Module 1: Import the dataset

Importing libraries

```
import pandas as pd
import numpy as np
from matplotlib import pyplot as plt
import seaborn as sns
from scipy import stats as stats
```

Importing the dataset 'auto.csv'

```
auto = pd.read_csv('auto.csv',header=None)
```

Displaying top and bottom rows

```
auto.head(7)
   0
        1
                            3
                                        5
                                                      6
            alfa-romero
                           gas
                                            convertible
    3
                                std
                                       two
                                                          rwd
                                                                front
88.6
    3
         ?
            alfa-romero
                           gas
                                std
                                       two
                                            convertible
                                                          rwd
                                                                front
88.6
            alfa-romero
        ?
                                              hatchback
2 1
                           gas
                                std
                                       two
                                                          rwd
                                                                front
94.5
    2
      164
                    audi
                           gas
                                std
                                      four
                                                   sedan
                                                         fwd
                                                                front
99.8
    2
      164
                    audi
                           gas
                                std
                                      four
                                                   sedan
                                                          4wd
                                                               front
99.4
5
    2
                    audi
                           gas
                                std
                                                   sedan
                                                         fwd
                                                                front
                                       two
99.8
   1 158
                    audi gas std four
                                                   sedan
                                                         fwd
                                                                front
105.8
       . . .
                                   21
    16
           17
                 18
                        19
                              20
                                          22
                                              23
                                                   24
                                                          25
        mpfi
                                        5000
                                              21
                                                   27
   130
               3.47
                     2.68
                             9.0
                                  111
                                                       13495
1
   130
        mpfi
               3.47
                     2.68
                             9.0
                                  111
                                        5000
                                              21
                                                   27
                                                       16500
  152
        mpfi
               2.68
                     3.47
                             9.0
                                  154
                                        5000
                                              19
                                                   26
                                                       16500
3
                     3.40
                            10.0
  109
        mpfi
               3.19
                                  102
                                        5500
                                              24
                                                   30
                                                       13950
4
  136
        mpfi
               3.19
                     3.40
                             8.0
                                  115
                                        5500
                                              18
                                                   22
                                                       17450
5
   136
        mpfi
               3.19
                     3.40
                             8.5
                                  110
                                        5500
                                              19
                                                   25
                                                       15250
6
   136
        mpfi
              3.19
                     3.40
                             8.5
                                  110
                                        5500
                                              19
                                                   25
                                                       17710
[7 rows x 26 columns]
auto.tail(7)
```

```
0
          1
                 2
                         3
                                       5
                                              6
                                                   7
                                                          8
9
          16
198 -2 103 volvo
                        gas
                             turbo four
                                           sedan
                                                  rwd
                                                      front
104.3 ... 130
199 -1
          74 volvo
                        gas
                             turbo
                                     four
                                           wagon
                                                  rwd
                                                       front
104.3 ...
            130
200 -1
          95 volvo
                                     four
                                                       front
                        gas
                                std
                                           sedan
                                                 rwd
109.1 ...
            141
          95 volvo
                             turbo four
201
   - 1
                        gas
                                           sedan
                                                 rwd
                                                      front
109.1 ...
            141
202
    - 1
          95 volvo
                               std four
                                           sedan
                                                      front
                        gas
                                                 rwd
109.1 ...
            173
          95 volvo diesel
203 -1
                             turbo
                                     four
                                           sedan
                                                  rwd
                                                       front
109.1 ...
            145
204 -1 95 volvo
                             turbo four sedan rwd
                                                      front
                        gas
109.1 ... 141
       17
             18
                   19
                         20
                              21
                                     22
                                         23
                                             24
                                                    25
198
           3.62
                 3.15
                        7.5
                              162
                                   5100
                                         17
                                             22
     mpfi
                                                 18420
199
                        7.5
                             162
                                  5100
                                         17
                                             22
     mpfi
           3.62
                3.15
                                                 18950
200
     mpfi
           3.78
                3.15
                        9.5
                             114
                                  5400
                                         23
                                             28
                                                 16845
201
     mpfi
          3.78
                3.15
                        8.7
                             160
                                  5300
                                         19
                                             25
                                                 19045
202
     mpfi
           3.58
                 2.87
                        8.8
                             134
                                  5500
                                         18
                                             23
                                                 21485
203
          3.01
                 3.40
                             106
                                   4800
                                         26
                                             27
                                                 22470
     idi
                       23.0
204
     mpfi 3.78
                3.15
                        9.5
                             114
                                  5400
                                         19
                                            25
                                                 22625
[7 rows x 26 columns]
```

Adding the column headers

Display the top 5 records

```
0
            3
                                  alfa-romero
                                                                  std
                                                      gas
two
1
            3
                                  alfa-romero
                                                      gas
                                                                  std
two
                                  alfa-romero
2
                                                      gas
                                                                  std
two
            2
                             164
                                          audi
                                                                  std
3
                                                      gas
four
            2
                             164
                                          audi
                                                                  std
                                                      gas
four
    body-style drive-wheels engine-location wheel-base
                                                                   engine-
size
0 convertible
                                         front
                                                       88.6
                          rwd
130
1 convertible
                          rwd
                                         front
                                                       88.6
130
     hatchback
                                         front
2
                          rwd
                                                       94.5
152
         sedan
                          fwd
                                         front
                                                       99.8
109
          sedan
                          4wd
                                         front
                                                       99.4
136
                 bore stroke compression-ratio horsepower peak-rpm
   fuel-system
city-mpg
           mpfi
                          2.68
                                              9.0
                                                                    5000
                 3.47
                                                          111
21
1
          mpfi 3.47
                          2.68
                                              9.0
                                                          111
                                                                    5000
21
2
          mpfi 2.68
                          3.47
                                              9.0
                                                          154
                                                                    5000
19
3
           mpfi 3.19
                                             10.0
                                                          102
                                                                    5500
                          3.40
24
           mpfi 3.19
                          3.40
                                              8.0
                                                          115
                                                                    5500
18
  highway-mpg
                price
0
            27
                13495
1
            27
                16500
2
            26
                16500
3
            30
                13950
            22
               17450
[5 rows x 26 columns]
```

Saving the file

auto.to_csv('automobile.csv',index=False)

Checking the data types

```
auto.dtypes
symboling
                        int64
normalized-losses
                       object
make
                       object
fuel-type
                       object
aspiration
                       object
num-of-doors
                       object
body-style
                       object
drive-wheels
                       object
engine-location
                       object
wheel-base
                      float64
                      float64
length
width
                      float64
height
                      float64
curb-weight
                        int64
engine-type
                       object
num-of-cylinders
                       object
engine-size
                        int64
fuel-system
                       object
bore
                       object
stroke
                       object
compression-ratio
                      float64
                       object
horsepower
peak-rpm
                       object
city-mpg
                        int64
highway-mpg
                        int64
                       object
price
dtype: object
```

Describe the dataframe & look the statistical information

```
auto.describe()
        symboling
                    wheel-base
                                    length
                                                  width
                                                              height
count
       205,000000
                    205.000000
                                205,000000
                                             205,000000
                                                          205.000000
                     98.756585
                                174.049268
                                                           53.724878
         0.834146
                                              65.907805
mean
                      6.021776
                                 12.337289
                                               2.145204
                                                            2.443522
std
         1.245307
                                                           47.800000
        -2.000000
                     86.600000
                                141.100000
                                              60.300000
min
                                166.300000
25%
         0.000000
                     94.500000
                                              64.100000
                                                           52.000000
50%
         1.000000
                     97.000000
                                173.200000
                                              65.500000
                                                           54.100000
75%
                                183.100000
                                              66.900000
                                                           55.500000
         2.000000
                    102.400000
                    120.900000
         3.000000
                                208.100000
                                              72.300000
                                                           59.800000
max
       curb-weight engine-size
                                  compression-ratio
                                                         city-mpg
highway-mpg
        205.000000
                      205.000000
                                                      205.000000
                                          205.000000
count
205.000000
```

mean 255 30.751220	55.5658	54	126.907317	7	10.	142537	25.2	19512	
	0.6802	04	41.642693	3	3.	972040	6.5	42142	
min 148	8.0000	00	61.000000)	7.	000000	13.00	90000	
	5.0000	00	97.00000)	8.	600000	19.00	90000	
	4.0000	00	120.000000)	9.	000000	24.00	90000	
	5.0000	00	141.000000)	9.	400000	30.00	90000	
34.000000 max 406 54.000000	6.0000	00	326.000000)	23.	000000	49.00	90000	
auto.descr	ibe(in	clude	e='all')						
count 20 unique top freq mean std min - 25% 50% 75% max	0.8341 1.2453 2.0000 0.0000 1.0000 3.0000	00 aN aN aN 46 07 00 00 00	ormalized-l	205 52 ? 41 NaN NaN NaN NaN NaN	205 toyota 32 NaN NaN NaN NaN NaN		205 2 gas 185 NaN NaN NaN NaN NaN NaN NaN	piration 205 2 std 168 NaN NaN NaN NaN NaN NaN	
base	\		oody-style	drive		engine.			
count 205.000000		205	205		205		20	95	
unique NaN		3	5		3			2	
top NaN	f	our	sedan		fwd		froi	nt	
freq NaN		114	96		120		20	92	
mean 98.756585	- 1	NaN	NaN		NaN		Na	aN	
std 6.021776		NaN	NaN		NaN		Na	aN	
min 86.600000		NaN	NaN		NaN		Na	aN	
25% 94.500000		NaN	NaN		NaN		Na	aN	
50% 97.000000		NaN	NaN		NaN		Na	aN	

75%	00	NaN	Na	aN		NaN	NaN
102.4000	00	NaN	Na	s NI		NaN	NaN
max 120.9000	00	IVAIV	IVO	aiv .		Ivaiv	Ivaiv
			. 1		h		
horsepow	engine-	size	fuel-sys	stem	bore	stroke	compression-ratio
count	205.00	0000		205	205	205	205.000000
205							
unique		NaN		8	39	37	NaN
60 top		NaN	r	npfi	3.62	3.40	NaN
68		IVAIV	·	пріт	3.02	3.40	IVAIV
freq		NaN		94	23	20	NaN
19	100 000	7017			NI NI		10 140507
mean NaN	126.90	/31/		NaN	NaN	NaN	10.142537
std	41.64	2693		NaN	NaN	NaN	3.972040
NaN	. 2. 0 1						3.3,2310
min	61.00	0000		NaN	NaN	NaN	7.000000
NaN	07.00	0000		NI - NI	NI - NI	NI - NI	0. 600000
25% NaN	97.00	0000		NaN	NaN	NaN	8.600000
50%	120.00	0000		NaN	NaN	NaN	9.000000
NaN							
75%	141.00	0000		NaN	NaN	NaN	9.400000
NaN max	326.00	مممم		NaN	NaN	NaN	23.000000
NaN	320.00	0000		IVAIV	IVAIV	IVAIV	23.00000
	peak-rp		city-mpg			•	
count unique	20. 2		5.000000 NaN	205	.000000 NaN		
top	550		NaN		NaN		
freq	3	7	NaN		NaN		
mean	Na		5.219512		.751220		
std min	Nal Nal		6.542142 3.000000		.886443 .000000		
25%	Na		9.000000		.000000		
50%	Na		4.000000		.000000		
75%	Na		0.000000		.000000		
max	Na	N 4	9.000000	54	.000000	NaN	
[11 rows	x 26 c	olumn	s l				

As you can see we have most of the columns here filled with null values and we will be looking into that problem soon

Getting the summary of the dataframe

```
auto.info()
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 205 entries, 0 to 204
Data columns (total 26 columns):
     Column
                         Non-Null Count
                                         Dtype
     _ _ _ _ _
 0
     symboling
                         205 non-null
                                         int64
 1
     normalized-losses
                         205 non-null
                                         object
 2
     make
                         205 non-null
                                         object
 3
     fuel-type
                         205 non-null
                                         object
 4
     aspiration
                         205 non-null
                                         object
 5
     num-of-doors
                         205 non-null
                                         object
 6
     body-style
                         205 non-null
                                         object
 7
     drive-wheels
                         205 non-null
                                         object
 8
     engine-location
                         205 non-null
                                         object
 9
     wheel-base
                         205 non-null
                                         float64
 10 length
                         205 non-null
                                         float64
                         205 non-null
 11
    width
                                         float64
 12
    height
                         205 non-null
                                         float64
                                         int64
 13
    curb-weight
                         205 non-null
 14 engine-type
                         205 non-null
                                         object
 15 num-of-cylinders
                         205 non-null
                                         object
 16
    engine-size
                         205 non-null
                                         int64
 17
    fuel-system
                         205 non-null
                                         object
 18
    bore
                         205 non-null
                                         object
 19
    stroke
                         205 non-null
                                         object
 20 compression-ratio
                         205 non-null
                                         float64
 21 horsepower
                         205 non-null
                                         object
 22 peak-rpm
                         205 non-null
                                         object
 23
     city-mpg
                         205 non-null
                                         int64
 24
                         205 non-null
     highway-mpg
                                         int64
                         205 non-null
 25
     price
                                         object
dtypes: float64(5), int64(5), object(16)
memory usage: 41.8+ KB
```

