

Package ‘TrafficBDE’

March 1, 2018

Type Package

Title Traffic Status Prediction in Urban Places using Neural Network Models

Version 0.1.0

Date 2018-02-26

Description

Estimate and return either the traffic speed or the car entries in the city of Thessaloniki using historical traffic data. It's used in transport pilot <<http://trafficstatusprediction.imet.gr/>> of the 'Big-DataEurope' project <<https://www.big-data-europe.eu/>>. There are functions for processing these data, training a neural network, select the most appropriate model and predict the traffic speed or the car entries for a selected time date.

Maintainer Aikaterini Chatzopoulou <kchatzopoul@okfn.gr>

URL <https://github.com/okgreece/TrafficBDE>

BugReports <https://github.com/okgreece/TrafficBDE/issues>

License GPL-2 | file LICENSE

Encoding UTF-8

LazyData true

Imports caret, data.table, dplyr, lubridate, neuralnet, RCurl, stats, zoo

RoxygenNote 6.0.1

Suggests ggplot2, knitr, lattice, rmarkdown

VignetteBuilder knitr

NeedsCompilation no

Author Aikaterini Chatzopoulou [aut, cre],
Kleanthis Koupidis [aut],
Charalampos Bratsas [aut],
Panagiotis Tzenos [dct],
Josep Maria Salanova [dct]

Repository CRAN

Date/Publication 2018-03-01 16:23:44 UTC

R topics documented:

fillMissingDates	2
fillMissingValues	3
kStepsForward	4
loadData	5
loadDataSpecLink	5
loadTrainTest	6
PredictionCR	7
PreProcessingLink	8
TrainCR	9
X163204843_1	10
Index	11

fillMissingDates	<i>Fill Missing Dates</i>
------------------	---------------------------

Description

This function fills the missing dates from the data.

Usage

```
fillMissingDates(Data, datetime)
```

Arguments

Data	The historical data
datetime	The datetime wanted

Details

This function returns a data frame without missing dates.

Value

A data frame with all the historical data between the first date and the date wanted.

Author(s)

Aikaterini Chatzopoulou

See Also

[loadData](#), [fillMissingValues](#)

Examples

```
Speclink <- loadDataSpeclink("163204843", "1", X163204843_1)
x <- fillMissingValues(Speclink)
datetime <- "2017-01-27 14:00:00"
newData <- fillMissingDates (x, datetime)
```

fillMissingValues *Fill Missing Values*

Description

This function fills the missing values from the data.

Usage

```
fillMissingValues(Data)
```

Arguments

Data The historical data of the roads of Thessaloniki

Details

This function returns a data frame without missing values.

Value

A data frame with all the historical data without missing values

Author(s)

Aikaterini Chatzopoulou, Kleanthis Koupidis

See Also

[loadData](#)

Examples

```
Speclink <- loadDataSpeclink("163204843", "1", X163204843_1)
x <- fillMissingValues(Speclink)
```

kStepsForward	<i>k Steps Forward</i>
---------------	------------------------

Description

This function predicts the wanted value after k steps.

Usage

```
kStepsForward (Data, Link_id, direction, datetime, predict, steps)
```

Arguments

Data	A data frame with the historical data
Link_id	A character with the id of the road needed
direction	The direction of the road
datetime	The datetime wanted
predict	The value to be predicted
steps	The number of steps

Details

This function returns the predicted value after k steps.

Value

The predicted value

Author(s)

Aikaterini Chatzopoulou, Kleanthis Koupidis

See Also

[loadData](#)

Examples

```
## Not run:  
kStepsForward (X163204843_1, "163204843", "1", "2017-01-27 14:00:00", "Mean_speed", 1)  
## End(Not run)
```

loadData	<i>Load traffic data</i>
----------	--------------------------

Description

This function loads the traffic data.

Usage

```
loadData(path)
```

Arguments

path The path where the data are.

Details

This function returns a data frame with the traffic data of the roads of Thessaloniki ordered by the roads.

Value

Returns a data frame.

Author(s)

Aikaterini Chatzopoulou, Kleanthis Koupidis

loadDataSpecLink	<i>Load data for a specific road of Thessaloniki</i>
------------------	--

Description

This function extracts the data of one road of Thessaloniki.

Usage

```
loadDataSpecLink(Link_id, direction, Data)
```

Arguments

Link_id A character with the id of the road needed
direction The direction of the road
Data The historical data of the roads of Thessaloniki

Details

This function returns a data frame with the historical data of a specific road.

