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 [dtc], Josep Maria Salanova [dtc]

Repository CRAN

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

R topics documented:

- fillMissingDates
- fillMissingValues
- kStepsForward
- loadData
- loadDataSetLink
- loadTrainTest
- PredictionCR
- PreProcessingLink
- TrainCR
- X163204843_1

Index

fillMissingDates   Fill Missing Dates

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
fillMissingValues

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)
datetime <- "2017-01-27 14:00:00"
newData <- fillMissingDates(x, datetime)
**kStepsForward**

---

**Description**

This function predicts the wanted value after k steps.

**Usage**

\[ \text{kStepsForward (Data, Link\_id, direction, datetime, predict, steps)} \]

**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**

```r
# Not run:
kStepsForward (X163204843_1, "163204843", "1", "2017-01-27 14:00:00", "Mean\_speed", 1)
# End(Not run)
```
**loadData**  
*Load traffic data*

**Description**  
This function loads the traffic data.

**Usage**  
```r  
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**  
*Load data for a specific road of Thessaloniki*

**Description**  
This function extracts the data of one road of Thessaloniki.

**Usage**  
```r  
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 the 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
**PredictionCR**

**Author(s)**

Aikaterini Chatzopoulou, Kleanthis Koupidis

**Examples**

```r
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")
```

---

**Description**

This function predicts the average speed of the road.

**Usage**

```r
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

```r
## Not run:
SpecLink <- loadSpecLink("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

```r
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
TrainCR

Examples

```r
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)
```

Description

This function trains the model.

Usage

```r
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

```r
## 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 Link 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