

Package ‘LDLcalc’

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Title Calculate and Predict the Low Density Lipoprotein Values

Version 1.0

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Description A wide variety of ways to calculate (through equations) or predict (using 9 Machine Learning methods as well as a stack algorithm combination of them all) the Low Density Lipoprotein values of patients based on the values of three other metrics as Total Cholesterol , Triglyceride and High Density Lipoprotein.

License GPL-3

Encoding UTF-8

LazyData true

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Cubist, randomForest

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Corr_Plot	<i>Plots a correlation plot to see the correlation between different columns of your data, for example LDL,HDL relative to age</i>
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Description

Plots a correlation plot to see the correlation between different columns of your data, for example LDL,HDL relative to age

Usage

```
Corr_Plot(listDaten)
```

Arguments

listDaten This is a list of the data amongst which you want to see the correlation. You need to provide at least two columns of equal length in order to see the correlation between them

Value

No return value, it prints the requested diagram.

Examples

```
Corr_Plot(SampleData[1:5])
```

LDLallEq	<i>Calculates and returns the LDL values using all available equations</i>
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Description

This function calculates and returns the LDL values computed with all of the 12 named equations.

Usage

```
LDLallEq(TC, HDL, TG)
```

Arguments

TC	The TC (Total Cholesterol) value.
HDL	The HDL (High-density lipoprotein-cholesterol) value.
TG	The TG (Triglyceride) value.

Value

The calculated LDL values, according to all the equations.

Examples

```
LDLallEq(170, 35, 174)
```

LDL_eq	<i>Calculates and returns the LDL Value for any of the 12 different equations</i>
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Description

This function calculates and returns the LDL value computed from any of the 12 named equations.

Usage

```
LDL_eq(TC, HDL, TG, EqMethod)
```

Arguments

TC	The TC (Total Cholesterol) value.
HDL	The HDL (High-density lipoprotein- cholesterol) value.
TG	The TG (Triglyceride) value.
EqMethod	The type of equation to be used to calculate the LDL value. The type of equation to be used to calculate the LDL value. EqMethod could be: ("Friedewald", "Ahmadi", "Chen", "Anandaraja" or "Rao").

Value

The calculated LDL value, according to the equation of choice or a printed error message and 404, if the equation type does not exist.

Examples

```
LDL_eq(170.5, 35.12, 230, "Martin360")
```

 LDL_ML_Main

Create, train, assess and return an ML prediction model

Description

This function reads data from a DATACSV.csv, or a data table file, partitions them according to the partition parameter and labels them, trains the model (according to the ML method chosen and the first set of the partitioned data), assesses the model using the second set of the partition data and returns it.

Usage

```
LDL_ML_Main(DataCSV, partition, MLmethod, ReportMultiPlot = TRUE)
```

Arguments

DataCSV The .csv or a data table file, path containing the data with which the model will be trained and assessed. Must contain at least 4 columns, named "CHOL", "HDL", "TG" and "LDLd", through which the train data and the validation data will be extracted.

partition A value in the range (0,1) that stipulates what percentage of the input data will be used for training the model, while the remainder will be used to assess it.

MLmethod A string that stipulates the Machine Learning method ("lm", "rlm", "glmnet", "earth", "svmRadial", "knn", "g" or "rf") that is to be used to train the prediction model with.

ReportMultiPlot A boolean that allows the user to select whether the LDL_ML_Main function will plot a diagram with 5 plots, relating different stats on the newly created model. Preset to TRUE.

Value

It initializes and returns the ML prediction model. In case of bad input, it will return either -2 (illegitimate partition input) or -3 (illegitimate ML method input).

Examples

```
model = LDL_ML_Main(SampleData, 0.7, "lm", ReportMultiPlot=FALSE)
```

`LDL_ML_Main_All_Models`*Create, train, assess and return all ML prediction models*

Description

This function reads data from a DATACSV.csv or a data.table file, partitions them according to the partition parameter and labels them, trains all of the models, assesses them using the second set of the partition data, optionally plots some info relating the accuracy of the models and returns them for further use.

