

Package ‘free’

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Type Package

Title Flexible Regularized Estimating Equations

Version 1.0.1

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Description Unified regularized estimating equation solver. Currently the package includes one solver with the l1 penalty only. More solvers and penalties are under development. Reference: Yi Yang, Yuwen Gu, Yue Zhao, Jun Fan (2021) <[arXiv:2110.11074](#)>.

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Imports Rcpp (>= 1.0.7)

LinkingTo Rcpp, RcppArmadillo

Encoding UTF-8

RoxygenNote 7.1.2

Suggests testthat (>= 3.0.0)

Config/testthat/edition 3

NeedsCompilation yes

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free-package	<i>Flexible Regularized Estimating Equations</i>
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Description

Unified regularized estimating equation solver. Currently include one solver with the l1 penalty only. More solvers and penalties are under development.

free_lasso	<i>Main solver of free</i>
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Description

Main solver of free

Usage

```
free_lasso(
  p,
  lambda,
  est_func,
  par_init,
  alpha,
  tau,
  maxit = 1000L,
  tol_ee = 1e-06,
  tol_par = 1e-06,
  verbose = FALSE
)
```

Arguments

p	The dimension of the dataset
lambda	Lasso regularization coefficient
est_func	R function, the estimating function specified by the user
par_init	Optional, initial value for parameter update
alpha	Tuning parameter
tau	Tuning parameter
maxit	Maximum iterations
tol_ee	Convergence criterion based on the update of the estimating function
tol_par	Convergence criterion based on the update of the parameter
verbose	logical, print updates

Value

A list containing the regularized estimating equation estimates and the number of iterations it takes to converge.

Examples

```
# Standardize data
dat <- scale(mtcars)
x <- as.matrix(dat[, -1])
y <- as.vector(dat[, 1])
n <- nrow(x)
p <- ncol(x)

# Specify estimating function
ufunc <- function(b) {
  1/n * crossprod(x, (x %*% b - y) )
}

# Set hyperparameters
tau <- 0.6
alpha <- 0.5

# Set regularization coefficient
lambda1 <- 0
free_R1 <- free_lasso(p = p,
  lambda = lambda1,
  est_func = ufunc,
  par_init = rep(0, p),
  alpha = alpha,
  tau = tau,
  maxit = 10000L,
  tol_ee = 1e-20,
  tol_par = 1e-10,
  verbose = FALSE)
free_R1$coefficients

# Compare with lm() - very close
lm(y~x-1)$coefficients

# Set regularization coefficient
lambda2 <- 0.7
free_R2 <- free_lasso(p = p,
  lambda = lambda2,
  est_func = ufunc,
  par_init = rep(0, p),
  alpha = alpha,
  tau = tau,
  maxit = 10000L,
  tol_ee = 1e-20,
  tol_par = 1e-10,
  verbose = FALSE)
free_R2$coefficients
```


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