

# Package ‘TrafficBDE’

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**Type** Package

**Title** Traffic Predictions Using Neural Networks

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## 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 of the 'BigDataEurope' project. 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.

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**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, DescriptiveStats.OBeu, dplyr, lubridate,  
RCurl, stats, zoo

**Suggests** devtools, knitr, neuralnet, rmarkdown

**VignetteBuilder** knitr

**RoxygenNote** 7.2.0

**NeedsCompilation** no

**Depends** R (>= 3.5.0)

**Repository** CRAN

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## R topics documented:

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

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### 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, Charalampos Bratsas

### 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)
```

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fillMissingValues      *Fill Missing Values*

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**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, Charalampos Bratsas

**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, Charalampos Bratsas

**See Also**

[loadData](#)

**Examples**

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

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|          |                          |
|----------|--------------------------|
| 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, Charalampos Bratsas

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

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**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](#)

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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, Charalampos Bratsas

**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")
```

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|              |                   |
|--------------|-------------------|
| PredictionCR | <i>Prediction</i> |
|--------------|-------------------|

---

**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, Charalampos Bratsas

**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)
```

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PreProcessingLink      *PreProcessing second model*

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## 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)
```

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X163204843\_1

*Sample data from Traffic BDE*

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**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

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