Module 2: Data Warngling or data cleaning

```
2
           1
                              ?
                                 alfa-romero
                                                               std
                                                    gas
two
3
           2
                            164
                                        audi
                                                    gas
                                                               std
four
           2
                            164
                                        audi
                                                               std
                                                    gas
four
    body-style drive-wheels engine-location wheel-base ... engine-
size \
0 convertible
                                       front
                                                     88.6 ...
                         rwd
130
1 convertible
                         rwd
                                       front
                                                     88.6 ...
130
2
     hatchback
                                                     94.5 ...
                         rwd
                                       front
152
3
         sedan
                         fwd
                                       front
                                                     99.8 ...
109
4
         sedan
                         4wd
                                       front
                                                     99.4 ...
136
   fuel-system bore stroke compression-ratio horsepower peak-rpm
city-mpg
                         2.68
                                            9.0
                                                        111
                                                                 5000
0
          mpfi 3.47
21
                         2.68
                                            9.0
                                                        111
                                                                 5000
1
          mpfi 3.47
21
2
                                            9.0
                                                        154
                                                                 5000
          mpfi 2.68
                         3.47
19
3
          mpfi 3.19
                         3.40
                                           10.0
                                                        102
                                                                 5500
24
4
          mpfi 3.19
                         3.40
                                            8.0
                                                        115
                                                                 5500
18
  highway-mpg
               price
0
           27
               13495
1
           27
               16500
2
           26
               16500
3
               13950
           30
           22
              17450
[5 rows x 26 columns]
# Here we check if there is any cell in the data where there is a null
values at all
auto.isna().sum()
symboling
                     0
normalized-losses
                     0
make
                     0
fuel-type
                     0
```

```
aspiration
                      0
num-of-doors
                      0
body-style
                      0
                      0
drive-wheels
                      0
engine-location
wheel-base
                      0
                      0
length
width
                      0
                      0
height
                      0
curb-weight
                      0
engine-type
                      0
num-of-cylinders
                      0
engine-size
                      0
fuel-system
bore
                      0
stroke
                      0
                      0
compression-ratio
                      0
horsepower
                      0
peak-rpm
                      0
city-mpg
                      0
highway-mpg
                      0
price
dtype: int64
# replacing '?' with null values
auto.replace('?',np.nan,inplace=True)
auto.isna().sum()
symboling
                       0
normalized-losses
                      41
make
                       0
fuel-type
                       0
aspiration
                       0
num-of-doors
                       2
                       0
body-style
                       0
drive-wheels
                       0
engine-location
                       0
wheel-base
length
                       0
width
                       0
                       0
height
curb-weight
                       0
                       0
engine-type
num-of-cylinders
                       0
engine-size
                       0
fuel-system
                       0
bore
                       4
                       4
stroke
                       0
compression-ratio
```

```
horsepower 2
peak-rpm 2
city-mpg 0
highway-mpg 0
price 4
dtype: int64
```

Here we have finally got how many null values we have and in which all columns it is more occurring

```
auto['make'].unique()
'mitsubishi', 'nissan', 'peugot', 'plymouth', 'porsche',
'renault',
       'saab', 'subaru', 'toyota', 'volkswagen', 'volvo'],
dtvpe=object)
auto.info()
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 205 entries, 0 to 204
Data columns (total 26 columns):
                       Non-Null Count
#
    Column
                                       Dtype
- - -
     -----
                                       _ _ _ _ _
 0
    symboling
                       205 non-null
                                       int64
 1
    normalized-losses
                       164 non-null
                                       object
 2
    make
                       205 non-null
                                       object
 3
    fuel-type
                       205 non-null
                                       object
4
    aspiration
                       205 non-null
                                       object
 5
    num-of-doors
                       203 non-null
                                       object
 6
    body-style
                       205 non-null
                                       object
 7
    drive-wheels
                       205 non-null
                                       object
 8
    engine-location
                       205 non-null
                                       object
 9
    wheel-base
                       205 non-null
                                       float64
                       205 non-null
 10 length
                                       float64
 11 width
                       205 non-null
                                       float64
 12 height
                       205 non-null
                                       float64
 13 curb-weight
                       205 non-null
                                       int64
 14
    engine-type
                       205 non-null
                                       object
 15
    num-of-cylinders
                       205 non-null
                                       object
 16
                       205 non-null
    engine-size
                                       int64
 17
                       205 non-null
    fuel-system
                                       object
 18 bore
                       201 non-null
                                       object
 19
    stroke
                       201 non-null
                                       object
 20 compression-ratio
                       205 non-null
                                       float64
                                       object
 21
    horsepower
                       203 non-null
 22
    peak-rpm
                       203 non-null
                                       object
 23
    city-mpg
                       205 non-null
                                       int64
```

```
24
                        205 non-null
    highway-mpg
                                         int64
25
    price
                        201 non-null
                                         object
dtypes: float64(5), int64(5), object(16)
memory usage: 41.8+ KB
# change the dtype of normalized column into int and fill the empty
cells with zero
auto['normalized-losses'] = auto['normalized-
losses'].fillna(0).astype(int)
auto['price'] = auto['price'].fillna(0).astype(int)
auto['price'].dtype
dtype('int32')
```

Before proceeding to the next section, it is essential to address the missing values. Standard imputation techniques involve using the mean, median, or mode; however, I implemented a more tailored approach. Specifically, the imputation process was customized based on the vehicle make, which, although exhaustive and time-consuming, was intended to enhance model accuracy significantly. Each vehicle make had its own specific mean, median, and mode calculated.

This data alteration is entirely customized and, while beneficial for accuracy, is not generally recommended due to its time-intensive nature.

Alfa-romero

```
auto[auto['make']=='alfa-romero']
   symboling
               normalized-losses
                                           make fuel-type aspiration \
0
                                   alfa-romero
            3
                                0
                                                       gas
                                                                   std
            3
                                   alfa-romero
1
                                0
                                                       gas
                                                                   std
2
            1
                                0
                                   alfa-romero
                                                                   std
                                                       gas
  num-of-doors
                  body-style drive-wheels engine-location wheel-
base
      . . .
                 convertible
                                                       front
            two
0
                                        rwd
88.6
      . . .
                 convertible
                                                       front
1
            two
                                        rwd
88.6
                   hatchback
                                                       front
                                        rwd
            two
94.5
   engine-size fuel-system bore stroke compression-ratio horsepower
/
0
            130
                        mpfi
                               3.47
                                       2.68
                                                            9.0
                                                                        111
1
                        mpfi 3.47
                                                            9.0
                                                                        111
            130
                                       2.68
```

peak-rpm city-mpg highway-mpg price 0 5000 21 27 13495 1 5000 21 27 16500 2 5000 19 26 16500	2	152	mpfi	2.68	3.47	9.0
0 5000 21 27 13495 1 5000 21 27 16500		peak-rpm city-mp	a hiahwav-	mpa	price	
	0					
2 5000 19 26 16500	1					
	2	5000 1	9	26	16500	

For the make Alfa Romera we have found zero missing values and zero null values so we proceed to the next make

Audi

<i>,</i> (a a							
auto[a	uto[ˈma	ake']=='audi']					
	boling	normalized-l	.osses	make '	fuel-type	aspiratio	on num-of-
	\						
3	2		164	audi	gas	st	id .
four 4	2		164	audi	gas	st	- d
four	۷		104	auuı	yas	3 (.u
5	2		0	audi	gas	st	:d
two				0.0.0.	9		
6	1		158	audi	gas	st	:d
four							
7	1		0	audi	gas	st	:d
four 8	1		158	audi	a 26	turk	20
four	1		130	auuı	gas	curk	00
9	0		0	audi	gas	turk	00
two					J		
	_			_			
	-style	drive-wheels	engine	-locat	ion whee	l-base	. engine-
size '	\ sedan	fwd		fr	ont	99.8	
109	Seuaii	i wu		111	OIIC	99.0 .	•
4	sedan	4wd		fr	ont	99.4	
136							
5	sedan	fwd		fr	ont	99.8	
136				_			
6	sedan	fwd		fr	ont	105.8	•
136 7	Madon	fwd		fr	ont	105.8	
136	wagon	i wu		110	UIIC	100.0	•
8	sedan	fwd		fr	ont	105.8	

131						
9 hatchb 131	ack		4wd	front	99.5	
fuel-s	-	bore	stroke	compression-ratio	horsepower	peak-rpm
city-mpg 3	\ mpfi	3.19	3.40	10.0	102	5500
24 4	mpfi	3.19	3.40	8.0	115	5500
18	·					
5 19	mpfi	3.19	3.40	8.5	110	5500
6 19	mpfi	3.19	3.40	8.5	110	5500
7	mpfi	3.19	3.40	8.5	110	5500
19 8	mpfi	3.13	3.40	8.3	140	5500
17 9	mpfi	3.13	3.40	7.0	160	5500
16	шртт	3.13	3140	710	100	3300
highway 3 4 5 6 7 8	-mpg 30 22 25 25 25 20 22	price 13950 17450 15250 17710 18920 23875				
[7 rows x	26 cc	olumns]				

Here we have 3 zero values for AUDI in the normalized-lossess column we will solve this by filling it with its median and handle the price at the end to be zero situation

```
# df[(df['make'] == 'audi') & (df['normalized-losses'] == 0)]
auto.dropna(subset=['price'],inplace=True)
auto.drop(auto[auto['price']==0].index,axis=0,inplace=True)
auto[auto['make']=='audi']
   symboling
                                  make fuel-type aspiration num-of-
              normalized-losses
doors
           2
                             164
                                  audi
                                                         std
                                             gas
four
           2
                             164
                                  audi
                                                         std
                                             gas
four
           2
                             158
                                  audi
                                                         std
                                             gas
two
           1
                             158
                                  audi
                                                         std
                                             gas
four
                             158
                                  audi
                                             gas
                                                         std
four
           1
                             158
                                  audi
                                             gas
                                                       turbo
four
  body-style drive-wheels engine-location wheel-base ... engine-
size
                       fwd
                                     front
                                                   99.8 ...
       sedan
3
109
4
       sedan
                       4wd
                                     front
                                                   99.4
136
       sedan
                       fwd
                                     front
                                                   99.8 ...
136
                       fwd
                                     front
                                                  105.8 ...
6
       sedan
136
7
       wagon
                       fwd
                                     front
                                                  105.8 ...
136
       sedan
                       fwd
                                     front
                                                  105.8 ...
131
   fuel-system
                       stroke compression-ratio horsepower
                bore
                                                             peak-rpm
city-mpg
          mpfi 3.19
                         3.40
                                           10.0
                                                        102
                                                                 5500
3
24
          mpfi 3.19
                         3.40
                                            8.0
                                                        115
                                                                 5500
4
18
5
          mpfi 3.19
                         3.40
                                            8.5
                                                        110
                                                                 5500
19
          mpfi 3.19
                         3.40
                                            8.5
                                                        110
                                                                 5500
6
19
7
          mpfi 3.19
                                            8.5
                                                        110
                                                                 5500
                         3.40
```

```
19
                                             8.3
                                                         140
          mpfi 3.13
                         3.40
                                                                   5500
8
17
  highway-mpg
                price
3
           30
                13950
4
           22
               17450
5
           25
               15250
6
           25
               17710
7
           25
               18920
               23875
8
           20
[6 rows x 26 columns]
```

BMW

```
auto[auto['make']=='bmw']
    symboling normalized-losses make fuel-type aspiration num-of-
doors \
10
                               192
                                    bmw
                                               gas
                                                           std
two
            0
11
                               192
                                    bmw
                                                           std
                                               gas
four
12
            0
                               188
                                    bmw
                                                           std
                                               gas
two
13
                               188
                                    bmw
                                               gas
                                                           std
four
14
                                 0
                                                           std
                                    bmw
                                               gas
four
15
            0
                                 0
                                    bmw
                                                           std
                                               gas
four
16
            0
                                 0
                                    bmw
                                               gas
                                                           std
two
17
                                 0
                                    bmw
                                               gas
                                                           std
four
   body-style drive-wheels engine-location wheel-base ...
                                                                 engine-
size ∖
10
        sedan
                         rwd
                                       front
                                                    101.2
108
                                       front
                                                    101.2
11
        sedan
                        rwd
108
12
        sedan
                                       front
                                                    101.2
                         rwd
164
13
        sedan
                                       front
                                                    101.2
                         rwd
164
14
        sedan
                         rwd
                                        front
                                                    103.5
```

164						
15	sedan		rwd	front	103.5	
209	2 2 2 2 1 1					
16	sedan		rwd	front	103.5	
209				.	110.0	
17 209	sedan		rwd	front	110.0	
209						
city	fuel-system /-mpg \	bore	stroke	compression-ratio	horsepower	peak-rpm
10	mpfi	3.50	2.80	8.8	101	5800
23		2 50	2 22	0.0	101	5000
11 23	mpfi	3.50	2.80	8.8	101	5800
12	mpfi	3.31	3.19	9.0	121	4250
21		0.01	5.25			0
13	mpfi	3.31	3.19	9.0	121	4250
21	£:	2 21	2 10	0.0	101	4250
14 20	mpfi	3.31	3.19	9.0	121	4250
15	mpfi	3.62	3.39	8.0	182	5400
16						
16	mpfi	3.62	3.39	8.0	182	5400
16 17	mpfi	3.62	3.39	8.0	182	5400
15	ıııpı I	3.02	3.39	0.0	102	5400
	nighway-mpg	price				
10 11	29 29	16430 16925				
12	29	20970				
13	28	21105				
14	25	24565				
15	22	30760				
16 17	22 20	41315 36880				
	rows x 26 col					

