```
North West 12108 ...
East of England 10090 ...
South East 12108 ...
                                                      0.399917
8
                                        35.697093
9
                                        38.701718
                                                      0.512950
                                        54.908644
10
                                                      0.713793
[11 rows x 14 columns]
******************
VEHICLE TYPE COMPARISON
  year region_id ... all_motor_vehicles other_vehicles
   1993
            373 ...
                          256.214013
                                         5.211234
25 2018
            373 ...
                           328.114695
                                         5.036214
[2 rows x 13 columns]
+----+
| Vehicle type | Billion vehicle miles |
Í--------
all motor vehicles
                                    328.115
cars and taxis
                                    255.013
vans
                                    50.9832
lorries
                                    17,0826
                                     3.32911 l
pedal_cycles
                                     2.73903
| two_wheeled_motor_vehicles |
                                     2.29719 İ
buses and coaches
+----+
***********************
MODEL Decision tree regression
features= Index(['year', 'region_id', 'road_category_id'], dtype='object')
score: 0.9983
regression error: 0.0976
*******************
MODEL 4 SVRegression with all features
features= Index(['year', 'region_id', 'road_category_id', 'total_link_length_km',
     'total_link_length_miles', 'pedal_cycles', 'two_wheeled_motor_vehicles',
     'cars_and_taxis', 'buses_and_coaches', 'vans', 'lorries'],
    dtype='object')
score: 0.9998
regression_error: 0.0341
******************
MODEL SVRegression
features= Index(['year', 'region_id', 'road_category_id'], dtype='object')
score: 0.9998
regression error: 0.0341
*******************
MODEL Random forest regression
features= Index(['year', 'region_id', 'road_category_id'], dtype='object')
score model forest: 0.9943
regression_error: 0.1181
******************
MODEL Linear regression 1
features= Index(['pedal_cycles', 'two_wheeled_motor_vehicles', 'cars_and_taxis',
     'buses_and_coaches', 'vans'],
    dtype='object')
```

score linear: 0.9978 regression error: 0.1253

```
*****************
```

In [24]: runfile('C:/Users/Utente/Desktop/DataScience/code/main.py', wdir='C:/Users/ Utente/Desktop/DataScience/code')

Reloaded modules: init, model, util, visualization, preprocessing

UNIQUE DISTRIBUTION OF FEATURES Total number of regions: 11 Total number of road categories: 6 region_id ... lorries all_motor_vehicles year count 1547.000000 1547.000000 ... 1547.000000 1547.000000 6.212023 ... mean 2005.475760 0.283026 5.028188 3.187790 ... 7.517803 0.292345 3.616128 std 1.000000 ... 1993.000000 0.000648 0.010438 min 3.000000 ... 25% 1999.000000 0.067333 2.238600 6.000000 ... 50% 2005.000000 0.168881 4.270186 9.000000 ... 75% 2012.000000 0.414246 7.396709 11.000000 ... 2018.000000 1.386260 15.845616 max

[8 rows x 12 columns]

GRO	OUP DIS	TRIBUTION O	N TRAFFIC BY YEAR			
	year	region_id	road_category_id	 vans	lorries	all_motor_vehicles
0	1993	373	219	 11.087950	10.849047	16.140504
1	1994	373	219	 11.553254	11.082147	16.501645
2	1995	373	219	 11.867358	11.382132	16.822704
3	1996	373	219	 12.317925	11.736691	17.270079
4	1997	373	219	 12.949367	12.014887	17.631146
5	1998	373	219	 13.548895	12.411285	17.951606
6	1999	373	219	 13.760718	12.586221	18.283915
7	2000	373	219	 13.925848	12.627528	18.252833
8	2001	367	216	 14.257194	12.544484	18.507065
9	2002	367	216	 14.585115	12.653575	18.941853
10	2003	367	216	 15.315447	12.717592	19.057797
11	2004	367	216	 16.064099	13.102573	19.343582
12	2005	368	218	 16.498701	12.951695	19.339939
13	2006	368	218	 17.158052	12.996429	19.622870
14	2007	367	216	 17.981100	13.093525	19.794497
15	2008	367	216	 17.865668	12.799325	19.603296
16	2009	367	216	 17.480556	11.743582	19.417265
17	2010	367	216	 17.630435	11.783215	19.107573
18	2011	367	216	 17.775096	11.466826	19.144793
19	2012	367	216	 17.732849	11.185769	19.072997
20	2013	367	216	 18.292121	11.284625	19.140180
21	2014	367	216	 19.337688	11.576409	19.640368
22	2015	367	216	 20.154004	12.003396	19.962072
23	2016	373	219	 21.142740	12.115465	20.354558
24	2017	373	219	 21.704466	12.258545	20.617241

