Package 'LadR'

February 25, 2019

Type Package

Title Routines for Fit, Inference and Diagnostics in LAD Models

Version 1.0.6

Author Kévin Allan Sales Rodrigues <kevin.asr@outlook.com>

Maintainer Kevin Allan Sales Rodrigues <kevin.asr@outlook.com>

Description LAD (Least Absolute Deviations) estimation for linear regression, confidence intervals, tests of hypotheses, methods for outliers detection, measures of leverage, methods of diagnostics for LAD regression, special diagnostics graphs and measures of leverage. The algorithms are based in Dielman (2005) <doi:10.1080/00949650420002236 80>, Elian et al. (2000) <doi:10.1080/03610920008832518> and Dodge (19 age also has two datasets ``houses" and ``pollution", respectively, from Narula and Wellington (1977) <doi:10.2307/1268628> and Santos et al. (2016) <doi:10.1371/journal.pone.0163225>.

License GPL (>= 3.0)

Depends R (>= 3.4.0)

Encoding UTF-8

LazyData true

Imports stats, grDevices, graphics, L1pack

RoxygenNote 6.1.0

NeedsCompilation yes

Repository CRAN

Date/Publication 2019-02-25 21:00:04 UTC

R topics documented:

`CookDistance` *Calculate Cook Distance*

Description

Calculate Cook Distance

Usage

```
CookDistance(y, X)
```

Arguments

`y`	A vector with response variables.
`X`	A matrix or vector with explanatory variables.

Value

`Cook Distance`	A vector with Cook Distance for each observation.

.

References

Sun, R.-B. and Wei, B.-C. (2004) On influence assessment for lad regression. *Statistics & Probability Letters*, **67**, 97-110. doi: 10.1016/j.spl.2003.08.018.

Examples

```
### Using stackloss data

CookDistance(stack.loss, stack.x)
```

detectOutliers *Algorithm To Detect Outliers*

Description

Algorithm To Detect Outliers

Usage

```
detectOutliers(y, X, intercepto = 1)
```

Arguments

y	A vector with response variables.
X	A matrix or vector with explanatory variables.
intercepto	1 for a model with intercept and 0 for a model without intercept.

Value

outliers	A vector with outliers indices.

.

References

Dodge, Y. (1997) Lad regression for detecting outliers in response and explanatory variables. *Journal of Multivariate Analysis*, **61**, 144–158. doi: 10.1006/jmva.1997.1666

Examples

```
### Using stackloss data

detectOutliers(stack.loss, stack.x)
```

FD *F Distance*

Description

F Distance

Usage

```
FD(y, X)
```

Arguments

y	A vector with response variables.
X	A matrix or vector with explanatory variables.

Value

F Distance	A vector with F Distance for each observation.

.

References

Sun, R.-B. and Wei, B.-C. (2004) On influence assessment for lad regression. *Statistics & Probability Letters*, **67**, 97-110. doi: 10.1016/j.spl.2003.08.018.

Examples

```
### Using stackloss data

CookDistance(stack.loss, stack.x)
```

FD1 *F1 Distance*

Description

F1 Distance

Usage

```
FD1(y, X)
```

Arguments

y	A vector with response variables.
X	A matrix or vector with explanatory variables.

Value

F1 Distance	A vector with F1 Distance for each observation.

.

References

Sun, R.-B. and Wei, B.-C. (2004) On influence assessment for lad regression. *Statistics & Probability Letters*, **67**, 97-110. doi: 10.1016/j.spl.2003.08.018.

Examples

```
### Using stackloss data

CookDistance(stack.loss, stack.x)
```

---

houses *Prices of 27 houses*

Description

A dataset containing the prices and other attributes of 27 houses. The variables are as follows:

Usage

```
data(houses)
```

Format

A data frame with 27 rows and 5 variables

Details

- Price. sale price of house in thousands of US dollars
- Taxes. taxes in hundreds of US dollars
- Area. total area in thousands of square feet
- Constructed Area. constructed area in thousands of square feet
- Age. age of the property in years

References

Narula, S. C. and Wellington, J. F. (1977). Prediction, linear regression and minimum sum of absolute errors. *Technometrics*, **19**, 185-190. doi: 10.2307/1268628

`ladfit` *Fitting LAD Models*

Description

Fitting LAD Models

Usage

```
ladfit(x, y, intercept = TRUE)
```

Arguments

`x`	A matrix or vector with explanatory variables.
`y`	A vector with response variables.
`intercept`	TRUE for a model with intercept and FALSE for a model without intercept.

