Package ‘rpls’

March 8, 2020

Type Package
Title Robust Partial Least Squares
Version 0.4.0
Author Peter Filzmoser, Sukru Acitas, Birdal Senoglu and Maximilian Plattner
Maintainer Peter Filzmoser <peter.filzmoser@tuwien.ac.at>
Description A robust Partial Least-Squares (PLS) method is implemented that is robust to outliers in the residuals as well as to leverage points. A specific weighting scheme is applied which avoids iterations, and leads to a highly efficient robust PLS estimator.
License GPL (>= 3)
Imports pcaPP, robustbase
NeedsCompilation no
Repository CRAN
Date/Publication 2020-03-08 18:10:02 UTC

R topics documented:

pramml ................................................................. 1
PRM ................................................................. 3
ramml ................................................................. 4

Index

pramml

Partial Robust Adaptive Modified Maximum Likelihood

Description

Robust Adaptive Modified Maximum Likelihood (RAMML) estimators can be used in the context of PLS to obtain scores and loadings in the latent regression model. The corresponding method is called Partial RAMML (PRAMML).
Usage

pramml(X, y, a, reg = "lts", pmml, opt = "l1m", usesvd = FALSE)

Arguments

X predictor matrix
y response variable
a number of PLS components
reg regression procedure to be used to compute initial estimate of parameter for the linearization of the intractable term; choices are LTS regression ("lts") and S regression ("s")
pmml shape parameter of long-tailed symmetric distribution (considered as robustness tuning constant)
opt if "l1m" the mean centering is done by the l1-median; otherwise if "median" the coordinate-wise median is taken
usesvd if TRUE singular value decomposition is performed; logical, default is FALSE

Value

coeffic vector with regression coefficients
intercept coefficient for intercept
wy vector of length(y) with residual weights
wt vector of length(y) with weights for leverage
w overall weights
scores matrix with PLS X-scores
loadings matrix with PLS X-loadings
fitted.values vector with fitted y-values
loadings column means of X
fitted.values mean of y

Author(s)

Sukru Acitas <sacitas@eskisehir.edu.tr>

References


Examples

U <- c(rep(2,20), rep(5,30))
X <- replicate(6, U+rnorm(50))
beta <- c(rep(1, 3), rep(-1,3))
e <- c(rnorm(45,0,1.5),rnorm(5,-20,1))
y <- X%*%beta + e
res <- pramml(X, y, 4,"s", 16.5, opt ="l1m")
**Robust PLS**

**Description**

Robust PLS by partial robust M-regression.

**Usage**

```r
PRM(formula, data, a, wfunX, wfunY, center.type, scale.type, usesvd, numit, prec)
```

**Arguments**

- `formula`: an object of class formula
- `data`: a data frame which contains the variables given in formula
- `a`: number of PLS components
- `wfunX`: weight function to downweight leverage points; predefined weight functions "Fair", "Huber", "Tukey" and "Hampel" with respective tuning constants are passed via a list object, e.g. `list("Fair",4)`
- `wfunY`: weight function to downweight residuals; predefined weight functions "Fair", "Huber", "Tukey" and "Hampel" with respective tuning constants are passed via a list object, e.g. `list("Fair",4)`
- `center.type`: type of centering of the data in form of a string that matches an R function, e.g. "median"
- `scale.type`: type of scaling for the data in form of a string that matches an R function, e.g. "qn" or alternatively "no" for no scaling
- `numit`: the number of maximal iterations for the convergence of the coefficient estimates
- `prec`: a value for the precision of estimation of the coefficients
- `usesvd`: if TRUE singular value decomposition is performed; logical, default is FALSE

**Details**

M regression is used to robustify PLS. Employment of separate weight functions for leverage points and residuals.

**Value**

- `coef`: vector with regression coefficients
- `intercept`: coefficient for intercept
- `wy`: vector of length(y) with residual weights
- `wt`: vector of length(y) with weights for leverage
- `w`: overall weights
- `scores`: matrix with PLS X-scores
- `loadings`: matrix with PLS X-loadings
- `fitted.values`: vector with fitted y-values
Description

Modified Maximum Likelihood (MML) estimators are asymptotically equivalent to the ML estimators but their methodology works under the assumption of a known shape parameter. Robust Adaptive MML estimators weaken this assumption and are robust to vertical outliers as well as leverage points.

Usage

ramml(X, y, p, e)

Arguments

- X: predictor matrix
- y: response variable
- p: shape parameter of long-tailed symmetric distribution (considered as robustness tuning constant)
- e: parameter for the linearization of the intractable term
Value

- coef: vector of coefficients
- scale: estimate of sigma
- fitted.values: vector with fitted y-values
- residuals: vector with y-residuals

Author(s)

Sukru Acitas <sacitas@eskisehir.edu.tr>

References

Index

*Topic multivariate
  pramml, 1
  PRM, 3
  ramml, 4

pramml, 1
PRM, 3
ramml, 4