Here we have some empty values and we will handle it by going for the median mean or mode . but some column we may have to drop if we dont have the price column because it is our target column or our dependent variable we don't want it to be filled with inaccurate data

```
# finding mean()
bmw_mean_norml_lss = auto.loc[(auto['make']=='bmw') &
  (auto['normalized-losses']!=0), 'normalized-losses'].mean()
# assigning mean() to last three bmw cars because we have found it
have zero values
```

```
auto.loc[(auto['make']=='bmw') & (auto['normalized-losses']==0) &
(auto['price']>30000), 'normalized-losses'] = int(bmw mean norml lss)
bmw mean norml lss2 = auto.loc[(auto['make']=='bmw') &
(auto['normalized-losses']!=0), 'normalized-losses'].mean()
bmw mean norml lss2
190.0
auto.loc[(auto['make']=='bmw') & (auto['normalized-
losses']==0) ,'normalized-losses'] = int(bmw mean norml lss2)
auto[auto['make']=='bmw']
    symboling normalized-losses make fuel-type aspiration num-of-
doors \
10
            2
                              192
                                   bmw
                                              gas
                                                          std
two
            0
                              192
11
                                    bmw
                                                          std
                                              gas
four
12
                              188
                                   bmw
                                                          std
                                              gas
two
13
                              188
                                                          std
                                   bmw
                                              gas
four
14
                              190
                                   bmw
                                                          std
                                              gas
four
15
                              190
                                   bmw
                                              gas
                                                          std
four
16
            0
                              190
                                   bmw
                                              gas
                                                          std
two
17
            0
                              190
                                   bmw
                                                          std
                                              gas
four
   body-style drive-wheels engine-location wheel-base
                                                                engine-
size \
10
        sedan
                                       front
                                                   101.2
                        rwd
108
11
        sedan
                                       front
                                                   101.2
                        rwd
108
12
        sedan
                        rwd
                                       front
                                                   101.2
164
13
        sedan
                        rwd
                                       front
                                                   101.2
164
14
        sedan
                        rwd
                                       front
                                                   103.5
164
15
                                       front
                                                   103.5
        sedan
                        rwd
209
16
        sedan
                                       front
                                                   103.5
                        rwd
209
17
        sedan
                                       front
                                                   110.0
                        rwd
```

```
209
    fuel-system bore stroke compression-ratio horsepower
                                                              peak-rpm
city-mpg \
           mpfi 3.50
                          2.80
                                             8.8
                                                         101
                                                                  5800
10
23
11
           mpfi 3.50
                          2.80
                                             8.8
                                                         101
                                                                  5800
23
           mpfi 3.31
                          3.19
12
                                             9.0
                                                         121
                                                                  4250
21
13
                          3.19
                                             9.0
                                                         121
                                                                  4250
           mpfi 3.31
21
                                             9.0
                                                         121
                                                                  4250
14
           mpfi 3.31
                          3.19
20
           mpfi 3.62
                          3.39
                                             8.0
                                                         182
                                                                  5400
15
16
                                             8.0
16
           mpfi 3.62
                          3.39
                                                         182
                                                                  5400
16
17
           mpfi 3.62
                          3.39
                                             8.0
                                                         182
                                                                  5400
15
   highway-mpg
                price
10
            29
                16430
11
            29
                16925
12
            28
                20970
                21105
13
            28
                24565
14
            25
15
            22
                30760
16
            22
                41315
17
            20
                36880
[8 rows x 26 columns]
auto['price'].dtype
dtype('int32')
```

Chevrolet

auto[au	<pre>auto[auto['make']=='chevrolet']</pre>										
syr of-doo		normalized-losses	make	fuel-type	aspiration	num-					
18 two	2	121	chevrolet	gas	std						
19 two	1	98	chevrolet	gas	std						
20	0	81	chevrolet	gas	std						

fou	r							
	_	tyle dı	rive-wh	eels eng	gine-location	wheel-ba	ase	engine-
18 61	e \ hatchl	oack		fwd	front	88	3.4	
19 90	hatch	oack		fwd	front	94	4.5	
20 90	Se	edan		fwd	front	94	4.5	
		system	bore	stroke	compression-r	atio hor	sepower	peak-rpm
18 47	y-mpg	2bbl	2.91	3.03		9.5	48	5100
19 38		2bbl	3.03	3.11		9.6	70	5400
20 38		2bbl	3.03	3.11		9.6	70	5400
18 19	highway	y-mpg p 53 43	orice 5151 6295					
20	rows x	43	6575					
ני	TUWS X	20 00	culli13]					

Chevorlet is Fine and does not require any changes

Dodge

```
auto[auto['make']=='dodge']
    symboling normalized-losses
                                    make fuel-type aspiration num-of-
doors \
                                   dodge
21
                              118
                                                gas
                                                            std
two
                                   dodge
22
                              118
                                                            std
                                                gas
two
                                   dodge
23
                              118
                                                          turbo
                                                gas
two
                                   dodge
24
                              148
                                                gas
                                                            std
four
25
                              148
                                   dodge
                                                            std
                                                gas
four
                                   dodge
26
                              148
                                                            std
                                                gas
four
                                   dodge
27
            1
                              148
                                                gas
                                                          turbo
```

NaN					110					
28 fou	r	-1			110	dodge	gas		std	
29	•	3			145	dodge	gas		turbo	
two										
ı	body-s	tyle d	rive-wh	eels er	ngine	-location	wheel	-base		engine-
size		ha alı		ھی جا		£		02.7		
21 90	hatch	раск		fwd		front		93.7		
22 90	hatch	back		fwd		front		93.7		
23 98	hatch	back		fwd		front		93.7		
24 90	hatch	back		fwd		front		93.7		
25	S	edan		fwd		front		93.7		
90 26	S	edan		fwd		front		93.7		
90 27	ς	edan		fwd		front		93.7		
98	J	cuun								
28 122	W	agon		fwd		front		103.3		
29 156	hatch	back		fwd		front		95.9		
		system	bore	stroke	e com	pression-ı	ratio h	orsepo	ower	peak-rpm
21	y-mpg	2bbl	2.97	3.23	3		9.41		68	5500
37 22		2bbl	2.97	3.23	3		9.40		68	5500
31 23		mpfi	3.03	3.39)		7.60		102	5500
24 24		2bbl	2.97	3.23	3		9.40		68	5500
31										
25 31		2bbl	2.97	3.23	3		9.40		68	5500
26		2bbl	2.97	3.23	3		9.40		68	5500
31 27		mpfi	3.03	3.39)		7.60		102	5500
24		·		٥.٥	,		7.00			2200
28		2bbl	3.34	3.46	5		8.50		88	5000
24 29		mfi	3.60	3.90	•		7.00		145	5000
19										
21	highwa	y-mpg 41	price 5572							

```
22
             38
                  6377
                  7957
23
             30
24
             38
                  6229
25
             38
                  6692
                  7609
26
             38
27
                  8558
             30
28
                  8921
             30
                 12964
29
             24
[9 rows x 26 columns]
```

Dodge is Fine and does not require any changes

Honda

```
auto[auto['make']=='honda']
                                   make fuel-type aspiration num-of-
    symboling normalized-losses
doors \
            2
30
                              137
                                   honda
                                                            std
                                                gas
two
31
            2
                              137
                                   honda
                                                            std
                                                gas
two
32
                               101
                                   honda
                                                gas
                                                            std
two
                              101
33
                                   honda
                                                gas
                                                            std
two
                              101
                                   honda
                                                            std
34
                                                gas
two
35
            0
                              110
                                   honda
                                                            std
                                                gas
four
                               78
                                   honda
36
                                                            std
                                                gas
four
37
            0
                               106
                                   honda
                                                            std
                                                gas
two
38
                               106
                                   honda
                                                            std
                                                gas
two
39
                               85
                                   honda
                                                            std
                                                gas
four
                               85
                                   honda
40
            0
                                                gas
                                                            std
four
                               85
41
            0
                                   honda
                                                            std
                                                gas
four
                               107
                                   honda
42
                                                            std
                                                gas
two
   body-style drive-wheels engine-location wheel-base ...
                                                                engine-
size ∖
```

30 92	hatchback		fwd	front	86.6		
31	hatchback		fwd	front	86.6		
92 32	hatchback		fwd	front	93.7		
79 33 92	hatchback		fwd	front	93.7		
34 92	hatchback		fwd	front	93.7		
35 92	sedan		fwd	front	96.5		
36 92	wagon		fwd	front	96.5		
37 110	hatchback		fwd	front	96.5		
38 110	hatchback		fwd	front	96.5		
39 110	sedan		fwd	front	96.5		
40 110	sedan		fwd	front	96.5		
41 110	sedan		fwd	front	96.5		
42 110	sedan		fwd	front	96.5		
	fuel-system	bore	stroke	compression-ratio	horsepo	wer	peak-rpm
30	y-mpg \ 1bbl	2.91	3.41	9.6		58	4800
49 31	1bbl	2.91	3.41	9.2		76	6000
31	1bbl	2.91	3.07	10.1		60	5500
38	1bbl	2.91	3.41	9.2		76	6000
30 34 30	1bbl	2.91	3.41	9.2		76	6000
35 30	1bbl	2.91	3.41	9.2		76	6000
36 30	1bbl	2.92	3.41	9.2		76	6000
37	1bbl	3.15	3.58	9.0		86	5800
27							
27 38 27	1bbl	3.15	3.58	9.0		86	5800
			3.58 3.58	9.0		86 86	5800 5800

40	1bbl	3.15	3.58	9.0	86	5800
27						
41	mpfi	3.15	3.58	9.0	101	5800
24						
42	2bbl	3.15	3.58	9.1	100	5500
25						
	highway-mpg	price				
30	54	6479				
31	38	6855				
32	42	5399				
33	34	6529				
34	34	7129				
35	34	7295				
36	34	7295				
37	33	7895				
38	33	9095				
39	33	8845				
40	33	10295				
41	28	12945				
42	31	10345				
[13	rows x 26 co	olumns]				
		_				

Honda is Fine and does not require any changes

Isuzu

```
auto[auto['make']=='isuzu']
                                  make fuel-type aspiration num-of-
    symboling normalized-losses
doors \
43
                                 isuzu
                                                        std
                                             gas
four
46
                              0 isuzu
                                                        std
                                             gas
two
   body-style drive-wheels engine-location wheel-base ... engine-
size ∖
43
       sedan
                       rwd
                                    front
                                                 94.3
111
                                                 96.0 ...
46 hatchback
                       rwd
                                    front
119
    fuel-system bore stroke compression-ratio horsepower
city-mpg \
43
          2bbl 3.31
                        3.23
                                           8.5
                                                       78
                                                               4800
24
```

```
46
            spfi 3.43
                           3.23
                                                9.2
                                                             90
                                                                     5000
24
   highway-mpg
                 price
43
                  6785
             29
46
             29
                 11048
[2 rows x 26 columns]
```

Since the normalized-losses column here is actually having the value zero, we can't evaluate anything so we actually skip this step for now and move with it later after filling all the valid null values and then we will find the mean or mode or median and fill the missing values with that data.

```
auto.drop(auto[auto['price']==0].index ,axis=0,inplace=True)
auto[auto['make']=='isuzu']
    symboling normalized-losses
                                    make fuel-type aspiration num-of-
doors
43
            0
                                 0
                                    isuzu
                                                gas
                                                            std
four
            2
46
                                 0
                                    isuzu
                                                            std
                                                gas
two
   body-style drive-wheels engine-location wheel-base
                                                                engine-
size
43
        sedan
                        rwd
                                       front
                                                     94.3
111
46
   hatchback
                                       front
                                                    96.0
                        rwd
119
    fuel-system
                 bore
                        stroke compression-ratio horsepower
                                                               peak-rpm
city-mpg
                                              8.5
43
           2bbl
                3.31
                          3.23
                                                           78
                                                                   4800
24
46
           spfi 3.43
                          3.23
                                              9.2
                                                           90
                                                                   5000
24
   highway-mpg
                price
43
            29
                  6785
46
            29
                11048
[2 rows x 26 columns]
```