Details

The Barrodale-Roberts algorithm, which is a specialized linear programming algorithm, is used.

Value

list defining the regression (compare with function `lsfit`).

`coefficients`	vector of coefficients.
`residuals`	residuals from the fit.
`message`	vector of one or two character strings stating whether a non-unique solution is possible, or if the x matrix was found to be rank deficient.

References

Barrodale, I., and Roberts, F.D.K. (1973). An improved algorithm for discrete L1 linear approximations. *SIAM Journal of Numerical Analysis* **10**, 839-848.

Barrodale, I., and Roberts, F.D.K. (1974). Solution of an overdetermined system of equations in the L1 norm. *Communications of the ACM* **17**, 319-320.

Bloomfield, P., and Steiger, W.L. (1983). *Least Absolute Deviations: Theory, Applications, and Algorithms.* Birkhauser, Boston, Mass.

Examples

```
### Using stackloss data

ladfit(stack.x, stack.loss, intercept =TRUE)
```

ladreg *Fitting LAD Models*

Description

Fitting LAD Models

Usage

```
ladreg(y, X, intercept = 1, alpha = 0.05, print = 1)
```

Arguments

y	A vector with response variables.
X	A matrix or vector with explanatory variables.
intercept	1 for a model with intercept and 0 for a model without intercept.
alpha	significance level to hypotheses tests.
print	1 to print response variables, fitted values and residuals, 0 to don't print.

Value

outliers	A vector with outliers indices.

.

References

Dielman, T. E. (2005) Least absolute value regression: recent contributions. *Journal of Statistical Computational and Simulation*, **75**(4), 263–286. doi: 10.1080/00949650420002236 80

Examples

```
### Using stackloss data

ladreg(stack.loss, stack.x, intercept =1, alpha=0.05, print=1)
```

likelihoodD *Calculate Likelihood Displacement*

Description

Calculate Likelihood Displacement

Usage

```
likelihoodD(y, X)
```

Arguments

y	A vector with response variables.
X	A matrix or vector with explanatory variables.

Value

`Likelihood Displacement`
A vector with Likelihood Displacement for each observation.

.

References

Elian, S. N., André, C. D. S. and Narula, S. C. (2000) Influence Measure for the $L1$ regression. *Communications in Statistics - Theory and Methods*, **29**(4), 837-849. doi: 10.1080/03610920008832518.

Examples

```
### Using stackloss data

likelihoodD(stack.loss, stack.x)
```

likelihoodDC *Calculate Conditional Likelihood Displacement*

Description

Calculate Conditional Likelihood Displacement

Usage

```
likelihoodDC(y, X)
```

Arguments

y	A vector with response variables.
X	A matrix or vector with explanatory variables.

Value

`Conditional Likelihood Displacement`
A vector with Conditional Likelihood Displacement for each observation.

.

References

Elian, S. N., André, C. D. S. and Narula, S. C. (2000) Influence Measure for the $L1$ regression. *Communications in Statistics - Theory and Methods*, **29**(4), 837-849. doi: 10.1080/03610920008832518.

Examples

```
### Using stackloss data

likelihoodDC(stack.loss, stack.x)
```

---

pollution *Data about pollution*

Description

A dataset containing 30 attributes of pollution. The variables are as follows:

Usage

```
data(pollution)
```

Format

A data frame with 101 rows and 30 variables

Details

- Occupation.
- Age.
- Bmi.
- Waist circunference.
- Time in job.
- Work shift.
- Exhlaled carbon monoxide.

- PM25.
- Exposure.
- ETS.
- ETS at home.
- ETS at work.
- HAS_DM.
- Haemoglobin.
- Hematocrit.
- White blood cells.
- Total Cholesterol.
- HDL.
- LDL.
- Albumin.
- Fasting blood clucose.
- FVCmeas.
- FVC pred.
- FEV1meas.
- FEV1 pred.
- FEVFVCmeas.
- FEF25 75 FVCmeas.
- FEF25 75 FVC pred.
- PFEmeas.
- PFE pred.
- Age. age of the property in years

References

Santos et al. (2016). Association between Traffic Air Pollution and Reduced Forced Vital Capacity: A Study Using Personal Monitors for Outdoor Workers. *PLoS ONE*, **11**(10): e0163225. doi: 10.1371/journal.pone.0163225.

Index