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REGULARIZED MIXTURE OF EXPERTS FOR GENERALIZED LINEAR MODELS
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We introduce 3 packages for the Regularized Mixture of Experts
models using the Lasso penalty:
     + Gaussian: RMoE package;
     + Poisson: PoissonRMoE package;
     + Logistic: LogisticRMoE package.
Please open the R project file and press "Ctrl + Shift + B" to
install package.

Each package has one main function:
     + RMoE: RMoE(X, Y, K, Lambda, Gamma, option);
     + PoissonRMoE: PoissonRMoE(X, Y, K, Lambda, Gamma,
option);
     + LogisticRMoE: LogisitcRMoE(X, Y, K, R, Lambda, Gamma,
option);

where

+ X: matrix of explanatory variables. Each feature should be
standardized to have mean 0 and variance 1. One must add the
column vector (1,1,...,1) for the intercept variable;

+ Y: vector of the response variable. For the Gaussian case Y
should be standardized. For multi-logistic model Y is numbered
from 1 to R (R is the number of labels of Y);

+ K: number of experts (K > 1);

+ R: number of labels of Y, used only for the logistic model.

+ Lambda: penalty value for the experts. In this work, lambda[k]
= Lambda, for all k in {1,..,K} (Lambda >= 0);

+ Gamma: penalty value for the gating network. Here, gambda[k] =
Lambda, for all k in {1,..K-1} (Gamma >= 0);

+ option: we use two methods to maximizing the M-step: proximal
Newton and proximal Newton-type method.
     - For proximal Newton: option = 0;
     - For proximal Newton-type: option = 1;
Note that, the EM algorithm based on proximal Newton method can
be stuck, especially in logistic model. In this case, the
proximal Newton-type approach is a suitable choice.

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       RESULTS
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The results are stored in 5 different ".txt" files:

+ Para.txt: contains the parameters for the experts and gating
network, where the last (K-1) vectors are vectors of the gating
network, the remains are vectors of the experts;
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+ LOG.txt: the penalized log-likelihood value;

+ BIC.txt: the value of BIC;

+ MAXP.txt: the mixing proportions for each observation;

+ Restore data.txt: contains the input data and the classification class (the last column) for each observation.

+ Sigma.txt: the value of sigma. (For Gaussian model only).

In addition, the figure in "Plots Tab" of RStudio is the array of the penalized log-likelihood value after each iteration.

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     TESTING DATA SETS
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Please find the testing data sets in the folder "Testing Data".
+ "Gaussian" includes 3 data sets:
     "Gaussian Data.txt": one typical simulated data (lambda =
5,   gamma = 5, K = 2);
     "Housing Data.txt": the housing data set (lambda = 42,
gamma      = 10 for K = 2 and lambda = 20, gamma = 10 for K =
3);
     "RB Data.txt": the residential building data set (lambda =
     15, gamma = 15 for K = 3).
+ "Poisson" contains 2 data sets:
     "Poisson Data.txt": one typical simulated data (lambda =
20,   gamma = 10, K = 2);
     "Cleveland.txt": the Cleveland data set (lambda = 10,
     gamma      = 4, K = 2).
+ "Logistic" contains 3 data sets:
     "Logistic Data.txt": one typical simulated data (lambda =
3,   gamma = 3, K = 2, R = 2);
     "Ionosphere Data.txt": Ionosphere data (lambda = 3, gamma
=    3, K = 2, R = 2);
     "Musk-1 Data.txt": Musk-1 data (lambda = 5, gamma = 5, K =
     2, R = 2).

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          EXAMPLE
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We demonstrate one example on how to use these functions. Here,
we give a simple R code for the Gaussian Regularized MoE.
--------------R code--------------
setwd("D:/R code/ProxL-MoEv.1.1") #set the directory
library("RMoE")
Data = read.table("Housing Data.txt")
Data = as.matrix(Data) #using matrix format
dms = dim(Data)[2]
X = Data[,-dms] #including the first column with 1..1
Y = Data[,dms]
K = 2 #number of experts
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Lambda = 42
Gamma = 10
opt = 0 #opt = 0: proximal Newton; opt = 1: proximal Newton-type
RMoE(X, Y, K, Lambda, Gamma, opt)
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THANK YOU!