[26 rows x 12 columns]

```
*************************
```

```
TRAFFIC BY REGION IN 2018
                                  year
                                         ... all_motor_vehicles other_vehicles
                           name
0
                    North East 12108
                                                          12.274201
                                                                             0.221726
                                         . . .
1
                          Wales 10090
                                                          18.260918
                                                                             0.309984
                                         . . .
2
                         London 10090
                                                          18.354733
                                                                             0.744356
                                         . . .
3
                 East Midlands 10090
                                                          27.647983
                                                                             0.365226
                                         . . .
    Yorkshire and The Humber 12108
Scotland 10090
4
                                                          27.760255
                                                                             0.374354
                                         . . .
5
                                                          29.716436
                                                                             0.507561
                                         . . .
                West Midlands 12108
South West 10090
6
                                                          31.554014
                                                                             0.372814
                                         . . .
7
                                                          33.238699
                                                                             0.513533
                                         . . .
              North West 12108 ...
East of England 10090 ...
8
                                                          35.697093
                                                                             0.399917
9
                                                          38.701718
                                                                             0.512950
10
                    South East 12108 ...
                                                          54,908644
                                                                             0.713793
```

[11 rows x 14 columns]

VEHICLE TYPE COMPARISON

	year	region_id	 all_motor_vehicles	other_vehicles
0	1993	373	 256.214013	5.211234
25	2018	373	 328.114695	5.036214

[2 rows x 13 columns]

- ++	+
Vehicle type	Billion vehicle miles
+ all_motor_vehicles	328.115 255.013
vans	50.9832 17.0826
pedal_cycles	3.32911
two_wheeled_motor_vehicles buses_and_coaches	2.73903 2.29719
++	+

MODEL Decision tree regression

features= Index(['year', 'region_id', 'road_category_id'], dtype='object')

score: 0.9951

regression_error: 0.1106

```
MODEL 4 SVRegression with all features
```

```
features= Index(['year', 'region_id', 'road_category_id', 'total_link_length_km',
       'total_link_length_miles', 'pedal_cycles', 'two_wheeled_motor_vehicles',
       'cars_and_taxis', 'buses_and_coaches', 'vans', 'lorries'],
      dtype='object')
```

score: 0.9999

regression_error: 0.0352

```
MODEL SVRegression
```

features= Index(['year', 'region_id', 'road_category_id'], dtype='object')

```
score: 0.9999
regression error: 0.0352
******************
MODEL Random forest regression
features= Index(['year', 'region_id', 'road_category_id'], dtype='object')
score model forest: 0.9951
regression_error: 0.1214
************************
MODEL Linear regression 1
features= Index(['pedal_cycles', 'two_wheeled_motor_vehicles', 'cars_and_taxis',
      'buses_and_coaches', 'vans'],
     dtype='object')
score linear: 0.9978
regression error: 0.1235
******************
MODEL Linear regression 2
features= Index(['year', 'region_id', 'road_category_id', 'total_link_length_km',
      'total_link_length_miles'],
     dtype='object')
score linear2: 0.1968
regression_error: 2.4633
<Figure size 432x288 with 0 Axes>
In [25]: runfile('C:/Users/Utente/Desktop/DataScience/code/main.py', wdir='C:/Users/
Utente/Desktop/DataScience/code')
Reloaded modules: init, model, util, visualization, preprocessing
***********************
UNIQUE DISTRIBUTION OF FEATURES
Total number of regions: 11
Total number of road categories: 6
                   region_id ...
                                     lorries all_motor_vehicles
            year
count 1547.000000 1547.000000 ... 1547.000000
                                                   1547.000000
                    6.212023 ...
mean
     2005.475760
                                    0.283026
                                                     5.028188
                    3.187790 ...
std
        7.517803
                                    0.292345
                                                      3.616128
      1993.000000
                    1.000000 ...
                                  0.000648
                                                     0.010438
min
25%
      1999.000000
                    3.000000 ... 0.067333
                                                     2,238600
50%
      2005.000000
                    6.000000 ... 0.168881
                                                     4.270186
75%
      2012.000000
                   9.000000 ... 0.414246
                                                     7.396709
     2018.000000 11.000000 ...
                                   1.386260
                                                     15.845616
max
[8 rows x 12 columns]
******************
GROUP DISTRIBUTION ON TRAFFIC BY YEAR
   year region_id road_category_id ...
                                                  lorries all motor vehicles
                                           vans
   1993
              373
                              219 ... 11.087950 10.849047
                                                                  16.140504
   1994
                              219 ... 11.553254 11.082147
1
              373
                                                                  16.501645
   1995
              373
                              219 ... 11.867358 11.382132
                                                                  16.822704
3
   1996
             373
                              219 ... 12.317925 11.736691
                                                                  17.270079
   1997
1
             373
                              219 ... 12.949367 12.014887
                                                                  17,631146
   1998
             373
                              219 ... 13.548895 12.411285
                                                                  17.951606
                              219 ... 13.760718 12.586221
6
   1999
             373
                                                                  18.283915
7
   2000
             373
                             219 ... 13.925848 12.627528
                                                                  18.252833
```

