

Package ‘rlmm’

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Type Package

Title robust linear mixed models

Version 1.0

Date 2022-08-24

Author Ian Meneghel Danilevich

Maintainer Ian Meneghel Danilevich <iandanilevich@gmail.com>

Description This package solves robust linear mixed models using Huber, Tukey or Least Squared loss function.

License GPL (>= 2)

Encoding UTF-8

LazyData true

Imports Rcpp (>= 1.0.5), MASS (>= 7.3-49)

LinkingTo Rcpp, RcppArmadillo

RoxyenNote 7.2.1

NeedsCompilation yes

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rlmm-package	<i>robust linear mixed models</i>
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Description

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Details

The DESCRIPTION file:

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Index of help topics:

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roblim	Robust linear model

This section should provide a more detailed overview of how to use the package, including the most important functions.

Author(s)

Ian Meneghel Danilevich

Maintainer: Ian Meneghel Danilevich <iandanilevich@gmail.com>

References

This optional section can contain literature or other references for background information.

See Also

Optional links to other man pages

Examples

```
## Optional simple examples of the most important functions
## Use \dontrun{} around code to be shown but not executed
```

roblim

*Robust linear model***Description**

Estimate parameters of a robust linear mixed models.

Usage

```
roblim(
  y,
  x,
  z,
  subj,
  cor = "Ind",
  loss = "Huber",
  c = 1.345,
  weight = TRUE,
  tol = 1e-04
)
```

Arguments

y	Numeric vector, outcome.
x	Numeric matrix, covariates
z	Numeric vector or matrix, a vector of 1's for random intercepts, a vector of one covariate for random slopes.
subj	Numeric vector, identifies the unit to which the observation belongs.
cor	Factor, "Ind" for independent residuals, "AR1" for autoregressive first order residuals.
loss	Factor, "LS" least squared loss function, "Huber" loss function or "Tukey" loss function.
c	Numeric, positive real number, common choices are 1.345 for Huber and 4.685 for Tukey.
weight	Factor, if TRUE uses the Cantoni's weights, if FALSE does not.
tol	Numeric scalar, internal value, small value.

Value

beta Numeric vector, exploratory variables' coefficients.
 sigma Numeric, standard deviation.
 Psi Numeric matrix, covariance structure.
 phi Numeric, scalar of covariance structure.
 SE Numeric vector, exploratory variables' standard errors.

loss Factor, "LS" least squared loss function, "Huber" loss function or "Tukey" loss function.
cor Factor, "Ind" for independent residuals, "AR1" for autoregressive first order residuals.

References

Danilevicz, I.M., Bondon, P., Reisen, V.A., Serpa, F.S. (2022), "A longitudinal study of the influence of air pollutants on respiratory health. A robust multivariate approach". Journal, vol number pages.
Gill, P.S. (2000), "A robust mixed linear model analysis for longitudinal data", Stat. Med., 19: 975-987.
Cantoni, E., Ronchetti, E. (2001), "Robust Inference for Generalized Linear Models", J. Am. Stat. Assoc., 96 (455): 1022-1030.

Examples

```
n = 10
m = 5
d = 4
N = n*m
x = matrix(rnorm(d*N), ncol=d, nrow=N)
subj = rep(1:n, each=m)
gamma = rnorm(n)
z = rep(1,N)
beta = rnorm(d)
eps = rnorm(N)
y = as.vector(x %*% beta + rep(gamma, each=m) + eps)
m1 = roblim(y, x, z, subj, cor="Ind", loss="Huber", c=1.345, weight = FALSE)
m1
```

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