Package ‘parglm’

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R topics documented:

   parglm ................................................................. 2
   parglm.control .................................................... 3

Index 5
parglm

Fitting Generalized Linear Models in Parallel

Description

Function like glm which can make the computation in parallel. The function supports most families listed in family. See "vignette("parglm","parglm")" for run time examples.

Usage

parglm(formula, family = gaussian, data, weights, subset, na.action, 
start = NULL, offset, control = list(...), contrasts = NULL, 
model = TRUE, x = FALSE, y = TRUE, ...)

parglm.fit(x, y, weights = rep(1, NROW(x)), start = NULL, 
etastart = NULL, mustart = NULL, offset = rep(0, NROW(x)), 
family = gaussian(), control = list(), intercept = TRUE, ...)

Arguments

formula an object of class formula.
family a family object.
data an optional data frame, list or environment containing the variables in the model.
weights an optional vector of 'prior weights' to be used in the fitting process. Should be NULL or a numeric vector.
subset an optional vector specifying a subset of observations to be used in the fitting process.
na.action a function which indicates what should happen when the data contain NAs.
start starting values for the parameters in the linear predictor.
offset this can be used to specify an a priori known component to be included in the linear predictor during fitting.
control a list of parameters for controlling the fitting process. For parglm.fit this is passed to parglm.control.
contrasts an optional list. See the contrasts.arg of model.matrix.default.
model a logical value indicating whether model frame should be included as a component of the returned value.
x, y For parglm: logical values indicating whether the response vector and model matrix used in the fitting process should be returned as components of the returned value.
For parglm.fit: x is a design matrix of dimension n*p, and y is a vector of observations of length n.
... For parglm: arguments to be used to form the default control argument if it is not supplied directly.
For parglm.fit: unused.
etastart  starting values for the linear predictor. Not supported.
mustart  starting values for the vector of means. Not supported.
intercept logical. Should an intercept be included in the null model?

Details
The current implementation uses \( \min(as.integer(n / p), \text{nthreads}) \) threads where \( n \) is the number of observations, \( p \) is the number of covariates, and \( \text{nthreads} \) is the \( \text{nthreads} \) element of the list returned by \text{parglm.control}. Thus, there is likely little (if any) reduction in computation time if \( p \) is almost equal to \( n \). The current implementation cannot handle \( p > n \).

Value
glm object as returned by \text{glm} but differs mainly by the \text{qr} element. The \text{qr} element in the object returned by \text{parglm(.fit)} only has the \( R \) matrix from the QR decomposition.

Examples
# small example from 'help('glm')'. Fitting this model in parallel does not matter as the data set is small
clotting <- data.frame(
  u = c(5,10,15,20,30,40,60,80,100),
  lot1 = c(118,58,42,35,27,25,21,19,18),
  lot2 = c(69,35,26,21,18,16,13,12,12))
f1 <- glm (lot1 ~ log(u), data = clotting, family = Gamma)
f2 <- parglm(lot1 ~ log(u), data = clotting, family = Gamma,
control = parglm.control(nthreads = 2L))
all.equal(coef(f1), coef(f2))

parglm.control

Auxiliary for Controlling GLM Fitting in Parallel

Description
Auxiliary function for \text{parglm} fitting.

Usage
parglm.control(epsilon = 1e-08, maxit = 25, trace = FALSE, nthreads = 1L, block_size = NULL, method = "LINPACK")

Arguments
epsilon  positive convergence tolerance.
maxit integer giving the maximal number of IWLS iterations.
trace logical indicating if output should be produced doing estimation.
nthreads  number of cores to use. You may get the best performance by using your number of physical cores if your data set is sufficiently large. Using the number of physical CPUs/cores may yield the best performance (check your number e.g., by calling parallel::detectCores(logical = FALSE)).

block_size  number of observation to include in each parallel block.

method  string specifying which method to use. Either "LINPACK", "LAPACK", or "FAST".

Details

The LINPACK method uses the same QR method as glm.fit for the final QR decomposition. This is the dqrdc2 method described in qr. All other QR decompositions but the last are made with DGEQP3 from LAPACK. See Wood, Goude, and Shaw (2015) for details on the QR method.

The FAST method computes the Fisher information and then solves the normal equation. This is faster but less numerically stable.

Value

A list with components named as the arguments.

References


Examples

# use one core
clotting <- data.frame(
  u = c(5,10,15,20,30,40,60,80,100),
  lot1 = c(118,58,42,35,27,25,21,19,18),
  lot2 = c(69,35,26,21,18,16,13,12,12))
f1 <- parglm(lot1 ~ log(u), data = clotting, family = Gamma,
  control = parglm.control(nthreads = 1L))

# use two cores
f2 <- parglm(lot1 ~ log(u), data = clotting, family = Gamma,
  control = parglm.control(nthreads = 2L))
all.equal(coef(f1), coef(f2))
Index

family, 2
formula, 2

glm, 2, 3
glm.fit, 4

model.matrix.default, 2

parglm, 2, 3
parglm.control, 2, 3, 3

qr, 4