216 ... 14.257194 12.544484

2001

367

18.507065

9	2002	367	216	14.585115	12.653575	18.941853
10	2003	367	216	15.315447	12.717592	19.057797
11	2004	367	216	16.064099	13.102573	19.343582
12	2005	368	218	16.498701	12.951695	19.339939
13	2006	368	218	17.158052	12.996429	19.622870
14	2007	367	216	17.981100	13.093525	19.794497
15	2008	367	216	17.865668	12.799325	19.603296
16	2009	367	216	17.480556	11.743582	19.417265
17	2010	367	216	17.630435	11.783215	19.107573
18	2011	367	216	17.775096	11.466826	19.144793
19	2012	367	216	17.732849	11.185769	19.072997
20	2013	367	216	18.292121	11.284625	19.140180
21	2014	367	216	19.337688	11.576409	19.640368
22	2015	367	216	20.154004	12.003396	19.962072
23	2016	373	219	21.142740	12.115465	20.354558
24	2017	373	219	21.704466	12.258545	20.617241
25	2018	373	219	21.908306	12.300529	20.681070

[26 rows x 12 columns]

TRAFFIC BY REGION IN 2018

	name	year	 all_motor_vehicles	other_vehicles
0	North East	12108	 12.274201	0.221726
1	Wales	10090	 18.260918	0.309984
2	London	10090	 18.354733	0.744356
3	East Midlands	10090	 27.647983	0.365226
4	Yorkshire and The Humber	12108	 27.760255	0.374354
5	Scotland	10090	 29.716436	0.507561
6	West Midlands	12108	 31.554014	0.372814
7	South West	10090	 33.238699	0.513533
8	North West	12108	 35.697093	0.399917
9	East of England	10090	 38.701718	0.512950
10	South East	12108	 54.908644	0.713793

[11 rows x 14 columns]

VEHICLE TYPE COMPARISON

	year	region_id	 all_motor_vehicles	other_vehicles
0	1993	373	 256.214013	5.211234
25	2018	373	 328.114695	5.036214

[2 rows x 13 columns]

Vehicle type	Billion vehicle miles
all_motor_vehicles cars_and_taxis vans lorries pedal_cycles two_wheeled_motor_vehicles buses_and_coaches	328.115 255.013 50.9832 17.0826 3.32911 2.73903 2.29719

MODEL Decision tree regression

features= Index(['year', 'region_id', 'road_category_id'], dtype='object')

score: 0.9913

```
*********************
MODEL 4 SVRegression with all features
features= Index(['year', 'region_id', 'road_category_id', 'total_link_length_km',
      'total_link_length_miles', 'pedal_cycles', 'two_wheeled_motor_vehicles',
      'cars_and_taxis', 'buses_and_coaches', 'vans', 'lorries'],
     dtype='object')
score: 0.9999
regression_error: 0.0350
*******************
MODEL SVRegression
features= Index(['year', 'region_id', 'road_category_id'], dtype='object')
score: 0.9999
regression error: 0.0350
*******************
MODEL Random forest regression
features= Index(['year', 'region_id', 'road_category_id'], dtype='object')
score model forest: 0.9970
regression_error: 0.1009
*******************
MODEL Linear regression 1
features= Index(['pedal_cycles', 'two_wheeled_motor_vehicles', 'cars_and_taxis',
      'buses_and_coaches', 'vans'],
     dtype='object')
score linear: 0.9976
regression_error: 0.1254
**********************
MODEL Linear regression 2
features= Index(['year', 'region_id', 'road_category_id', 'total_link_length_km',
      'total_link_length_miles'],
     dtype='object')
score linear2: 0.1766
regression_error: 2.5073
<Figure size 432x288 with 0 Axes>
In [26]: runfile('C:/Users/Utente/Desktop/DataScience/code/main.py', wdir='C:/Users/
Utente/Desktop/DataScience/code')
Reloaded modules: init, model, util, visualization, preprocessing
******************
UNIQUE DISTRIBUTION OF FEATURES
Total number of regions: 11
Total number of road categories: 6
                                    lorries all_motor_vehicles
            year
                   region_id ...
count 1547.000000 1547.000000 ... 1547.000000
                                                  1547.000000
                   6.212023 ...
     2005.475760
                                 0.283026
                                                    5.028188
mean
                   3.187790 ...
        7.517803
                                   0.292345
                                                    3.616128
std
                   1.000000 ...
     1993.000000
                                 0.000648
                                                    0.010438
min
                   3.000000 ...
25%
     1999.000000
                                 0.067333
                                                    2.238600
50%
     2005.000000
                  6.000000 ... 0.168881
                                                    4.270186
                  9.000000 ...
75%
     2012.000000
                                 0.414246
                                                    7.396709
```