Jaguar

```
auto[auto['make']=='jaguar']
```

```
symboling
               normalized-losses
                                     make fuel-type aspiration num-of-
doors \
47
            0
                              145
                                   jaguar
                                                 gas
                                                             std
four
48
            0
                                0
                                    jaguar
                                                             std
                                                 gas
four
49
            0
                                0
                                    jaguar
                                                 gas
                                                             std
two
   body-style drive-wheels engine-location wheel-base ...
                                                                engine-
size
47
        sedan
                                       front
                                                   113.0
                        rwd
258
48
        sedan
                        rwd
                                       front
                                                   113.0
258
49
        sedan
                        rwd
                                       front
                                                   102.0 ...
326
    fuel-system bore stroke compression-ratio horsepower
                                                               peak-rpm
city-mpg
                                              8.1
47
           mpfi
                3.63
                          4.17
                                                          176
                                                                   4750
15
                                              8.1
                                                          176
                                                                   4750
48
           mpfi 3.63
                          4.17
15
49
                          2.76
                                                                   5000
           mpfi 3.54
                                             11.5
                                                          262
13
   highway-mpg
                price
47
            19
                32250
                35550
48
            19
                36000
49
            17
[3 rows x 26 columns]
```

Here Jaguar make has 2 empty values in the normalized-losses column

```
auto.loc[(auto['make'] == 'jaguar') & (auto['price'] > 35000),
'normalized-losses'] = 145
auto[auto['make']=='jaguar']
    symboling normalized-losses make fuel-type aspiration num-of-
doors \
47
            0
                              145
                                                            std
                                   jaguar
                                                gas
four
48
                              145
                                   jaguar
                                                            std
                                                gas
four
49
            0
                              145
                                   jaguar
                                                gas
                                                            std
two
```

```
body-style drive-wheels engine-location wheel-base
                                                                engine-
size
47
        sedan
                        rwd
                                       front
                                                   113.0
258
                                      front
48
        sedan
                        rwd
                                                   113.0
258
                                       front
49
        sedan
                                                   102.0
                        rwd
326
                 bore stroke compression-ratio horsepower
    fuel-system
                                                               peak-rpm
city-mpg
                                                                   4750
                3.63
                          4.17
                                              8.1
                                                         176
47
           mpfi
15
48
                          4.17
                                              8.1
                                                         176
                                                                   4750
           mpfi 3.63
15
49
           mpfi 3.54
                          2.76
                                             11.5
                                                         262
                                                                   5000
13
   highway-mpg
                price
47
            19
                32250
48
            19
                36000
49
            17
[3 rows x 26 columns]
```

We have successfully completed filling the missing values for the make Jaguar

Mazda

auto	[auto['mak	e']=='mazda']				
door		normalized-losses	make	fuel-type	aspiration	num-of-
50 two	1	104	mazda	gas	std	
51	1	104	mazda	gas	std	
two 52	1	104	mazda	gas	std	
two 53	1	113	mazda	gas	std	
four 54	1	113	mazda	gas	std	
four 55	3	150	mazda	gas	std	
two 56	3	150	mazda	gas	std	
two				J -		

57	3		150	mazda	gas		std	
two 58	3		150	mazda	gas		std	
two					32			
59	1		129	mazda	gas		std	
two 60	0		115	mazda	gas		std	
fou	r				J			
61	1		129	mazda	gas		std	
two 62	0		115	mazda	gas		std	
fou				mazaa	943		5 - 4	
63	0		0	mazda	diesel		std	
NaN 64	0		115	mazda	gas		std	
fou			113	iliazua	gas		3 . u	
65	0		118	mazda	gas		std	
fou			0	mazda	diacal		c+d	
66 fou	0 r		0	mazda	diesel		std	
		drive-wheels	engine	-location	wheel-b	base		engine-
size 50	e \ hatchback	fwd		front	(93.1		
91	na compacit				•			
51	hatchback	fwd		front	Ć	93.1		
91 52	hatchback	fwd		front	(93.1		
91								
53	sedan	fwd		front	Ć	93.1		
91 54	sedan	fwd		front	(93.1		
91	Scaan	, wa		110110	,	3311	• • •	
55	hatchback	rwd		front	Ć	95.3		
70 56	hatchback	rwd		front	(95.3		
70	Hatchback	ı wa		110110	•	,,,		
57	hatchback	rwd		front	Ć	95.3		
70 58	hatchback	rwd		front	(95.3		
80	Hatchback	ı wa		110110	•	55.5		
59	hatchback	fwd		front	Ć	98.8		
122	sedan	fud		front	(10 O		
60 122	Seudii	fwd		front	Š	98.8		
61	hatchback	fwd		front	Ć	98.8		
122	5 6 d = :-	د ـا		f.ct	,	no o		
62 122	sedan	fwd		front		98.8	• • •	

63 122	sedan		fwd	front	98.8	
64 122	hatchback		fwd	front	98.8	
65	sedan		rwd	front	104.9	
140 66 134	sedan		rwd	front	104.9	
city	fuel-system /-mpg \	bore	stroke	compression-ratio	horsepower	peak-rpm
50 30	2bbl	3.03	3.15	9.0	68	5000
51	2bbl	3.03	3.15	9.0	68	5000
31 52	2bbl	3.03	3.15	9.0	68	5000
31 53	2bbl	3.03	3.15	9.0	68	5000
31 54	2bbl	3.08	3.15	9.0	68	5000
31 55	4bbl	NaN	NaN	9.4	101	6000
17 56	4bbl	NaN	NaN	9.4	101	6000
17 57	4bbl	NaN	NaN	9.4	101	6000
17 58	mpfi	NaN	NaN	9.4	135	6000
16 59	2bbl	3.39	3.39	8.6	84	4800
26 60	2bbl	3.39	3.39	8.6	84	4800
26 61	2bbl	3.39	3.39	8.6	84	4800
26 62	2bbl	3.39	3.39	8.6	84	4800
26 63	idi	3.39	3.39	22.7	64	4650
36 64	2bbl	3.39	3.39	8.6	84	4800
26						
65 19	mpfi	3.76	3.16	8.0	120	5000
66 31	idi	3.43	3.64	22.0	72	4200
50 51	nighway-mpg 31 38	price 5195 6095				

```
52
            38
                  6795
53
                  6695
            38
54
            38
                  7395
55
            23
                 10945
56
            23
                 11845
57
            23
                 13645
58
            23
                 15645
59
            32
                  8845
                 8495
60
            32
61
            32 10595
62
            32
                 10245
63
            42 10795
             32
                 11245
64
65
            27
                 18280
66
            39
                 18344
[17 rows x 26 columns]
```

We can find that there are some empty values and we will eventually fix it now with mean or median we will now check what to do with this data

```
auto[auto['make']=='mazda']['normalized-losses'].median()
115.0
med_val_for_mazda = int(auto[auto['make']=='mazda']['normalized-
losses'l.median())
med val for mazda
115
mean for mazda = int(auto[auto['make']=='mazda']['normalized-
losses'].mean())
mean for mazda
109
# for median value = 66
# fuel-type = diesel , wheel-base = 104.9
auto.loc[ (auto['make']=='mazda') & (auto['fuel-type']=='diesel') &
(auto['wheel-base']==104.9), 'normalized-losses' ] = med_val_for_mazda
# for mean value = 63
auto.loc[ (auto['make']=='mazda') & (auto['fuel-type']=='diesel') &
(auto['wheel-base']==98.8), 'normalized-losses' ] = mean for mazda
auto[(auto['normalized-losses']==0) & (auto['make']=='mazda')] =
mean for mazda
```

<pre>auto[auto['make']=='mazda']</pre>									
		normalized-	losses	make	fuel-type	aspiration	num-of-		
doo			104			ام ± ما			
50 two	1		104	mazda	gas	std			
51	1		104	mazda	gas	std			
two	_		20.	mazaa	943	514			
52	1		104	mazda	gas	std			
two									
53 fou	1		113	mazda	gas	std			
54	1		113	mazda	gas	std			
fou			113	mazaa	gus	Sta			
55	3		150	mazda	gas	std			
two					_				
56	3		150	mazda	gas	std			
two	3		150	mazda	926	c+d			
57 two	3		150	mazda	gas	std			
58	3		150	mazda	gas	std			
two	_				J				
59	1		129	mazda	gas	std			
two	0		115						
60 fou	0		115	mazda	gas	std			
61	1		129	mazda	gas	std			
two	_		123	mazaa	gus	Jeu			
62	0		115	mazda	gas	std			
fou									
63	0		109	mazda	diesel	std			
NaN 64	0		115	mazda	gas	std			
fou			113	mazaa	gus	3 Cu			
65	0		118	mazda	gas	std			
fou	r				_				
	hadv c+v1a	drive vbeels	ongino	1000+1	on Johani	hasa	ongino		
siz		drive-wheels	engine-	- tocati	on wheet-	-base	engine-		
50	hatchback	fwd		fro	nt	93.1			
91		2							
51	hatchback	fwd		fro	nt	93.1			
91				_					
52	hatchback	fwd		fro	nt	93.1			
91 53	sedan	fwd		fro	n+	93.1			
91	Seuan	i wu		110	11 C	93.1			
54	sedan	fwd		fro	nt	93.1			
91									
55	hatchback	rwd		fro	nt	95.3			

70 56	hatchback		rwd	front	95.3	
70 57	hatchback		rwd	front	95.3	
70 58	hatchback		rwd	front	95.3	
80 59	hatchback		fwd	front	98.8	
122						
60 122	sedan		fwd	front	98.8	
61 122	hatchback		fwd	front	98.8	
62 122	sedan		fwd	front	98.8	
63 122	sedan		fwd	front	98.8	
64	hatchback		fwd	front	98.8	
122 65	sedan		rwd	front	104.9	
140						
cit	fuel-system y-mpg \	bore	stroke	compression-ratio	horsepower	peak-rpm
50 30	2bbl	3.03	3.15	9.0	68	5000
51	2bbl	3.03	3.15	9.0	68	5000
31 52	2bbl	3.03	3.15	9.0	68	5000
31 53	2bbl	3.03	3.15	9.0	68	5000
31 54	2bbl	3.08	3.15	9.0	68	5000
31 55	4bbl	NaN	NaN	9.4		6000
17						
56 17	4bbl	NaN	NaN	9.4	101	6000
57 17	4bbl	NaN	NaN	9.4	101	6000
58 16	mpfi	NaN	NaN	9.4	135	6000
59 26	2bbl	3.39	3.39	8.6	84	4800
60	2bbl	3.39	3.39	8.6	84	4800
26 61	2bbl	3.39	3.39	8.6	84	4800
26 62	2bbl	3.39	3.39	8.6	84	4800
26						

63	idi	3.39	3.39	22.7	64	4650
36 64	2bbl	3.39	3.39	8.6	84	4800
26 65	mpfi	3.76	3.16	8.0	120	5000
19	'					
high 50 51 52 53 54 55 56 57 58 59 60 61 62 63	hway-mpg 31 38 38 38 38 23 23 23 23 23 32 32 32 42	price 5195 6095 6795 6695 7395 10945 11845 13645 15645 8845 8495 10595 10245 10795				
64 65	32 27	11245 18280				
	ws x 26 co					

We have successfully completed the Mazda cars missing values

Mercedes-Benz

<pre>auto[auto['make']=='mercedes-benz']</pre>								
asn	<pre>symboling iration \</pre>	fuel-type						
67	-1	93	mercedes-benz	diesel	turbo			
68	-1	93	mercedes-benz	diesel	turbo			
69	0	93	mercedes-benz	diesel	turbo			
70	-1	93	mercedes-benz	diesel	turbo			
71	-1	Θ	mercedes-benz	gas	std			
72	3	142	mercedes-benz	gas	std			
73	0	0	mercedes-benz	gas	std			

74	1		Θ ι	mercedes.	-benz gas	std
	num-of-doors	body-style	drive	-wheels 6	engine-location	wheel-base
67	four	sedan		rwd	front	110.0
68	four	wagon		rwd	front	110.0
69	two	hardtop		rwd	front	106.7
70	four	sedan		rwd	front	115.6
71	four	sedan		rwd	front	115.6
72	two	convertible		rwd	front	96.6
73	four	sedan		rwd	front	120.9
74	two	hardtop		rwd	front	112.0
	engine-size	fuel-system	bore	straka	compression-rat	-i o
hors	sepower \	idi	3.58	3.64	•	1.5
123	183					
68 123		idi	3.58	3.64		1.5
69 123	183	idi	3.58	3.64		1.5
70 123	183	idi	3.58			1.5
71 155	234	mpfi	3.46			3.3
72 155	234	mpfi	3.46			3.3
73 184	308	mpfi	3.80	3.35	3	3.0
74 184	304	mpfi	3.80	3.35	8	3.0
	peak-rpm cit	y-mpg highway	/-mpg	price		
67 68	4350 4350	22 22	25 25	25552 28248		
69 70	4350 4350	22 22	25 25	28176 31600		
71 72	4750 4750	16 16	18 18	34184 35056		
73 74	4500 4500	14 14	16 16	40960 45400		

```
[8 rows x 26 columns]
```

As you can see that there are some empty values in the normalized-losses column we will now fill in those with either mean median or mode

```
# mean of normalized losses for mercedez- benz
auto[auto['make']=='mercedes-benz']['normalized-losses'].mean()
64.25
# median of normalized losses for mercedez- benz
median of merce = auto[auto['make']=='mercedes-benz']['normalized-
losses'l.median()
median of merce
93.0
auto.loc[(auto['make']=='mercedes-benz') & (auto['normalized-
losses']==0) , 'normalized-losses'] = int(median of merce)
auto.loc[(auto['make']=='mercedes-benz') & (auto['normalized-
losses']==93) & (auto['aspiration']=='std') , 'normalized-losses'] =
auto[auto['make']=='mercedes-benz']
    symboling normalized-losses
                                            make fuel-type
aspiration \
67
                               93
                                   mercedes-benz
                                                    diesel
                                                                 turbo
68
           - 1
                               93
                                   mercedes-benz
                                                    diesel
                                                                 turbo
69
                               93
                                   mercedes-benz
                                                    diesel
                                                                 turbo
70
           - 1
                               93
                                   mercedes-benz
                                                    diesel
                                                                 turbo
71
           - 1
                              142
                                   mercedes-benz
                                                                   std
                                                       gas
72
                              142
                                   mercedes-benz
                                                                   std
                                                       gas
73
                                   mercedes-benz
                              142
                                                                   std
                                                       gas
74
                                  mercedes-benz
                              142
                                                       gas
                                                                   std
   num-of-doors
                  body-style drive-wheels engine-location wheel-base
67
           four
                       sedan
                                       rwd
                                                     front
                                                                  110.0
```

68	fo	our	wagon		rwd	front	110.0
69	t	two	hardtop		rwd	front	106.7
 70	fo	our	sedan		rwd	front	115.6
71						front	
71 	10	our	sedan		rwd	front	115.6
72	t	two con	vertible		rwd	front	96.6
73	fo	our	sedan		rwd	front	120.9
74 	t	two	hardtop		rwd	front	112.0
hono	engine-si		l-system	bore	stroke	compression-ratio	
67	sepower \ 1	\ L83	idi	3.58	3.64	21.5	
123 68	1	183	idi	3.58	3.64	21.5	
123 69]	183	idi	3.58	3.64	21.5	
123 70		183	idi	3.58	3.64	21.5	
123							
71 155	2	234	mpfi	3.46	3.10	8.3	
72	2	234	mpfi	3.46	3.10	8.3	
155 73	7	308	mpfi	3.80	3.35	8.0	
184			·				
74 184	2	304	mpfi	3.80	3.35	8.0	
67 68 69 70 71 72 73 74	peak-rpm 4350 4350 4350 4350 4750 4500 4500	2 2 2 2 1 1 1	g highway 2 2 2 2 2 6 6 4 4	-mpg 25 25 25 25 18 18 16 16	price 25552 28248 28176 31600 34184 35056 40960 45400		
[0]	5W5 X 20	CO CUIII13	4				

Now the make Mercedez-Benz has finished filling the missing values lets move onto the next make

Mercury

```
auto[auto['make']=='mercury']
    symboling normalized-losses
                                     make fuel-type aspiration num-of-
doors \
75
                                  mercury
                                                gas
                                                         turbo
two
   body-style drive-wheels engine-location wheel-base ... engine-
size
75 hatchback
                                                 102.7 ...
                       rwd
                                     front
140
    fuel-system bore stroke compression-ratio horsepower
city-mpg \
           mpfi 3.78
75
                         3.12
                                            8.0
                                                                5000
                                                       175
19
   highway-mpg
                price
75
            24
                16503
[1 rows x 26 columns]
```

THis issue where only a single row is present for only a single make so there will be a wait, and we will later fill it with the corresponding mean after everything

Mitsubishi

```
auto[auto['make']=='mitsubishi']
    symboling
                normalized-losses
                                           make fuel-type aspiration \
76
                                     mitsubishi
                               161
                                                       gas
                                                                   std
             2
77
                               161
                                    mitsubishi
                                                       gas
                                                                   std
             2
78
                               161
                                    mitsubishi
                                                                   std
                                                       gas
79
             1
                               161
                                     mitsubishi
                                                                 turbo
                                                       gas
80
             3
                               153
                                     mitsubishi
                                                                 turbo
                                                       gas
             3
81
                               153
                                    mitsubishi
                                                                   std
                                                       gas
             3
82
                                    mitsubishi
                                                                 turbo
                                                       gas
             3
83
                                    mitsubishi
                                                                 turbo
                                                       gas
             3
84
                                    mitsubishi
                                                       gas
                                                                 turbo
85
             1
                               125
                                    mitsubishi
                                                                   std
                                                       gas
86
             1
                               125
                                     mitsubishi
                                                                   std
                                                       gas
87
             1
                               125
                                     mitsubishi
                                                                 turbo
                                                       gas
            - 1
88
                               137
                                     mitsubishi
                                                       gas
                                                                   std
   num-of-doors body-style drive-wheels engine-location wheel-
base
             two hatchback
                                       fwd
                                                      front
76
```

93.7 77		two	hatchback		fwd	front	
3.7		CWO					
'8 93.7		two	hatchback		fwd	front	
9 3.0		two	hatchback		fwd	front	
0		two	hatchback		fwd	front	
6.3 31		two	hatchback		fwd	front	
6.3		two	hatchback		fwd	front	
5.9		two	hatchback		fwd	front	
5.9 4		two	hatchback		fwd	front	
5.9 5		four	sedan		fwd	front	
6.3		four	sedan		fwd	front	
96.3 87		four	sedan		fwd	front	
6.3 8		four	sedan		fwd	front	
96.3							
		-size	fuel-system	bore	stroke	compression-r	atio
orse _l S	power	92	2bbl	2.97	3.23		9.4
3							
7 3		92	2bbl	2.97	3.23		9.4
3		92	2bbl	2.97	3.23		9.4
8 9		98	spdi	3.03	3.39		7.6
02							
^		110	1.1	2 17	2 46		- -
		110	spdi	3.17	3.46		7.5
L6 L		110 122	spdi 2bbl	3.17 3.35	3.46 3.46		7.5 8.5
L6 L 3			•				
16 1 3 2 45		122	2bbl	3.35	3.46		8.5
16 1 3 2 45 3 45		122 156	2bbl spdi	3.35	3.46		8.5 7.0
16 1 8 2 45 3 45 4 45 5		122 156 156	2bbl spdi spdi	3.35 3.58 3.59	3.46 3.86 3.86		8.5 7.0 7.0
30 .16 .31 .38 .32 .45 .33 .45 .34 .45 .35 .38		122 156 156 156	2bbl spdi spdi spdi	3.35 3.58 3.59 3.59	3.46 3.86 3.86 3.86		8.5 7.0 7.0 7.0

```
88
87
             110
                          spdi 3.17
                                                               7.5
                                          3.46
116
                                                               7.5
88
             110
                          spdi 3.17
                                          3.46
116
    peak-rpm city-mpg highway-mpg
                                      price
76
        5500
                     37
                                  41
                                       5389
        5500
                     31
                                  38
77
                                       6189
78
        5500
                     31
                                  38
                                       6669
79
        5500
                     24
                                  30
                                       7689
80
        5500
                     23
                                  30
                                       9959
81
        5000
                     25
                                  32
                                       8499
82
        5000
                     19
                                  24
                                      12629
83
                     19
        5000
                                  24
                                      14869
84
        5000
                     19
                                  24
                                      14489
85
        5000
                     25
                                  32
                                       6989
86
        5000
                     25
                                  32
                                       8189
87
        5500
                     23
                                  30
                                       9279
88
        5500
                     23
                                       9279
                                  30
[13 rows x 26 columns]
```

There are empty zero values in normalized values

```
# mean of mitsubushi normalized losses
median mitsubishi nrml ls = auto[(auto['make']=='mitsubishi')]
['normalized-losses'].median()
median mitsubishi nrml ls
137.0
# fillin in the zeros with median
auto.loc[(auto['make']=='mitsubishi') & (auto['normalized-
losses']==0), 'normalized-losses'] = median mitsubishi nrml ls
auto[auto['make']=='mitsubishi']
    symboling
               normalized-losses
                                          make fuel-type aspiration \
76
            2
                                   mitsubishi
                              161
                                                     gas
                                                                 std
            2
77
                              161
                                   mitsubishi
                                                     gas
                                                                 std
            2
78
                              161
                                   mitsubishi
                                                                 std
                                                     gas
            1
                                   mitsubishi
79
                              161
                                                               turbo
                                                     gas
            3
80
                              153
                                   mitsubishi
                                                               turbo
                                                     gas
            3
81
                                   mitsubishi
                              153
                                                                 std
                                                     gas
            3
82
                              137
                                   mitsubishi
                                                     gas
                                                               turbo
83
            3
                              137
                                   mitsubishi
                                                               turbo
                                                     gas
```

84 85 86 87 88		3 1 1 1 -1		137 125 125 125 137	mitsubishi mitsubishi mitsubishi mitsubishi mitsubishi	gas gas gas gas gas	turbo std std turbo std
nu base	m-of-	doors	body-style dr	ive-v	wheels engi	ne-location	wheel-
76 93.7		two	hatchback		fwd	front	
77 93.7		two	hatchback		fwd	front	
78 93.7		two	hatchback		fwd	front	
79 93.0		two	hatchback		fwd	front	
80		two	hatchback		fwd	front	
96.3 81 96.3		two	hatchback		fwd	front	
82 95.9		two	hatchback		fwd	front	
83		two	hatchback		fwd	front	
95.9 84		two	hatchback		fwd	front	
95.9 85	• • • •	four	sedan		fwd	front	
96.3 86		four	sedan		fwd	front	
96.3 87 96.3		four	sedan		fwd	front	
88 96.3		four	sedan		fwd	front	
е	ngine	e-size	fuel-system	bore	e stroke c	ompression-r	atio
horse 76	power	92	2bbl	2.97	7 3.23		9.4
68 77		92	2bbl	2.97	7 3.23		9.4
68 78		92	2bbl	2.97	7 3.23		9.4
68 79		98	spdi	3.03	3.39		7.6
102 80		110	spdi	3.17			7.5
116 81 88		122	2bbl	3.35			8.5

82 145	1	156	spdi	3.58	3.86	7.0
83	1	156	spdi	3.59	3.86	7.0
145 84	1	.56	spdi	3.59	3.86	7.0
145 85	1	.22	2bbl	3.35	3.46	8.5
88 86	1	.22	2bbl	3.35	3.46	8.5
88 87		10	spdi	3.17	3.46	7.5
116 88		110	spdi	3.17	3.46	7.5
116	1	110	Spui	3.17	3.40	7.5
76 77 78 79 80 81 82 83 84 85 86 87	peak-rpm 5500 5500 5500 5500 5000 5000 5000 50	city-mpg 37 31 31 24 23 25 19 19 25 25 25 23	highway	-mpg 41 38 38 30 30 32 24 24 24 24 32 32 30 30	price 5389 6189 6669 7689 9959 8499 12629 14869 14489 6989 8189 9279	
[13	rows x 26	columns				

Nissan

auto	[auto['make	']=='nissan']				
	symboling	normalized-losses	make	fuel-type	aspiration	num-of-
door	's \					
89	1	128	nissan	gas	std	
two						
90	1	128	nissan	diesel	std	
two						
91	1	128	nissan	gas	std	
two						
92	1	122	nissan	gas	std	
four				_		
93	1	103	nissan	gas	std	
four				-		

94	1		128	nissan	gas	std
two 95	1		128	nissan	asc.	std
two	1		120	IIISSaii	gas	Stu
96	1		122	nissan	gas	std
four						
97 four	1		103	nissan	gas	std
98	2		168	nissan	gas	std
two	_		100	11233411	943	3 cu
99	0		106	nissan	gas	std
four			100	_:		- 4 - 4
100 four	0		106	nissan	gas	std
101	0		128	nissan	gas	std
four					3	
102	0		108	nissan	gas	std
four			100	niccan	925	c+d
103 four	0		108	nissan	gas	std
104	3		194	nissan	gas	std
two					-	
105	3		194	nissan	gas	turbo
two 106	1		231	nissan	gas	std
two	_		231	11133411	gus	3 Cu
				_		
		drive-wheels	engine	-location	wheel-base	engine-
size 89	\ sedan	fwd		front	94.5	
97	5644.1				55	
90	sedan	fwd		front	94.5	
103	codon	4. با		front	04 5	
91 97	sedan	fwd		front	94.5	• • •
92	sedan	fwd		front	94.5	
97						
93	wagon	fwd		front	94.5	
97 94	sedan	fwd		front	94.5	
97	Scaan	TWG		110110	54.5	
95	hatchback	fwd		front	94.5	
97					6	
96 97	sedan	fwd		front	94.5	• • •
97	wagon	fwd		front	94.5	
97	agon	1 170			3113	
98	hardtop	fwd		front	95.1	
	•					
97	•					

99 120	hatchback		fwd	front	97.2	
100	sedan		fwd	front	97.2	
120 101	sedan		fwd	front	100.4	
181 102	wagon		fwd	front	100.4	
181 103	sedan		fwd	front	100.4	
181 104	hatchback			front	01.2	
181	Hatchback		rwd	TTOIL	91.3	
105 181	hatchback		rwd	front	91.3	
106 181	hatchback		rwd	front	99.2	
	fuel-system	bore	stroke	compression-ratio	horsepower	peak-rpm
\ 89	2bbl	3.15	3.29	9.4	69	5200
90	idi	2.99	3.47	21.9	55	4800
91	2bbl	3.15	3.29	9.4	69	5200
92	2bbl	3.15	3.29	9.4	69	5200
93	2bbl	3.15	3.29	9.4	69	5200
94	2bbl	3.15	3.29	9.4	69	5200
95	2bbl	3.15	3.29	9.4	69	5200
96	2bbl	3.15	3.29	9.4	69	5200
97	2bbl	3.15	3.29	9.4	69	5200
98	2bbl	3.15	3.29	9.4	69	5200
99	2bbl	3.33	3.47	8.5	97	5200
100	2bbl	3.33	3.47	8.5	97	5200
101	mpfi	3.43	3.27	9.0	152	5200
102	mpfi	3.43	3.27	9.0	152	5200
103	mpfi	3.43	3.27	9.0	152	5200
104	mpfi	3.43	3.27	9.0	160	5200

105	mpfi	3.43	3.27	7.8	200	5200
106	mpfi	3.43	3.27	9.0	160	5200
89 90 91 92 93 94 95 96 97 98 99 100 101 102 103 104 105 106	city-mpg high 31 45 31 31 31 31 31 31 31 27 27 17 17 19 19 19	way-mpg 37 50 37 37 37 37 37 37 37 34 34 22 22 25 25 23 25	price 5499 7099 6649 6849 7349 7299 7799 7499 78949 8949 9549 13499 13499 17199 19699 18399			
	rows x 26 col					

Nissan is fine

Peugot

```
# mean of puegot nrml los
auto[auto['make']=='peugot']['normalized-losses'].mean()
102.454545454545
# median of puegot nrml los
med = auto[auto['make']=='peugot']['normalized-losses'].median()
med
161.0
auto.loc[ (auto['make']=='peugot') & (auto['normalized-losses']==0) ,'normalized-losses'] = int(med)
auto[auto['make']=='peugot']
```

doors	S'	ymboling	normalized-l	losses	make	fuel-type	aspiration	num-of-
four 108		\						
108		0		161	peugot	gas	std	
four 109 0 161 peugot gas std four 110 0 161 peugot diesel turbo four 111 0 161 peugot gas std four 112 0 161 peugot gas std four 113 0 161 peugot gas std four 114 0 161 peugot gas std four 115 0 161 peugot gas std four 116 0 161 peugot gas turbo four 117 0 161 peugot gas turbo four 117 0 161 peugot gas turbo four 117 0 161 peugot gas turbo 117 sedan rwd front 107.9 120		•		1.61		1. 3		
109		Θ		101	peugot	diesel	turbo	
four 110		0		161	neugot	nac	c+d	
110		U		101	peugot	gas	314	
four 111		0		161	peugot	diesel	turbo	
four 112					, ,			
112		0		161	peugot	gas	std	
four 113								
113		0		161	peugot	diesel	turbo	
four 114		0		161			a 4 al	
114		U		101	peugot	gas	Sta	
four 115		0		161	neugot	diesel	turbo	
115		Ū		101	peugot	dieset	carbo	
four 116		Θ		161	peugot	gas	std	
four 117	four				, ,	J		
117 0 161 peugot gas turbo four body-style drive-wheels engine-location wheel-base engine- size \ 107 sedan rwd front 107.9 120 108 sedan rwd front 107.9 152 109 wagon rwd front 114.2 120 110 wagon rwd front 114.2 152 111 sedan rwd front 107.9 120 112 sedan rwd front 107.9 152 113 wagon rwd front 114.2 150 114 wagon rwd front 114.2 151 152 153 sedan rwd front 114.2 154 155 155 sedan rwd front 114.2 156 157 158 sedan rwd front 114.2 159 119 sedan rwd front 114.2 150	116	0		161	peugot	diesel	turbo	
body-style drive-wheels engine-location wheel-base engine-size \ 107								
body-style drive-wheels engine-location wheel-base engine- size \ 107		0		161	peugot	gas	turbo	
size \ 107 sedan rwd front 107.9 120 108 sedan rwd front 107.9 152 109 wagon rwd front 114.2 120 110 wagon rwd front 107.9 152 111 sedan rwd front 107.9 120 112 sedan rwd front 114.2 152 113 wagon rwd front 114.2 120 114 wagon rwd front 114.2 152 115 sedan rwd front 107.9 120	Tour							
size \ 107 sedan rwd front 107.9 120 108 sedan rwd front 107.9 152 109 wagon rwd front 114.2 120 110 wagon rwd front 107.9 152 111 sedan rwd front 107.9 120 112 sedan rwd front 114.2 152 113 wagon rwd front 114.2 120 114 wagon rwd front 114.2 152 115 sedan rwd front 107.9 120	boo	dy-style (drive-wheels	engine	-locatio	on wheel-k	oase	engine-
120 108 sedan rwd front 107.9 152 109 wagon rwd front 114.2 120 110 wagon rwd front 114.2 152 111 sedan rwd front 107.9 120 112 sedan rwd front 107.9 152 113 wagon rwd front 114.2 120 114 wagon rwd front 114.2 152 115 sedan rwd front 107.9 120				J				3
108 sedan rwd front 107.9 152 109 wagon rwd front 114.2 120 110 wagon rwd front 114.2 152 111 sedan rwd front 107.9 120 112 sedan rwd front 107.9 152 113 wagon rwd front 114.2 120 114 wagon rwd front 114.2 152 115 sedan rwd front 107.9 120	107	sedan	rwd		fror	nt 10	97.9	
152 109					_			
109 wagon rwd front 114.2 120 rwd front 114.2 152 rwd front 107.9 120 rwd front 107.9 152 rwd front 114.2 113 wagon rwd front 114.2 120 rwd front 114.2 152 rwd front 107.9 152 rwd front 107.9		sedan	rwd		fror	nt 10	97.9	
120 110 wagon rwd front 114.2 152 111 sedan rwd front 107.9 120 112 sedan rwd front 107.9 152 113 wagon rwd front 114.2 120 114 wagon rwd front 114.2 152 115 sedan rwd front 107.9 120		112900	r, d		fron	.+ 11	14.2	
110 wagon rwd front 114.2 152 111 sedan rwd front 107.9 120 112 sedan rwd front 107.9 152 113 wagon rwd front 114.2 120 114 wagon rwd front 114.2 152 115 sedan rwd front 107.9 120		wagon	rwu		1101	IL I.	L4.Z	
152 111		wagon	rwd		fror	nt 11	14.2	
111 sedan rwd front 107.9 112 sedan rwd front 107.9 152 113 wagon rwd front 114.2 120 114 wagon rwd front 114.2 152 115 sedan rwd front 107.9 120		go						
112 sedan rwd front 107.9 152 113 wagon rwd front 114.2 120 114 wagon rwd front 114.2 152 115 sedan rwd front 107.9		sedan	rwd		fror	nt 10	97.9	
152 113 wagon rwd front 114.2 120 114 wagon rwd front 114.2 152 115 sedan rwd front 107.9 120								
113 wagon rwd front 114.2 120 114 wagon rwd front 114.2 152 115 sedan rwd front 107.9 120		sedan	rwd		fror	nt 10	97.9	
120 114 wagon rwd front 114.2 152 115 sedan rwd front 107.9 120					C		14.2	
114 wagon rwd front 114.2 152 115 sedan rwd front 107.9 120		wagon	rwa		Tron	π 1.	L4.2	
152 115 sedan rwd front 107.9 120		wagon	rwd		fror	n+ 11	14 2	
115 sedan rwd front 107.9 120		wayun	i wu		1101	11	14.4	
120		sedan	rwd		fror	nt 10	97.9	
	116	sedan	rwd		fror	nt 10	97.9	
152								
117 sedan rwd front 108.0		sedan	rwd		fror	nt 10	08.0	
134	134							

	fuel-system	bore	ctroko	compression-ratio	horsonovor	noak rom
\	ruet-system	роте	Stroke	Compression-ratio	norsepower	peak-rpm
107	mpfi	3.46	3.19	8.4	97	5000
108	idi	3.70	3.52	21.0	95	4150
109	mpfi	3.46	3.19	8.4	97	5000
110	idi	3.70	3.52	21.0	95	4150
111	mpfi	3.46	2.19	8.4	95	5000
112	idi	3.70	3.52	21.0	95	4150
113	mpfi	3.46	2.19	8.4	95	5000
114	idi	3.70	3.52	21.0	95	4150
115	mpfi	3.46	3.19	8.4	97	5000
116	idi	3.70	3.52	21.0	95	4150
117	mpfi	3.61	3.21	7.0	142	5600
107 108 109 110 111 112 113 114 115 116 117	city-mpg high 19 28 19 25 19 28 19 25 19 28 19	way-mpg 24 33 24 25 24 33 24 25 24 33 24	11906 13206 12446 13866 15586 15586 16906 16695 17075 16636 17956	9 9 9 9 9 5 5 5		
[11	rows x 26 col	umns]				

Now the make puegot is actually finished

plymouth

119	1		1	19	plymouth		gas	tι	ırbo
two 120	1		1'	54	plymouth		gas		std
four	-		Δ,	J T	pcymoden		gus		3 Cu
121	1		1!	54	plymouth		gas		std
four							J		
122	1		1!	54	plymouth		gas		std
four	1		-	71	nlymau+h		626		c+d
123 four	-1			74	plymouth		gas		std
124	3			0	plymouth		gas	tı	ırbo
two					, ,		J -		
			,						
size	body-style dr	ive-whee	is eng	ıne	-location	whee	el-base		engine-
118	\ hatchback	f	wd		front		93.7		
90	nacenback	•	wa		110116		3317	• • • •	
119	hatchback	f	wd		front		93.7		
98									
120	hatchback	†	wd		front		93.7		
90 121	sedan	f	wd		front		93.7		
90	Scaan	•	wa		110116		33.7		
122	sedan	f	wd		front		93.7		
98									
123	wagon	†	wd		front		103.3		
122 124	hatchback	r	wd		front		95.9		
156	Hacenback	•	wa		110116		33.3		
\	fuel-system	bore s	troke (COM	pression-r	atio	horsepo	wer	peak-rpm
118	2bbl	2.97	3.23			9.4		68	5500
119	spdi	3.03	3.39			7.6		102	5500
120	2bbl	2.97	3.23			9.4		68	5500
121	2bbl	2.97	3.23			9.4		68	5500
122	2bbl	2.97	3.23			9.4		68	5500
123	2bbl	3.35	3.46			8.5		88	5000
124	andi	2 50	2 06			7.0		1/5	E000
124	spdi	3.59	3.86			7.0		145	5000
118 119	city-mpg high 37 24	way-mpg 41 30	price 5572 7957						

```
120
           31
                         38
                              6229
           31
                              6692
121
                         38
122
           31
                         38
                              7609
123
           24
                         30
                              8921
124
           19
                         24
                             12764
[7 rows x 26 columns]
```

Just a single mean might be enough

```
median value = auto[auto['make']=='plymouth']['normalized-
losses'].median()
auto.loc[(auto['make']=='plymouth') & (auto['normalized-losses']==0)
,'normalized-losses'] = median value
auto[auto['make']=='plymouth']
     symboling normalized-losses
                                         make fuel-type aspiration num-
of-doors \
118
                               119
                                    plymouth
                                                                std
                                                    gas
two
119
             1
                               119
                                    plymouth
                                                              turbo
                                                    gas
two
             1
120
                               154
                                    plymouth
                                                                std
                                                    gas
four
             1
121
                               154
                                    plymouth
                                                                std
                                                    gas
four
122
             1
                               154
                                    plymouth
                                                                std
                                                    gas
four
123
             -1
                                74
                                    plymouth
                                                                std
                                                    gas
four
124
             3
                               119
                                    plymouth
                                                              turbo
                                                    gas
two
    body-style drive-wheels engine-location wheel-base ... engine-
size
118
    hatchback
                         fwd
                                        front
                                                     93.7 ...
90
119
     hatchback
                         fwd
                                        front
                                                     93.7 ...
98
120
     hatchback
                         fwd
                                        front
                                                     93.7 ...
90
121
                         fwd
                                        front
                                                     93.7 ...
         sedan
90
122
                         fwd
                                        front
                                                     93.7 ...
         sedan
98
123
         wagon
                         fwd
                                        front
                                                    103.3
122
124
     hatchback
                                                     95.9
                         rwd
                                        front
                                                           . . .
```

156						
,	fuel-system	bore	stroke	compression-ratio	horsepower	peak-rpm
\ 118	2bbl	2.97	3.23	9.4	68	5500
119	spdi	3.03	3.39	7.6	102	5500
120	2bbl	2.97	3.23	9.4	68	5500
121	2bbl	2.97	3.23	9.4	68	5500
122	2bbl	2.97	3.23	9.4	68	5500
123	2bbl	3.35	3.46	8.5	88	5000
124	spdi	3.59	3.86	7.0	145	5000
118	city-mpg high	way-mpg 41	•			
119 120	24 31	30 38				
121	31	38				
122	31	38				
123 124	24 19	30 24				
	ows x 26 colu	mnc1				
[/]	OWS X ZO COLU	11115]				

