

Package: `asymptest` (via `r-universe`)

September 2, 2024

Version 0.1.4

Date 2018-05-10

Title A Simple R Package for Classical Parametric Statistical Tests
and Confidence Intervals in Large Samples

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Depends R (>= 1.8.0)

Description One and two sample mean and variance tests (differences and ratios) are considered. The test statistics are all expressed in the same form as the Student t-test, which facilitates their presentation in the classroom. This contribution also fills the gap of a robust (to non-normality) alternative to the chi-square single variance test for large samples, since no such procedure is implemented in standard statistical software.

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URL <https://www.r-project.org>

NeedsCompilation no

Date/Publication 2018-05-10 12:15:54 UTC

Repository <https://lafaye.r-universe.dev>

RemoteUrl <https://github.com/cran/asymptest>

RemoteRef HEAD

RemoteSha 476e78959d7893a4531c2af8cc14b25afad4c35d

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asyp.test

Asymptotic tests

Description

Performs one and two sample asymptotic (no gaussian assumption on distribution) parametric tests on vectors of data.

Usage

```
asyp.test(x,...)
## Default S3 method:
asyp.test(x, y = NULL,
parameter = c("mean", "var", "dMean", "dVar", "rMean", "rVar"),
alternative = c("two.sided", "less", "greater"),
reference = 0, conf.level = 0.95, rho = 1, ...)
## S3 method for class 'formula'
asyp.test(formula, data, subset, na.action, ...)
```

Arguments

x	a (non-empty) numeric vector of data values.
y	an optional (non-empty) numeric vector of data values.
parameter	a character string specifying the parameter under testing, must be one of "mean", "var", "dMean" (default), "dVar", "rMean", "rVar"
alternative	a character string specifying the alternative hypothesis, must be one of "two.sided" (default), "greater" or "less". You can specify just the initial letter.
reference	a number indicating the reference value of the parameter (difference or ratio true value for two sample test)
conf.level	confidence level of the interval.
rho	optional parameter (only used for parameters "dMean" and "dVar") for penalization (or enhancement) of the contribution of the second parameter.
formula	a formula of the form lhs ~ rhs where lhs is a numeric variable giving the data values and rhs a factor with two levels giving the corresponding groups.
data	an optional matrix or data frame (or similar: see model.frame) containing the variables in the formula formula. By default the variables are taken from environment(formula).
subset	an optional vector specifying a subset of observations to be used.
na.action	a function which indicates what should happen when the data contain NAs. Defaults to <code>getOption("na.action")</code> .
...	further arguments to be passed to or from methods.

Details

Asymptotic parametric test and confidence intervals are based on the following unified statistic :

$$\frac{\hat{\theta}(Y) - \theta}{\sigma \wedge (Y\theta)}$$

which asymptotically follows a $N(0, 1)$.

θ stands for the parameter under testing (mean/variance, difference/ratio of means or variances).

The term $\sigma \wedge (Y\theta)$ is calculated by the ad-hoc `seTheta` function (see [seMean](#)).

Value

A list with class "htest" containing the following components:

<code>statistic</code>	the value of the unified θ statistic.
<code>p.value</code>	the p-value for the test.
<code>conf.int</code>	a confidence interval for the parameter appropriate to the specified alternative hypothesis.
<code>estimate</code>	the estimated parameter depending on whether it was a one-sample test or a two-sample test (in which case the estimated parameter can be a difference/ratio in means/variances).
<code>null.value</code>	the specified hypothesized value of parameter depending on whether it was a one-sample test or a two-sample test.
<code>alternative</code>	a character string describing the alternative hypothesis.
<code>method</code>	a character string indicating what type of asymptotic test was performed.
<code>data.name</code>	a character string giving the name(s) of the data.

