Package 'dwlm'

May 8, 2026

Type Package

Title Doubly Weighted Linear Model

Version 0.1.0

Date 2019-09-01

Author Hugo Gasca-Aragon [aut,cre]

Maintainer Hugo Gasca-Aragon <hugo_gasca_aragon@hotmail.com>

Description This linear model solution is useful when both predictor and response have associated uncertainty. The doubly weights linear model solution is invariant on which quantity is used as predictor or response. Based on the results by Reed(1989) <doi:10.1119/1.15963> and Ripley & Thompson(1987) <doi:10.1039/AN9871200377>.

Depends stats (>= 3.4.0), R (>= 3.4.0)

License GPL (>= 2)

Encoding UTF-8

NeedsCompilation no

Repository CRAN

Date/Publication 2019-09-09 10:20:02 UTC

Contents

dwlm 1

Index **4**

`dwlm` *Solves the doubly weighted simple linear model*

Description

Fits the simple linear model using weights on both the predictor and the response

Usage

```
dwlm(x, y, weights.x = rep(1, length(x)),
weights.y = rep(1, length(y)), subset = rep(TRUE, length(x)),
sigma2.x = rep(0, length(x[subset])),
from = min((y[subset] - mean(y[subset]))/(x[subset] - mean(x[subset]))),
to = max((y[subset] - mean(y[subset]))/(x[subset] - mean(x[subset]))),
n = 1000, max.iter = 100, tol = .Machine$double.eps^0.25,
method = c("MLE", "SSE", "R"), trace = FALSE, coef.H0 = c(0,1), alpha = 0.05)
```

Arguments

x	the predictor values
y	the response values
weights.x	the weight attached to the predictor values
weights.y	the weight attached to the response values
subset	a logical vector or a numeric vector with the positions to be considered
sigma2.x	numeric, the variance due to heterogeneity in the predictor value
from	numeric, the lowest value of the slope to search for a solution
to	numeric, the highest value of the slope to search for a solution
n	integer, the number of slices the search interval (from, to) is divided in
max.iter	integer, the maximum number of allowed iterations
tol	numeric, the maximum allowed error tolerance
method	string, the selected method (MSE, SSE, R) as described in the references.
trace	logical, flag to keep track of the solution
coef.H0	numeric vector, the coeffients to test against to for significant difference
alpha	numeric, the significance level for estimating the Degrees of Equivalence (DoE)

Value

A list with the following elements:

x	original pedictor values
y	original response values
weights.x	original predictor weigths
weights.y	original response weights
subset	original subset parameter
coef.H0	original parameter value for hypothesis testing against to
coefficients	estimated parameters for the linear model solution
cov.mle	Maximum Likelihood Estimafor for the covariance matrix
cov.lse	Least Squares Estiimator for the covariance matrix
x.hat	fitted true predictor value, this is a latent (unobserved) variable

y.hat	fitted true response value, this is a latent (unobserved) variable
df.residuals	degrees of freedom
MSE	mean square error of the solution
DoE	pointwise degrees of equivalente between the observed and the latent variables
u.DoE.mle	uncerainty of the pointwise degrees of equivalence using maximum likelihood solution
u.DoE.lse	uncertainty of the pointwise degrees of equivalence using least squares solution
dm.dXj	partial gradient of the slope with respect to the jth predictor variable
dm.dYj	partial gradient of the slope with respect to the jth response variable
dc.dXj	partial gradient of the intercept with respect to the jth predictor variable
dc.dYj	partial gradient of the intercept with respect to the jth response variable
curr.iter	number of iterations
curr.tol	reached tolerance

Author(s)

Hugo Gasca-Aragon

Maintainer: Hugo Gasca-Aragon <hugo_gasca_aragon@hotmail.com>

References

Reed, B.C. (1989) "Linear least-squares fits with errors in both coordinates", American Journal of Physics, 57, 642. https://doi.org/10.1119/1.15963

Reed, B.C. (1992) "Linear least-squares fits with errors in both coordinates. II: Comments on parameter variances", American Journal of Physics, 60, 59. https://doi.org/10.1119/1.17044

Ripley and Thompson (1987) "Regression techniques for the detection of analytical bias", Analysts, 4. https://doi.org/10.1039/AN9871200377

See Also

lm

Examples

```
# Example ISO 28037 Section 7
X.i<- c(1.2, 1.9, 2.9, 4.0, 4.7, 5.9)
Y.i<- c(3.4, 4.4, 7.2, 8.5, 10.8, 13.5)
sd.X.i<- c(0.2, 0.2, 0.2, 0.2, 0.2, 0.2)
sd.Y.i<- c(0.2, 0.2, 0.2, 0.4, 0.4, 0.4)

# values obtained on sep-26, 2016
dwlm.res <- dwlm(X.i, Y.i, 1/sd.X.i^2, 1/sd.Y.i^2,
from = 0, to=3, coef.H0=c(0, 2), tol = 1e-10)
dwlm.res$coefficients
dwlm.res$cov.mle[1, 2]
dwlm.res$curr.tol
dwlm.res$curr.iter
```

Index

∗ **dwlm**
dwlm, 1

dwlm, 1

lm, *3*