Usage

```
LDL_ML_Main_All_Models(  
  DataCSV,  
  partition,  
  ReportMultiPlot = TRUE,  
  ComparisonPlot = TRUE  
)
```

Arguments

DataCSV	The .csv or a data table file, path containing the data with which the model will be trained and assessed. Must contain at least 4 columns, named "CHOL", "HDL", "TG" and "LDLd", through which the train data and the validation data will be extracted.
partition	A value in the range (0,1) that stipulates what percentage of the input data will be used for training the models, while the remainder will be used to assess them.
ReportMultiPlot	A boolean that allows the user to select whether the LDL_ML_Main function will plot a diagram with 5 plots, relating different stats on the newly created model. Preset to TRUE.
ComparisonPlot	A boolean that allows the user to select whether the LDL_ML_Main_All_Models function will plot a comparison plot, relating different stats on the newly created models. Preset to TRUE.

Value

It initializes and returns all ML prediction models. In case of bad input, it will return -2 (illegitimate partition input).

Examples

```
allModels = LDL_ML_Main_All_Models(SampleData,0.8,ReportMultiPlot = FALSE,ComparisonPlot=FALSE)
```

LDL_ML_Main_StackingAlgorithm

Create, train, assess and return a Stacking Algorithm Machine Learning prediction model

Description

This function reads data from a DATACSV.csv or data table file, partitions them according to the partition parameter and labels them, trains all of the models and 'stacks' them into one, assesses them using the second set of the partition data, optionally plots some info relating the accuracy of the models and returns them for further use.

Usage

```
LDL_ML_Main_StackingAlgorithm(
  DataCSV,
  partition,
  ReportMultiPlot = TRUE,
  ComparisonPlot = TRUE
)
```

Arguments

DataCSV	The .csv or data table file, path containing the data with which the model will be trained and assessed. Must contain at least 4 columns, named "CHOL", "HDL", "TG" and "LDLd", through which the train data and the validation data will be extracted.
partition	A value in the range (0,1) that stipulates what percentage of the input data will be used for training the model, while the remainder will be used to assess it.
ReportMultiPlot	A boolean that allows the user to select whether the LDL_ML_Main function will plot a diagram with 5 plots, relating different stats on the newly created model. Preset to TRUE.
ComparisonPlot	A boolean that allows the user to select whether the LDL_ML_Main_All_Models function will plot a comparison plot, relating different stats on the newly created models. Preset to TRUE.

Value

It initializes and returns the stacked algorithm prediction model. In case of bad input, it will return -2 (illegitimate partition input)

Examples

```
stackModel = LDL_ML_Main_StackingAlgorithm(SampleData,0.8,ReportMultiPlot=TRUE,ComparisonPlot=TRUE)
```

LDL_ML_predict	<i>Predict LDL value(s)</i>
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Description

This function predicts and returns your predictions, based on the model you previously trained.

Usage

```
LDL_ML_predict(model, data)
```

Arguments

model	The model with which the predictions will be made.
data	The data with which the predictions will be made, can either be a single set of (CHOL,HDL,TG) values or a data table of sets of said values.

Value

The predicted LDL value(s).

Examples

```
modelPrediction = LDL_ML_predict(model,data.table::data.table(CHOL=170.5,HDL=35.12,TG=175))
```

model	<i>A trained model</i>
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Description

An already trained ML model with the "lm" method using the default data from the package, to be used in the predict example, and potentially by the user for further predictions.

Usage

```
model
```

Format

An object of class train (inherits from train.formula) of length 23.

SampleData

Anonymous real data

Description

A dataset tibble for the Test of your model, containing Low Density Lipoprotein, Total Cholesterol, Triglyceride and High-Density Lipoprotein values of 2000 cases. It is used as data for the examples.

Usage

SampleData

Format

A tibble with 5 elements, which are:

AGE The Age of cases

CHOL The Cholesterol of cases

TG The Triglyceride of cases

HDL The High Density Lipoprotein of cases

LDLd The direct Low Density Lipoprotein of cases

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