Author(s)

J.-F. Coeurjolly, R. Drouilhet, P. Lafaye de Micheaux, J.-F. Robineau

References

Coeurjolly, J.F. Drouilhet, R. Lafaye de Micheaux, P. Robineau, J.F. (2009) `asypTest`: a simple R package for performing classical parametric statistical tests and confidence intervals in large samples, *The R Journal*

See Also

[t.test](#), [var.test](#) for normal distributed data.

Examples

```
## one sample
x <- rnorm(70, mean = 1, sd = 2)
asyp.test(x)
asyp.test(x,par="mean",alt="g")
asyp.test(x,par="mean",alt="1",ref=2)
asyp.test(x,par="var",alt="g")
asyp.test(x,par="var",alt="1",ref=2)
## two samples
y <- rnorm(50, mean = 2, sd = 1)
asyp.test(x,y)
asyp.test(x,y,"rMean","1",.75)
asyp.test(x,y,"dMean","1",0,rho=.75)
asyp.test(x,y,"dVar")
## Formula interface
asyp.test(uptake~Type,data=C02)
```

DIGdata

DIG NHLBI Teaching Dataset

Description

A clinical trial focused dataset was developed using the Digitalis Investigation Group (DIG). This dataset was designed to replicate the results found in the February 1997 New England Journal of Medicine article. Note that statistical processes such as permutations within treatment groups were used to completely anonymize the data; therefore, inferences derived from the teaching dataset may not be valid. The DIG Trial was a randomized, double-blind, multicenter trial with more than 300 centers in the United States and Canada participating. The purpose of the trial was to examine the safety and efficacy of Digoxin in treating patients with congestive heart failure in sinus rhythm. Data on 5281 male and 1519 female collected.

Format

This data frame contains the following columns:

ID Patient ID

TRTMT (0=Placebo, 1=Treatment)

AGE Calculated: age at randomization

RACE Q5: Race, 1=White 2=Nonwhite

SEX (1 = male or 2 = female)

EJFPER Q3: Ejection fraction (percent)

EJFMETH Q3A: Ejection Fraction method

CHESTX Q6: Chest X-ray (CT-Ratio)

BMI Calculated: Body Mass Index (kg per M-squared)

KLEVEL Q9A: Serum Potassium level

CREAT Q9: Serum Creatinine (mg per dL)
DIGDOSER Q10: Recommended Digoxin dose
CHFDUR Q12: Duration of CHF (months)
RALES Q13: Rales
ELEVJVP Q14: Elevated jugular venous pressure
PEDEMA Q15: Peripheral Edema
RESTDYS Q16: Dyspnea at Rest
EXERTDYS Q17: Dyspnea on Exertion
ACTLIMIT Q18: Limitation of activity
S3 Q19: S3 Gallop
PULCONG Q20: Pulmonary congestion
NSYM Calculated: Sum of Q13-Q20, Y or N status
HEARTRTE Q21: Heart Rate (beats per min)
DIABP Q22: Diastolic BP (mmHg)
SYSBP Q22: Sysolic BP (mmHg)
FUNCTCLS Q23: NYHA Functional Class
CHFETIOL Q24: CHF Etiology
PREVMI Q25: Previous Myocardial Infarction
ANGINA Q26: Current Angina
DIABETES Q27: History of Diabetes
HYPERTEN Q28: History of Hypertension
DIGUSE Q29: Digoxin within past week
DIURETK Q30: Potassium sparing Diuretics
DIURET Q31: Other Diuretics
KSUPP Q31A: Potassium supplements
ACEINHIB Q32: Ace inhibitors
NITRATES Q33: Nitrates
HYDRAL Q34: Hydralazine
VASOD Q35: Other Vasodilators
DIGDOSE Q36: Dose of Digoxin per Placebo prescribed
CVD Hosp: Cardiovascular Disease
CVDDAYS Days randomization to First CVD Hosp
WHF Hosp: Worsening Heart Failure
WHFDAYS Days randomization to First WHF Hosp
DIG Hosp: Digoxin Toxicity
DIGDAYS Days rand. to First Digoxin Tox Hosp
MI Hosp: Myocardial Infarction