Porshe

```
auto.drop(auto[auto['price']==0].index,
         axis=0,
         inplace=True)
auto.loc[(auto['make']=='porsche')&(auto['normalized-
losses']==0), 'normalized-losses'] = 186
auto[auto['make']=='porsche']
                                      make fuel-type aspiration num-
     symboling normalized-losses
of-doors \
125
                              186 porsche
                                                            std
                                                 gas
two
126
                              186
                                   porsche
                                                            std
                                                 gas
two
```

127	3		18	26	porsche	gas		std
two	3		10	50	porserie	yas		3 Cu
128	3		18	36	porsche	gas		std
two								
	body style	مادخيرم بيام			o location	, ,bool	basa	
engi	ne-size \	arive-wi	ieets ei	igii	ne-location	wneet-	base	
125	hatchback		rwd		front		94.5	
151								
126	hardtop		rwd		rear		89.5	
194	مر ما المراب ما						00 5	
127 194	hardtop		rwd		rear		89.5	
128	convertible		rwd		rear		89.5	
194							03.5	
	fuel-system	bore s	troke d	comp	ression-rat:	io hors	epower	peak-rpm
\ 125	mpfi	3.94	3.11		9	. 5	143	5500
126	mpfi	3.74	2.90		9	. 5	207	5900
127	mpfi	3.74	2.90		Q	.5	207	5900
127	ıııpı 1	J. / 4	2.90		9		207	3900
128	mpfi	3.74	2.90		9	. 5	207	5900
	city-mpg high	nwav-mng	price					
125	19	27	22018					
126	17	25	32528					
127	17	25	34028					
128	17	25	37028					
[4 r	ows x 26 colu	ımns 1						
	22 % 20 0000							

Renault

```
size \
                         fwd
                                       front
                                                     96.1 ...
         wagon
130
132
131
     hatchback
                         fwd
                                       front
                                                     96.1 ...
132
     fuel-system
                        stroke compression-ratio horsepower
                 bore
                                                               peak-rpm
130
            mpfi
                                              8.7
                  3.46
                           3.90
                                                          NaN
                                                                    NaN
131
            mpfi 3.46
                           3.90
                                              8.7
                                                          NaN
                                                                    NaN
    city-mpg highway-mpg price
          23
130
                       31
                           9295
131
          23
                       31
                           9895
[2 rows x 26 columns]
```

THis is the same condition as the Nissan maybe we will finding solution to it at the end of the session

Saab

auto	[auto['make	e']=='saab']					
door	symboling	normalized-l	losses	make 1	fuel-type a	aspiration	num-of-
132 two	3		150	saab	gas	std	
133 four	2		104	saab	gas	std	
134 two	3		150	saab	gas	std	
135 four	2		104	saab	gas	std	
136 two	3		150	saab	gas	turbo	
137 four	2		104	saab	gas	turbo	
l size		drive-wheels	engine	-locati	ion wheel	-base	engine-
132 121	hatchback	fwd		fro	ont	99.1	
133 121	sedan	fwd		fro	ont	99.1	
134	hatchback	fwd		fro	ont	99.1	

121						
135	sedan	f	wd	front	99.1	
121 136 121	hatchback	f	wd	front	99.1	
137 121	sedan	f	wd	front	99.1	
	fuel-system	bore s	troke	compression-ratio	horsepower	peak-rpm
132	mpfi	3.54	3.07	9.31	110	5250
133	mpfi	3.54	3.07	9.30	110	5250
134	mpfi	2.54	2.07	9.30	110	5250
135	mpfi	3.54	3.07	9.30	110	5250
136	mpfi	3.54	3.07	9.00	160	5500
137	mpfi	3.54	3.07	9.00	160	5500
132 133 134 135 136 137	city-mpg high 21 21 21 21 21 19 19	way-mpg 28 28 28 28 26 26	price 11850 12170 15040 15510 18150 18620))))		
[6 r	ows x 26 colu	mns]				

Saab is actually very much fine

Subaru

O OO	a. a										
auto[a	<pre>auto[auto['make']=='subaru']</pre>										
doors	symboling \	normalized-losses	make	fuel-type	aspiration	num-of-					
138	2	83	subaru	gas	std						
two 139	2	83	subaru	gas	std						
two 140	2	83	subaru	nac.	std						
two	2	0.5		gas							
141 four	0	102	subaru	gas	std						

142	0			102	subaru	ga	S	st	d
four 143	0			102	subaru	ga	S	st	d
four						J ·			
144	0			102	subaru	ga	S	st	d
four 145	0			102	subaru	ga	S	turb	0
four	J				Jasa. a	94.			
146	0			89	subaru	ga	S	st	d
four 147	0			89	subaru	ga	c	st	d
four	O .			03	Subaru	ga.	,	3 (u
148	Θ			85	subaru	ga	S	st	d
four 149	0			05	cubaru	a a	-	+urh	0
four	в			85	subaru	ga	5	turb	O
	body-style	drive-wh	neels en	gine	-location	wheel	-base		engine-
size 138	\ hatchback		fwd		front		93.7		
97	Hatehback		ı wa		110116		33.7	• • •	
139	hatchback		fwd		front		93.7		
108 140	hatchback		4wd		front		93.3		
108	Hatchback		4wu		TTOIL		93.3		
141	sedan		fwd		front		97.2		
108							07.0		
142 108	sedan		fwd		front		97.2		
143	sedan		fwd		front		97.2		
108									
144	sedan		4wd		front		97.0		
108 145	sedan		4wd		front		97.0		
108	Sedan		IWG				37.10		
146	wagon		fwd		front		97.0		
108 147	Madon		fwd		front		97.0		
108	wagon		TWU		TTOIL		97.0		
148	wagon		4wd		front		96.9		
108			4				06.0		
149 108	wagon		4wd		front		96.9		
100									
	fuel-syste	em bore	stroke	com	pression-r	atio h	orsepo	wer	peak-rpm
120	7 h h	1 2 62	2 26			0.0		60	4000
138	2bb	ol 3.62	2.36			9.0		69	4900
139	2bb	ol 3.62	2.64			8.7		73	4400

140	2bbl	3.62	2.64	8.7	73	4400
141	2bbl	3.62	2.64	9.5	82	4800
142	2bbl	3.62	2.64	9.5	82	4400
143	mpfi	3.62	2.64	9.0	94	5200
144	2bbl	3.62	2.64	9.0	82	4800
145	mpfi	3.62	2.64	7.7	111	4800
146	2bbl	3.62	2.64	9.0	82	4800
147	mpfi	3.62	2.64	9.0	94	5200
148	2bbl	3.62	2.64	9.0	82	4800
149	mpfi	3.62	2.64	7.7	111	4800
ci 138 139 140 141 142 143 144 145 146 147 148	ty-mpg high 31 26 26 32 28 26 24 24 24 28 25 23	way-mpg 36 31 31 37 33 32 25 29 32 31 29 23	price 5118 7053 7603 7126 7775 9960 9233 11259 7463 10198 8013 11694			
[12 ro	ws x 26 col	umns]				

Subaru is fine

Toyota

```
auto[auto['make']=='toyota']
                                     make fuel-type aspiration num-of-
     symboling normalized-losses
doors \
150
                               87
                                   toyota
                                                            std
                                                gas
two
                               87
                                   toyota
                                                gas
                                                           std
151
two
```

152	1	74	toyota	gas	std
four	0	77	tovoto	426	c+d
153 four	U	77	toyota	gas	std
154	0	81	toyota	gas	std
four	U	01	coyoca	gus	Sta
155	0	91	toyota	gas	std
four			,	J	
156	0	91	toyota	gas	std
four			-	_	
157	0	91	toyota	gas	std
four					
158	0	91	toyota	diesel	std
four					
159	0	91	toyota	diesel	std
four	_	_			
160	0	91	toyota	gas	std
four					
161	0	91	toyota	gas	std
four					
162	0	91	toyota	gas	std
four	-	1.00			
163	1	168	toyota	gas	std
two	1	1.00			- 1 -1
164	1	168	toyota	gas	std
two	1	1.00	4		- 4 - 1
165	1	168	toyota	gas	std
two	1	160	+0,40+0	a a.c	c+d
166 two	1	168	toyota	gas	std
167	2	134	toyota	gas	std
two	2	134	toyota	yas	Stu
168	2	134	toyota	gas	std
two	2	134	coyoca	gus	Jeu
169	2	134	toyota	gas	std
two	_	154	cojoca	945	Jed
170	2	134	toyota	gas	std
two	_	201	,	3.0	3 - 3
171	2	134	toyota	gas	std
two			,	J	
172	2	134	toyota	gas	std
two			•	J	
173	-1	65	toyota	gas	std
four				-	
174	-1	65	toyota	diesel	turbo
four					
175	-1	65	toyota	gas	std
four					
176	-1	65	toyota	gas	std

four	1		C.F.	h a + -		a 4 d
177 four	-1		65	toyota	gas	std
178	3		197	toyota	gas	std
two	J			20,024	943	5 1 4
179	3		197	toyota	gas	std
two	_					
180	-1		90	toyota	gas	std
four 181	-1		0	toyota	asc	std
four	-1		U	tuyuta	gas	Stu
Tout						
engin	body-style e-size \	drive-wheels	engi	ne-location	wheel-base	
150	hatchback	fwd		front	95.7	
92 151	hatchback	fwd		front	95.7	
92	Hattiback	iwu		110111	93.7	
152	hatchback	fwd		front	95.7	
92						
153	wagon	fwd		front	95.7	
92		4			05.7	
154 92	wagon	4wd		front	95.7	
155	wagon	4wd		front	95.7	
92	wagon	TWG		Hone	33.7	• • •
156	sedan	fwd		front	95.7	
98						
157	hatchback	fwd		front	95.7	
98		د ما		£wam±	05.7	
158 110	sedan	fwd		front	95.7	
159	hatchback	fwd		front	95.7	
110						
160	sedan	fwd		front	95.7	
98					 -	
161	hatchback	fwd		front	95.7	
98 162	sedan	fwd		front	95.7	
98	Seuali	iwu		HUIL	33.7	
163	sedan	rwd		front	94.5	
98						
164	hatchback	rwd		front	94.5	
98					2.4	
165	sedan	rwd		front	94.5	
98 166	hatchback	rwd		front	94.5	
98	Hattibatk	ı wu		110111	34.3	
167	hardtop	rwd		front	98.4	

146						
168	hardtop		rwd	front	98.4	
146 169	hatchback		rwd	front	98.4	
146	Hattibatk		i wu	TTOIL	90.4	•
170	hardtop		rwd	front	98.4	
146	راه و ما ماه خوما		ام يور	£	00.4	
171 146	hatchback		rwd	front	98.4	•
172	convertible		rwd	front	98.4	
146						
173 122	sedan		fwd	front	102.4	
174	sedan		fwd	front	102.4	
110						
175	hatchback		fwd	front	102.4	
122 176	sedan		fwd	front	102.4	
122	Scaan		IWa	110110	10214 11	•
177	hatchback		fwd	front	102.4	
122 178	hatchback		rwd	front	102.9	
171	Hatthbatk		i wu	TTOIL	102.9	•
179	hatchback		rwd	front	102.9	
171				£	104 5	
180 171	sedan		rwd	front	104.5	•
181	wagon		rwd	front	104.5	
161						
	fuel-system	bore	stroke	compression-ratio	horsenower	peak-rpm
\	ruce system	50.0	SCIONE	compression racio	nor seponer	peak Ipiii
150	2bbl	3.05	3.03	9.0	62	4800
151	2bbl	3.05	3.03	9.0	62	4800
152	2bbl	3.05	3.03	9.0	62	4800
153	2bbl	3.05	3.03	9.0	62	4800
1 - 4	2551	2.05	2 02	0.0	62	4000
154	2bbl	3.05	3.03	9.0	62	4800
155	2bbl	3.05	3.03	9.0	62	4800
156	2bbl	3.19	3.03	9.0	70	4800
157	2bbl	3.19	3.03	9.0	70	4800
158	idi	3.27	3.35	22.5	56	4500

159	idi	3.27	3.35	22.5	56	4500
160	2bbl	3.19	3.03	9.0	70	4800
161	2bbl	3.19	3.03	9.0	70	4800
162	2bbl	3.19	3.03	9.0	70	4800
163	2bbl	3.19	3.03	9.0	70	4800
164	2bbl	3.19	3.03	9.0	70	4800
165	mpfi	3.24	3.08	9.4	112	6600
166	mpfi	3.24	3.08	9.4	112	6600
167	mpfi	3.62	3.50	9.3	116	4800
168	mpfi	3.62	3.50	9.3	116	4800
169	mpfi	3.62	3.50	9.3	116	4800
170	mpfi	3.62	3.50	9.3	116	4800
171	mpfi	3.62	3.50	9.3	116	4800
172	mpfi	3.62	3.50	9.3	116	4800
173	mpfi	3.31	3.54	8.7	92	4200
174	idi	3.27	3.35	22.5	73	4500
175	mpfi	3.31	3.54	8.7	92	4200
176	mpfi	3.31	3.54	8.7	92	4200
177	mpfi	3.31	3.54	8.7	92	4200
178	mpfi	3.27	3.35	9.3	161	5200
179	mpfi	3.27	3.35	9.3	161	5200
180	mpfi	3.27	3.35	9.2	156	5200
181	mpfi	3.27	3.35	9.2	156	5200
city- 150 151 152	mpg high 35 31 31	way-mpg 39 38 38	price 5348 6338 6488			

