

Package ‘rlmm’

December 1, 2022

Type Package

Title Robust Linear Mixed Models

Version 1.1

Date 2022-12-01

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

License GPL (>= 2)

Encoding UTF-8

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

LinkingTo Rcpp, RcppArmadillo

Suggests tinytest (>= 1.3.1)

RoxygenNote 7.2.1

NeedsCompilation yes

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rlmm-package	<i>Robust Linear Mixed Models</i>
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Description

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

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Maintainer

NA

Author(s)

NA

rmm	<i>Robust linear model</i>
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Description

Estimate parameters of a robust linear mixed models.

Usage

```
rmm(
  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 = rmm(y, x, z, subj, cor="Ind", loss="Huber", c=1.345, weight = FALSE)
m1
```

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