BCa UL	the upper limit of the Bias-Corrected and accelerated boostrapped Confidence Interval
exp LL	the lower limit of the expanded percentile boostrapped Confidence Interval
exp UL	the upper limit of the expanded percentile boostrapped Confidence Interval

References

Efron, B. (1987). "Better Bootstrap Confidence Intervals". Journal of the American Statistical Association. Journal of the American Statistical Association, Vol. 82, No. 397. 82 (397): 171–185. doi:10.2307/2289144. JSTOR 2289144.

Examples

```
data("schoene")
attach(schoene)
boot.es(post_HRT,group,pre_HRT,1000,.05)
```

lamme *lamme*

Description

Log-Analytic Methods for Multiplicative Effects

Details

The lamme package is designed to test and estimate multiplicative effects via log-analytic methods.

Usage

To access this package's tutorial, type the following line into the console:

```
vignette("lamme-vignette")
```

lancova *Logged ANCOVA*

Description

Mathematically, LANCOVA is the ANCOVA form of a log-log model where both the dependent variable and the covariate is log-transformed. LANCOVA can test and estimate multiplicative effects.

Usage

```
lancova(y, g, x, plot = F)
```

Arguments

y	the raw posttest scores of a continuous outcome variable.
g	the categorical variable that denotes the group membership
x	the raw pretest scores of a continuous outcome variable.
plot	a TRUE/FALSE variable that denotes if diagnostic plots are desired. (default=F)

Value

An summary object of the LANCOVA results. In residuals, the summary statistics are of sample multiplicative errors. In the coefficients table, the estimate of the intercept is the (control group) geometric mean estimate. The estimate for the pretest scores is the power parameter beta's estimate. Other coefficient estimates are effect size measure zeta's estimates. The standard error is on the logged scale. The confidence intervals are of significance level = .05 for the control group geometric mean and for the zeta estimates, respectively, of the intercept and other coefficients The residual standard error is that of the logged scale residuals. Both R-squared and Adjusted R-squared are computed on the logged model. If 'plot=TRUE', diagnostic plots are provided.

Examples

```
data("schoene")
attach(schoene)
lancova(post_HRT,group,pre_HRT)
```

`lanova` *Logged ANOVA*

Description

Mathematically, LANOVA is the ANOVA form of a log-log model where the dependent variable is log-transformed. LANOVA can test and estimate multiplicative effects.

Usage

```
lanova(y, g, plot = F)
```

Arguments

`y`	the raw scores of a continuous outcome variable.
`g`	a categorical variable that denotes the group membership.
`plot`	a TRUE/FALSE variable that denotes if diagnostic plots are desired. (default=F)

Value

An summary object of the LANOVA results. In residuals, the summary statistics are of sample multiplicative errors. In the coefficients table, the estimate of the intercept is the default group (control group) geometric mean estimate. Other coefficient estimates are effect size measure zeta's estimates. The standard error is on the logged scale. The confidence intervals are of significance level = .05 for the control group geometric mean and for the zeta estimates, respectively, of the intercept and other coefficients The residual standard error is that of the logged scale residuals. Both R-squared and Adjusted R-squared are computed on the logged model. If 'plot=TRUE', diagnostic plots are provided.

Examples

```
# generate data
y1=rnorm(1000,5,1)+rnorm(1000)
y2=rnorm(1000,5.5,1)+rnorm(1000)
y3=rnorm(1000,6,1)+rnorm(1000)
y1=exp(y1)
y2=exp(y2)
y3=exp(y3)
dep=c(y1,y2,y3)
tc=rep(c(0,1,2),each=1000)
# applying lanova with the generated data
lanova(dep,tc)
```

pwr.lancova *Power Calculation for LANCOVA*

Description

Compute the statistical power of the LANCOVA test.

Usage

```
pwr.lancova(k, n, r_sqrd, rho_sqrd, alpha = 0.05)
```

Arguments

k	the number of groups.
n	the number of observations per group.
r_sqrd	the expected explained variance (on the logged scale)
rho_sqrd	the pretest-posttest correlation
alpha	the significance level (default=.05)

Value

power	the statistical power of test

References

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

Examples

```
pwr.lancova(3,40,.1,.4,.05)
```

pwr.lanova *Power Calculation for LANOVA*

Description

Compute the statistical power of the LANOVA test.

Usage

```
pwr.lanova(k, n, r_sqrd, alpha = 0.05)
```

Arguments

k	the number of groups.
n	the number of observations per group.
r_sqrd	the expected explained variance (on the logged scale)
alpha	the significance level (default=.05)

Value

power	the statistical power of test

References

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

Examples

```
pwr.lanova(3,40,.4,.05)
```

---

schoene *Data on Interactive Cognitive-Motor Step Training*

Description

Data from a randomized controlled trial on Interactive cognitive-motor step training. 81 observations are included. The outcome variable included is the hand reaction time. The data come from a randomzied pretest-posttest design with control and treatment groups.

Usage

```
data(schoene)
```

Format

A dataframe with 81 rows and 3 variables:

group treatment or control group from experimental manipulation

pre_HRT prettest hand reaction time

post_HRT posttest hand reaction time

References

Schoene D, Valenzuela T, Toson B, Delbaere K, Severino C, Garcia J, et al. (2015) Interactive Cognitive-Motor Step Training Improves Cognitive Risk Factors of Falling in Older Adults – A Randomized Controlled Trial. PLoS ONE 10(12): e0145161.

Examples

```
data(schoene)
head(schoene)
table(schoene$group)
```

`ss.lancova` *Sample Size Planning for LANCOVA*

Description

Compute the required per-group sample size for the LANCOVA test.

Usage

```
ss.lancova(k, rho_sqrd, r_sqrd, power = 0.8, alpha = 0.05)
```

Arguments

`k`	the number of groups.
`rho_sqrd`	the pretest-posttest correlation
`r_sqrd`	the expected explained variance by the model (on the logged scale)
`power`	the desired statistical power (default=.8)
`alpha`	the significance level (default=.05)

Value

`n`	the per-group sample size requirement

References

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

Examples

```
ss.lancova(3,.5,.01,.14,.05)
```

`ss.lanova` *Sample Size Planning for LANOVA*

Description

Compute the required per-group sample size for the LANOVA test.

Usage

```
ss.lanova(k, r_sqrd, power = 0.8, alpha = 0.05)
```

Arguments

`k`	the number of groups.
`r_sqrd`	the expected explained variance (on the logged scale)
`power`	the desired statistical power (default=.8)
`alpha`	the significance level (default=.05)

Value

`n`	the per-group sample size requirement

References

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

Examples

```
ss.lanova(3,.01,.14,.05)
```

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