MIDAYS Days randomization to First MI Hosp
UANG Hosp: Unstable Angina
UANGDAYS Days rand. to First Unstable Angina Hosp
STRK Hosp: Stroke
STRKDAY Days randomization to First Stroke Hosp
SVA Hosp: Supraventricular Arrhythmia
SVADAYS Days rand. to First SupraVent Arr. Hosp
VENA Hosp: Ventricular Arrhythmia
VENADAYS Days rand. to First Vent. Arr. Hosp
CREV Hosp: Coronary Revascularization
CREVDAYS Days rand. to First Cor. Revasc.
OCVD Hosp: Other Cardiovascular Event
OCVDDAYS Days rand. to First Other CVD Hosp
RINF Hosp: Respiratory Infection
RINFDAY Days rand. to First Resp. Infection Hosp
OTH Hosp: Other noncardiac, nonvascular
OTHDAYS Days rand. to 1st Other Non CVD Hosp
HOSP Hosp: Any Hospitalization
HOSPDAYS Days randomization to First Any Hosp
NHOSP Number of Hospitalizations
DEATH Vital Status of Patient 1=Death 0=Alive
DEATHDAY Days till last followup or death
REASON Cause of Death
DWHF Primary Endpt: Death or Hosp from HF
DWHFDAYS Days rand. to death or Hosp from WHF

Source

NHLBI Teaching Dataset

References

The effect of digoxin on mortality and morbidity in patients with heart failure . The Digitalis Investigation Group. N En gl J Med. 1997 Feb 20;336(8):525-33

Examples

data(DIGdata)

seMean	<i>se functions</i>
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Description

se functions compute the Standard Error of respectively mean, variance, difference of means, of variances and ratio of means and variances.

Usage

```
seMean(x,...)
## Default S3 method:
seMean(x,...)
seVar(x,...)
## Default S3 method:
seVar(x,...)
seDMean(x,...)
## Default S3 method:
seDMean(x, y, rho = 1, ...)
seDMeanG(x,...)
## Default S3 method:
seDMeanG(x, y,...)
seDVar(x,...)
## Default S3 method:
seDVar(x, y, rho = 1, ...)
seRMean(x,...)
## Default S3 method:
seRMean(x, y, r0,...)
seRVar(x,...)
## Default S3 method:
seRVar(x, y, r0,...)
```

Arguments

x	a (non-empty) numeric vector of data values.
y	an optional (non-empty) numeric vector of data values.
rho	optional parameter for penalization (or enhancement) of the contribution of the second parameter.
r0	an optional parameter for ratio of means (seRMean) or variances (seRVar). It acts as parameter r in seDMean and seDVar. Defaults are mean(x)/mean(y) in seRMean and var(x)/var(y) for seRVar.
...	further arguments to be passed to or from methods.

Details

se functions performs classical standard error estimation for parameters mean, variance, difference of means or variances, ratio of means or variances.

Value

Return the value of the estimated standard error for the corresponding parameter.

Author(s)

J.-F. Coeurjolly, R. Drouilhet, P. Lafaye de Micheaux, J.-F. Robineau

References

Coeurjolly, J.F. Drouilhet, R. Lafaye de Micheaux, P. Robineau, J.F. (2008) asympTest: a simple R package for performing classical parametric statistical tests and confidence intervals in large samples, The R Journal

See Also

[asymp.test](#) that used estimated standard error for asymptotic parametric tests.

Examples

```
x <- rnorm(70, mean = 1, sd = 2)
y <- rnorm(50, mean = 2, sd = 1)
## mean statistic
asymp.test(x)$stat
mean(x)/seMean(x)
## variance statistic
asymp.test(x,param="var",alt="1",param0=2)$stat
(var(x)-2)/seVar(x)
## difference of means statistic
asymp.test(x,y)$stat
(mean(x)-mean(y))/seDMean(x,y)
```


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