1.386260

15.845616

2018.000000 11.000000 ...

max

regression error: 0.1339

		************ BUTION ON TRA		***	******	*****	
GNO					vans	lorries	all motor vehicle
0	1993	373		• •	11.087950	10.849047	16.14050
1	1994	373		• •	11.553254	11.082147	16.50164
2	1995						
3		373		• •	11.867358	11.382132	16.82270
	1996	373		• •	12.317925	11.736691	17.27007
4	1997	373		• •	12.949367	12.014887	17.63114
5	1998	373		• •	13.548895	12.411285	17.95160
6	1999	373	240	• •	13.760718	12.586221	18.28391
7	2000	373		• •	13.925848	12.627528	18.25283
8	2001	367		• •	14.257194	12.544484	18.50706
9	2002	367		• •	14.585115	12.653575	18.94185
10	2003	367		• •	15.315447	12.717592	19.05779
11	2004	367		• •	16.064099	13.102573	19.34358
12	2005	368		• •	16.498701	12.951695	19.33993
13	2006	368		• •	17.158052	12.996429	19.62287
14	2007	367		• •	17.981100	13.093525	19.79449
15	2008	367	216	• •	17.865668	12.799325	19.60329
16	2009	367	216	• •	17.480556	11.743582	19.41726
17	2010	367	216		17.630435	11.783215	19.10757
18	2011	367	216		17.775096	11.466826	19.14479
19	2012	367	216		17.732849	11.185769	19.07299
20	2013	367	216		18.292121	11.284625	19.14018
21	2014	367	216		19.337688	11.576409	19.64036
22	2015	367			20.154004	12.003396	19.96207
23	2016	373			21.142740	12.115465	20.35455
24	2017	373			21.704466	12.258545	20.61724
25	2018	373			21.908306	12.300529	20.681070
		2 columns]					
			******	***	*******	*****	
IKA	FETC BA KE	EGION IN 2018		- 1	1		
_			ame year	aı	.l_motor_ve		er_vehicles
0		North E				274201	0.221726
1			les 10090			260918	0.309984
2			don 10090			354733	0.744356
3		East Midla				647983	0.365226
4	Yorkshire	e and The Hum				760255	0.374354
5		Scot1				716436	0.507561
6		West Midla				554014	0.372814
7		South W				238699	0.513533
8		North W				697093	0.399917
9		East of Engl				701718	0.512950
10		South E	ast 12108		54.	908644	0.713793
[11	rows x 14	4 columns]					
***	******	******	******	***	*******	*****	
VEH:	ICLE TYPE	COMPARISON					
			all_motor_vehic	cles	other ve	hicles	
0	1993	373	256.214			211234	
25	2018	373	328.114			036214	
ر_	2010	٠٠٠ د ر	320.112	+022	, 5.	000214	

[2 rows x 13 columns]

7

```
| Vehicle type
                            Billion vehicle miles
all_motor_vehicles
                                      328.115
cars_and_taxis
                                       255.013
                                       50.9832
| vans
lorries
                                       17.0826
| pedal cycles
                                        3.32911
two_wheeled_motor_vehicles
                                        2.73903
buses_and_coaches
                                        2.29719
*****************
MODEL Decision tree regression
features= Index(['year', 'region_id', 'road_category_id'], dtype='object')
score: 0.9931
regression error: 0.1292
*******************
MODEL 4 SVRegression with all features
features= Index(['year', 'region_id', 'road_category_id', 'total_link_length_km',
      'total_link_length_miles', 'pedal_cycles', 'two_wheeled_motor_vehicles',
      'cars_and_taxis', 'buses_and_coaches', 'vans', 'lorries'],
     dtype='object')
score: 0.9998
regression error: 0.0349
******************
MODEL SVRegression
features= Index(['year', 'region_id', 'road_category_id'], dtype='object')
score: 0.9998
regression_error: 0.0349
******************
MODEL Random forest regression
features= Index(['year', 'region_id', 'road_category_id'], dtype='object')
score model_forest: 0.9982
regression_error: 0.0944
**********************
MODEL Linear regression 1
features= Index(['pedal_cycles', 'two_wheeled_motor_vehicles', 'cars_and_taxis',
      'buses_and_coaches', 'vans'],
     dtype='object')
score linear: 0.9977
regression error: 0.1261
*******************
MODEL Linear regression 2
features= Index(['year', 'region_id', 'road_category_id', 'total_link_length_km',
      'total_link_length_miles'],
     dtype='object')
score linear2: 0.2097
regression_error: 2.4114
<Figure size 432x288 with 0 Axes>
```

In [27]: