

Package ‘mdscore’

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Type Package

Title Improved Score Tests for Generalized Linear Models

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Depends R ($\geq 3.3.2$), MASS, stats

Suggests Sleuth3

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Description A set of functions to obtain modified score test for generalized linear models.

License GPL (≥ 2)

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LazyData yes

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`lr.test`*Likelihood ratio test for generalized linear models*

Description

Computes the likelihood ratio test for the coefficients of a generalized linear model.

Usage

```
lr.test(fit1, fit2)
```

Arguments

<code>fit1</code>	an object that stores the results of <code>glm</code> fit of the model under the null hypothesis.
<code>fit2</code>	an object that stores the results of <code>glm</code> fit of the model under the alternative hypothesis.

Details

The objects `fit1` and `fit2` are obtained using the usual options passed to the `glm` function.

Value

The function `lrt.test()` returns the following list of values:

LR	the value of the likelihood ratio statistic.
pvalue	the p value of test under null hypothesis chi-square distribution.

Note

Both `fit1` and `fit2` must have the same family and link function.

Author(s)

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References

McCullagh P, Nelder J (1989). *Generalized Linear Models*. Chapman & Hall/CRC, London.
Da Silva DN, Cordeiro GM (2009). "A Computer Program to Improve LR Tests for Generalized Linear Models." *Communications in Statistics – Simulation and Computation*, 38(10), 2184–2197.

See Also

[mdscore](#)
[wald.test](#)

Examples

```
data(strength)
fitf <- glm(y ~ cut * lot, data = strength, family = inverse.gaussian("inverse"))
fit0 <- glm(y ~ cut + lot, data = strength, family = inverse.gaussian("inverse"))
lr.test(fit0, fitf)
```

mdscore

*Modified score test for generalized linear models***Description**

Computes the modified score test based for the coefficients of a generalized linear model.

Usage

```
mdscore(model = model, X1 = X1, phi = NULL)
```

Arguments

model	an object that stores the results of glm fit of the model under the null hypothesis.
X1	the matrix with the columns of the model matrix X that correspond to the coefficients being specified in the null hypothesis.
phi	the precision parameter.

Details

The object `fit.model` is obtained using the usual options passed to the `glm` function.

Value

The function `mdscore()` returns the following list of values:

Sr	the value of the score statistic.
Srcor	the value of the modified score statistic.
coef	a vector with the coefficients A1 , A2 and A3.
n	the total sample size.
df	the number of degrees of freedom of the chi-squared approximations for the tests.
phi	the precision parameter used in the computations

Author(s)

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References

- Cordeiro GM, Ferrari SLP (1991). A Modified Score Test Statistic Having chi-squared Distribution to Order $n-1$. *Biometrika*, 78(3), 573–582.
- Cordeiro GM, Ferrari SLP, Paula GA (1993). Improved Score Tests for Generalized Linear Models. *Journal of the Royal Statistical Society B*, 55(3), 661–674.
- Cribari-Neto F, Ferrari SLP (1995). Second Order Asymptotics for Score Tests in Generalised Linear Models. *Biometrika*, 82(2), 426–432.
- da Silva-Junior AHM, da Silva DN, Ferrari SLP (2014). mdscore: An R Package to Compute Improved Score Tests in Generalized Linear Models. *Journal of Statistical Software*, 61(2), 1-16., <http://www.jstatsoft.org/v61/c02/>

See Also

[summary.mdscore](#)

Examples

```
data(strength)
fitf <- glm(y ~ cut * lot, data = strength, family = inverse.gaussian("inverse"))
summary(fitf)
X <- model.matrix(fitf, data = strength)
fit0 <- glm(y ~ cut + lot, data = strength, family = inverse.gaussian("inverse"))
mdscore(fit0, X1=X[, 7:10])
```

strength

Impact Strength an Insulating Material

Description

The dataset is a subsample of the 5 x 2 factorial experiment given by Ostle and Mensing (1963).

Usage

```
data(strength)
```

Format

A data frame with 30 observations on the following 3 variables.

cut type of specimen cut.

lot lot of the material – I, II, III, IV and V.

y observations of the impact strength.

Source

Ostle B, Mensing RW (1963). *Statistics in Research: Basic Concepts and Techniques for Research Workers*. Iowa State University.

Examples

```
data(strength)
fitf <- glm(y ~ cut * lot, data = strength, family = inverse.gaussian("inverse"))
summary(fitf)
X <- model.matrix(fitf, data = strength)
fit0 <- glm(y ~ cut + lot, data = strength, family = inverse.gaussian("inverse"))
test <- mdscore(fit0, X1=X[, 7:10])
summary(test)
```

summary.mdscore	<i>Summary methods for mdscore objects</i>
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Description

summary methods for the mdscore objects

Usage

```
## S3 method for class 'mdscore'
summary(object, ...)
```

Arguments

object	object resulting from a run of the mdscore function.
...	not currently used

Author(s)

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References

da Silva-Junior AHM, da Silva DN, Ferrari SLP (2014). mdscore: An R Package to Compute Improved Score Tests in Generalized Linear Models. *Journal of Statistical Software*, 61(2), 1-16., <http://www.jstatsoft.org/v61/c02/>

See Also

[mdscore](#)

Examples

```
library(Sleuth3)
d <- transform(case1102, TLrat = Brain/Liver, Ltime = log(Time),
               Lwrat = log((Weight + Loss)/Weight),
               Treat = factor(Treatment == "BD",
                             labels=c("NS", "BD"))
               )
```

```

fitf <- glm(TLrat ~ Ltime * Treat + Days + Sex + Lwrat
            + Tumor + Treat*Lwrat, data = d,
            family = Gamma("log")
            )
X <- model.matrix(fitf)
fit0 <- glm(TLrat ~ Ltime * Treat + Sex + Lwrat + Tumor + Days,
            data=d, family=Gamma("log"))
test <- mdscore(fit0, X1=X[,9], phi=NULL)
summary(test)

```

wald.test

Wald test for generalized linear models

Description

Computes the Wald score test for the coefficients of a generalized linear model.

Usage

```
wald.test(model = model, terms)
```

Arguments

model	an object that stores the results of glm fit of the model under the null hypothesis.
terms	number of coefficients to be tested under null hypothesis

Details

The object model is obtained using the usual options passed to the glm function.

Value

The function wald.test() returns the following list of values:

W	the value of the Wald statistic.
pvalue	the p value of test under null hypothesis chi-square distribution.

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References

McCullagh P, Nelder J (1989). *Generalized Linear Models*. Chapman & Hall/CRC, London.

See Also

[lr.test](#)

[mdscore](#)

Examples

```
data(strength)
fitf <- glm(y ~ cut * lot, data = strength, family = inverse.gaussian("inverse"))
wald.test(fitf, term=9)
```

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