Package 'ELMR'

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Title Extreme Machine Learning (ELM)

Version 1.0

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Description Training and prediction functions are provided for the Extreme Learning Machine algorithm (ELM). The ELM use a Single Hidden Layer Feedforward Neural Network (SLFN) with random generated weights and no gradient-based backpropagation. The training time is very short and the online version allows to update the model using small chunk of the training set at each iteration. The only parameter to tune is the hidden layer size and the learning function.

Depends R (>= 3.2.2)

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LazyData true

RoxygenNote 5.0.1

NeedsCompilation no

Repository CRAN

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OSelm_train.formula *Trains an extreme learning machine with random weights*

Description

Trains an extreme learning machine with random weights

Usage

```
OSelm_train.formula(formula, data, Elm_type, nHiddenNeurons, ActivationFunction,
  N0, Block)
```

Arguments

formula	a symbolic description of the model to be fitted.
data	training data frame containing the variables specified in formula.
Elm_type	select if the ELM must perform a "regression" or "classification"
nHiddenNeurons	number of neurons in the hidden layer
ActivationFunction	"rbf" for radial basis function with Gaussian kernels , "sig" for sigmoidal fucntion, "sin" for sine function, "hardlim" for hard limit function
N0	size of the first block to be processed
Block	size of each chunk to be processed at each step

Value

returns all the parameters used in the function, the weight matrix, the labels for the classification, the number of classes found, the bias, the beta activation function and the accuracy on the trainingset

OSelm_training *Trains an online sequential extreme learning machine with random weights*

Description

Trains an online sequential extreme learning machine with random weights

Usage

```
OSelm_training(p, y, Elm_Type, nHiddenNeurons, ActivationFunction, N0, Block)
```

Arguments

p	dataset used to perform the training of the model
y	classes vector for classiication or regressors for regression
Elm_Type	select if the ELM must perform a "regression" or "classification"
nHiddenNeurons	number of neurons in the hidden layer
ActivationFunction	"rbf" for radial basis function with Gaussian kernels , "sig" for sigmoidal fucntion, "sin" for sine function, "hardlim" for hard limit function
N0	size of the first block to be processed
Block	size of each chunk to be processed at each step

Value

returns all the parameters used in the function, the weight matrix, the labels for the classification, the number of classes found, the bias, the beta activation function and the accuracy on the trainingset

References

[1] N.-Y. Liang, G.-B. Huang, P. Saratchandran, and N. Sundararajan, 'A Fast and Accurate On-line Sequential Learning Algorithm for Feedforward Networks' IEEE Transactions on Neural Networks, vol. 17, no. 6, pp. 1411-1423, 2006

Examples

```
x = runif(100, 0, 50)
y = sqrt(x)
train = data.frame(y,x)
train = data.frame(preProcess(train))
OSelm_train.formula(y~x, train, "regression", 100, "hardlim", 10, 10)
```

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predict_elm *Prediction function for the ELM model generated with the elm_training() function*

Description

Prediction function for the ELM model generated with the elm_training() function

Usage

```
predict_elm(model, test)
```

Arguments

model	the output of the elm_training() function
test	dataset used to perform the testing of the model, the first column must be the column to be fitted for the regression or the labels for the classification

Value

returns the accuracy on the testset

References

[1] N.-Y. Liang, G.-B. Huang, P. Saratchandran, and N. Sundararajan, "A Fast and Accurate Online Sequential Learning Algorithm for Feedforward Networks" IEEE Transactions on Neural Networks, vol. 17, no. 6, pp. 1411-1423, 2006

Examples

```
x = runif(100, 0, 50)
y = sqrt(x)
train = data.frame(y,x)
train = data.frame(preProcess(train))
model = OSelm_train.formula(y~x, train, "regression", 100, "hardlim", 10, 10)
#' x = runif(100, 0, 50)
y = sqrt(x)
test = data.frame(y,x)
test = data.frame(preProcess(train))
accuracy = predict_elm(model, test)
```

`preProcess` *Pre processing function for the training and test data set. Each numeric variable is standardized between -1 and 1 and each categorical variable is coded with a dummy coding.*

Description

Pre processing function for the training and test data set. Each numeric variable is standardized between -1 and 1 and each categorical variable is coded with a dummy coding.

Usage

```
preProcess(data)
```

Arguments

`data`	to be preprocesses

Value

return the pre processed dataset

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