Value

A data frame with the data of a specific road

Author(s)

Aikaterini Chatzopoulou, Kleanthis Koupidis

See Also

[loadData](#)

Examples

```
Speclink <- loadDataSpecLink("163204843", "1", X163204843_1)
```

loadTrainTest

Load Train and Test Data

Description

This function returns a list with the train and test data.

Usage

```
loadTrainTest(Data, datetime, predict)
```

Arguments

Data	The historical data
datetime	The date time the user wants to predict
predict	The value he user wants to predict must be a column name of the data set

Details

This function returns a list with the train and test data that will be used for train and prediction.

Value

A list with the following components:

- trainsData The trainData for the model
- testsData The testData to be predict

Author(s)

Aikaterini Chatzopoulou, Kleanthis Koupidis

Examples

```
SpecLink <- loadDataSpecLink("163204843", "1", X163204843_1)
x <- fillMissingValues(SpecLink)
datetime <- "2017-01-27 14:00:00"
newData <- fillMissingDates(x, datetime)
DataList <- loadTrainTest(newData, datetime, "Mean_speed")
```

PredictionCR

Prediction

Description

This function predicts the average speed of the road.

Usage

```
PredictionCR(List, NNOut, predict)
```

Arguments

List	A list with the following components: trainset, testset, MinMaxFromScaling
NNOut	The train model
predict	The value to be predicted

Details

This function returns the predicted average speed.

Value

The predicted average speed of the road

Author(s)

Aikaterini Chatzopoulou, Kleanthis Koupidis

See Also

[PreProcessingLink](#), [TrainCR](#)

Examples

```
## Not run:
Speclink <- loadDataSpeclink("163204843", "1", X163204843_1)
x <- fillMissingValues(Speclink)
datetime <- "2017-01-27 14:00:00"
newData <- fillMissingDates(x, datetime)
DataList <- loadTrainTest(newData, datetime, "Mean_speed")
List <- PreProcessingLink(DataList)
NNOut <- TrainCR(List, "Mean_speed")
predicted <- PredictionCR(List, NNOut, "Mean_speed")
## End(Not run)
```

PreProcessingLink *PreProcessing second model*

Description

This function processes the data.

Usage

```
PreProcessingLink(DataList)
```

Arguments

DataList A list with the following components: trainData, testData, trainDataWide, cor-mat

Details

This function returns as a list object the parameters needed to train the model and predict.

Value

A list with the following components:

- trainset The trainset for the model
- testset The testset to be predict
- Minimum The min values of each column of the initial dataset
- Maximum The max values of each column of the initial dataset

Author(s)

Aikaterini Chatzopoulou, Kleanthis Koupidis

Examples

```
SpecLink <- loadDataSpecLink("163204843", "1", X163204843_1)
x <- fillMissingValues(SpecLink)
datetime <- "2017-01-27 14:00:00"
newData <- fillMissingDates(x, datetime)
DataList <- loadTrainTest(newData, datetime, "Mean_speed")
List <- PreProcessingLink(DataList)
```

TrainCR

Train

Description

This function trains the model.

Usage

```
TrainCR(List, predict)
```

Arguments

List	A list with the following components: trainset, testset, Min, Max
predict	The value to be predicted

Details

This function returns the trained model.

Value

The train model

Author(s)

Aikaterini Chatzopoulou, Kleanthis Koupidis

See Also

[PreProcessingLink](#)

Examples

```
## Not run:
Speclink <- loadDataSpeclink("163204843","1", X163204843_1)
x <- fillMissingValues(Speclink)
datetime <- "2017-01-27 14:00:00"
newData <- fillMissingDates(x, datetime)
DataList <- loadTrainTest(newData, datetime, "Mean_speed")
List <- PreProcessingLink(DataList)
NNout <- TrainCR(List,"Mean_speed")
## End(Not run)
```

X163204843_1

Sample data from Traffic BDE

Description

Sample data of the traffic data of the road with Lik id "163204843" and direction = "1"

- The Link id of the road
- The direction of the road
- The date and time of the recorded arguments
- The min speed each time
- The max speed each time
- The mean speed each time
- The standard deviation of the speed
- The skewness of the speed
- The kurtosis of the speed
- The entries each time
- The unique entries each time

Format

RData file

Source

TrafficBDE

Index

[fillMissingDates](#), [2](#)
[fillMissingValues](#), [2](#), [3](#)

[kStepsForward](#), [4](#)

[loadData](#), [2–4](#), [5](#), [6](#)
[loadDataSpecLink](#), [5](#)
[loadTrainTest](#), [6](#)

[PredictionCR](#), [7](#)
[PreProcessingLink](#), [7](#), [8](#), [9](#)

[TrainCR](#), [7](#), [9](#)

[X163204843_1](#), [10](#)