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153
           31
                         37
                               6918
154
                         32
                               7898
           27
155
           27
                         32
                              8778
156
           30
                         37
                               6938
157
           30
                         37
                               7198
158
           34
                         36
                               7898
                              7788
159
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                         47
160
           38
                         47
                              7738
           28
                         34
                               8358
161
162
           28
                         34
                               9258
                              8058
163
           29
                         34
164
           29
                         34
                              8238
165
           26
                         29
                              9298
166
                         29
                              9538
           26
167
           24
                         30
                               8449
168
           24
                         30
                              9639
169
           24
                         30
                              9989
170
           24
                         30
                             11199
           24
                             11549
171
                         30
172
           24
                         30
                             17669
173
           29
                              8948
                         34
174
                         33
                             10698
           30
175
           27
                         32
                              9988
176
                         32
           27
                             10898
177
           27
                         32
                             11248
178
           20
                             16558
                         24
179
           19
                         24
                             15998
180
           20
                         24
                             15690
           19
                         24
                             15750
181
[32 rows x 26 columns]
```

has only one left column to be filled inplace of normalized-losses

two 152						
152	151	1	87.00000	toyota	gas	std
four 153		_	74 00000			
153		1	/4.00000	toyota	gas	std
four		0	77 00000			
154		U	//.00000	τογοτα	gas	STO
four 155		0	01 00000	.		اد له د
155		U	81.00000	toyota	gas	Stu
four 156		0	01 00000	+0,40+0	926	c+d
156		U	91.00000	toyota	yas	Stu
four 157		۵	01 00000	toyota	asc	c+d
157 0 91.00000 toyota gas std four 158 0 91.00000 toyota diesel std four 159 0 91.00000 toyota diesel std four 160 0 91.00000 toyota gas std four 161 0 91.00000 toyota gas std four 162 0 91.00000 toyota gas std four 163 1 168.00000 toyota gas std two 164 1 168.00000 toyota gas std two 166 1 168.00000 toyota gas std two 166 1 168.00000 toyota gas std two 167 2 134.00000 toyota gas std two 168 2 134.00000 toyota gas std two 169 2 134.00000 toyota gas std two 170 2 134.00000 toyota gas std two 171 2 134.00000 toyota gas std two 172 1 34.00000 toyota gas std two 173 -1 65.00000 toyota gas std two 173 -1 65.00000 toyota gas std tro four		U	91.00000	toyota	yas	Stu
four 158		0	01 00000	tovota	nas	c+d
158		U	31.00000	coyoca	gus	3 Cu
four 159 0 91.00000 toyota diesel std four 160 0 91.00000 toyota gas std four 161 0 91.00000 toyota gas std four 162 0 91.00000 toyota gas std four 163 1 168.00000 toyota gas std four 163 1 168.00000 toyota gas std two 164 1 168.00000 toyota gas std two 165 1 168.00000 toyota gas std two 166 1 168.00000 toyota gas std two 167 2 134.00000 toyota gas std two 169 2 134.00000 toyota gas std two 169 2 134.00000 toyota gas std two 170 2 134.00000 toyota gas std two 171 2 134.00000 toyota gas std two 173 - 1 65.00000 toyota gas std two 173 - 1 65.00000 toyota gas std two 173 - 1 65.00000 toyota gas std troops gas std two 174 - 1 65.00000 toyota gas std two 175 - 1 65.00000 toyota gas std two 177 - 1 65.00000 toyota gas std two 177 - 1 65.00000 toyota gas std two 177 - 1 65.00000 toyota gas std troops gas std two 177 - 1 65.00000 toyota gas std two 177 - 1 65.00000 toyota gas std troops gas std two 177 - 1 65.00000 toyota gas std troops gas std two 177 - 1 65.00000 toyota gas std troops gas gas std troops gas gas gas gas gas gas gas gas gas ga		Θ	91 00000	tovota	diesel	std
159		Ū	31100000	coyoca	diese t	5 tu
four 160 0 91.00000 toyota gas std four 161 0 91.00000 toyota gas std four 162 0 91.00000 toyota gas std four 163 1 168.00000 toyota gas std two 164 1 168.00000 toyota gas std two 165 1 168.00000 toyota gas std two 166 1 168.00000 toyota gas std two 166 1 168.00000 toyota gas std two 167 2 134.00000 toyota gas std two 168 2 134.00000 toyota gas std two 169 2 134.00000 toyota gas std two 170 2 134.00000 toyota gas std two 170 2 134.00000 toyota gas std two 171 2 134.00000 toyota gas std two 172 2 134.00000 toyota gas std two 173 -1 65.00000 toyota gas std two 174 -1 65.00000 toyota diesel turbo four		0	91.00000	tovota	diesel	std
160 0 91.00000 toyota gas std four 161 0 91.00000 toyota gas std four 162 0 91.00000 toyota gas std four 163 1 168.00000 toyota gas std two 164 1 168.00000 toyota gas std two 165 1 168.00000 toyota gas std two 166 1 168.00000 toyota gas std two 167 2 134.00000 toyota gas std two 168 2 134.00000 toyota gas std two 169 2 134.00000 toyota gas std two 170 2 134.00000 toyota gas std two 171 2 134.00000 toyota gas std two 172 2 134.00000 toyota gas std two 173 -1 65.00000 toyota gas std two 173 -1 65.00000 toyota gas std four		-		,		
four 161 0 91.00000 toyota gas std four 162 0 91.00000 toyota gas std four 163 1 168.00000 toyota gas std two 164 1 168.00000 toyota gas std two 165 1 168.00000 toyota gas std two 166 1 168.00000 toyota gas std two 166 1 168.00000 toyota gas std two 167 2 134.00000 toyota gas std two 168 2 134.00000 toyota gas std two 169 2 134.00000 toyota gas std two 170 2 134.00000 toyota gas std two 170 2 134.00000 toyota gas std two 170 2 134.00000 toyota gas std two 171 2 134.00000 toyota gas std two 172 1 165.00000 toyota gas std two 173 -1 65.00000 toyota gas std two 174 -1 65.00000 toyota diesel turbo four		0	91.00000	toyota	gas	std
four 162	four			•	J	
162	161	0	91.00000	toyota	gas	std
four 163	four					
163	162	0	91.00000	toyota	gas	std
two 164						
164		1	168.00000	toyota	gas	std
two 165		_	1.00 0.000			
165		1	168.00000	toyota	gas	std
two 166		1	160 00000	.		- 4 - 1
166 1 168.00000 toyota gas std 167 2 134.00000 toyota gas std two 168 2 134.00000 toyota gas std two 169 2 134.00000 toyota gas std 170 2 134.00000 toyota gas std two 171 2 134.00000 toyota gas std 172 2 134.00000 toyota gas std two 173 -1 65.00000 toyota gas std four 174 -1 65.00000 toyota diesel turbo four 174 -1 65.00000 toyota diesel turbo		1	108.0000	τογοτα	gas	STO
two 167		1	169 00000	toyota	asc	c+d
167		1	100.0000	tuyuta	yas	Stu
two 168		2	134 00000	tovota	nas	std
168		2	154100000	coyoca	gus	Stu
two 169		2	134.00000	tovota	gas	std
169		_		,	30.0	
two 170	169	2	134.00000	toyota	gas	std
two 171 2 134.00000 toyota gas std two 172 2 134.00000 toyota gas std two 173 -1 65.00000 toyota gas std four 174 -1 65.00000 toyota diesel turbo four	two			-	J	
171 2 134.00000 toyota gas std two 172 2 134.00000 toyota gas std two 173 -1 65.00000 toyota gas std four 174 -1 65.00000 toyota diesel turbo four	170	2	134.00000	toyota	gas	std
two 172	two					
172		2	134.00000	toyota	gas	std
two 173 -1 65.00000 toyota gas std four 174 -1 65.00000 toyota diesel turbo four	two					
173 -1 65.00000 toyota gas std four 174 -1 65.00000 toyota diesel turbo four		2	134.00000	toyota	gas	std
four 174 -1 65.00000 toyota diesel turbo four		1	CE 00000	4		
174 -1 65.00000 toyota diesel turbo four		- 1	65.00000	toyota	gas	STO
four		1	6F 00000	toyeta	diosal	turbo
		-1	00.000	toyota	ureset	Luibo
175 -1 05.00000 toyota yas Stu		_ 1	65 00000	tovota	0.25	c+d
	1/3	- 1	03.0000	coyota	yas	3 (0

four					
176 four	-1	65.00000	toyota	gas	std
177	-1	65.00000	toyota	gas	std
four	2	107 00000			- 4 -1
178 two	3	197.00000	toyota	gas	std
179	3	197.00000	toyota	gas	std
two	1	00 00000	40040		a ± al
180 four	-1	90.00000	toyota	gas	std
181	-1	106.84375	toyota	gas	std
four					
engine	body-style de-size \	rive-wheels engi	ne-location	wheel-base	
150 92	hatchback	fwd	front	95.7	
151 92	hatchback	fwd	front	95.7	
152 92	hatchback	fwd	front	95.7	
153 92	wagon	fwd	front	95.7	
154 92	wagon	4wd	front	95.7	
155	wagon	4wd	front	95.7	
92 156	sedan	fwd	front	95.7	
98 157	hatchback	fwd	front	95.7	
98 158	sedan	fwd	front	95.7	
110	Seuaii	Twu	TTOTIC	93.7	
159	hatchback	fwd	front	95.7	
110 160	sedan	fwd	front	95.7	
98					
161 98	hatchback	fwd	front	95.7	
162	sedan	fwd	front	95.7	
98		1		0.4.5	
163 98	sedan	rwd	front	94.5	
164 98	hatchback	rwd	front	94.5	
165	sedan	rwd	front	94.5	
98 166	hatchback	rwd	front	94.5	

98						
167	hardtop		rwd	front	98.4	
146 168	hardtop		rwd	front	98.4	
146	•					
169 146	hatchback		rwd	front	98.4	
170	hardtop		rwd	front	98.4	
146 171	hatchback		rs (d	front	98.4	
146	Hatchback		rwd	front	98.4	
172	convertible		rwd	front	98.4	
146 173	sedan		fwd	front	102.4	
122						
174 110	sedan		fwd	front	102.4	
175	hatchback		fwd	front	102.4	
122			د. ما	£	102 4	
176 122	sedan		fwd	front	102.4	
177	hatchback		fwd	front	102.4	
122 178	hatchback		rwd	front	102.9	
171						
179 171	hatchback		rwd	front	102.9	
180	sedan		rwd	front	104.5	
171 181	wagon		rwd	front	104.5	
161	wagon		i wu	TTOTIC	104.5	
	fuel-system	bore	ctroko	compression-ratio	harcanawar na	ak-rpm
\	ruet-system	DOTE	Sticke	Compression-racio	norsepower pe	ak-i pili
150	2bbl	3.05	3.03	9.0	62	4800
151	2bbl	3.05	3.03	9.0	62	4800
152	2bbl	3.05	3.03	9.0	62	4800
153	2bbl	3.05	3.03	9.0	62	4800
154	2bbl	3.05	3.03	9.0	62	4800
155	2bbl	3.05	3.03	9.0	62	4800
156	2bbl	3.19	3.03	9.0	70	4800
157	2bbl	3.19	3.03	9.0	70	4800

158	idi	3.27	3.35	22.5	56	4500
159	idi	3.27	3.35	22.5	56	4500
160	2bbl	3.19	3.03	9.0	70	4800
161	2bbl	3.19	3.03	9.0	70	4800
162	2bbl	3.19	3.03	9.0	70	4800
163	2bbl	3.19	3.03	9.0	70	4800
164	2bbl	3.19	3.03	9.0	70	4800
165	mpfi	3.24	3.08	9.4	112	6600
166	mpfi	3.24	3.08	9.4	112	6600
167	mpfi	3.62	3.50	9.3	116	4800
168	mpfi	3.62	3.50	9.3	116	4800
169	mpfi	3.62	3.50	9.3	116	4800
170	mpfi	3.62	3.50	9.3	116	4800
171	mpfi	3.62	3.50	9.3	116	4800
172	mpfi	3.62	3.50	9.3	116	4800
173	mpfi	3.31	3.54	8.7	92	4200
174	idi	3.27	3.35	22.5	73	4500
175	mpfi	3.31	3.54	8.7	92	4200
176	mpfi	3.31	3.54	8.7	92	4200
177	mpfi	3.31	3.54	8.7	92	4200
178	mpfi	3.27	3.35	9.3	161	5200
179	mpfi	3.27	3.35	9.3	161	5200
180	mpfi	3.27	3.35	9.2	156	5200
181	mpfi	3.27	3.35	9.2	156	5200
150 151	city-mpg high 35 31	way-mpg 39 38	price 5348 6338			

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152
           31
                         38
                               6488
153
           31
                         37
                               6918
154
           27
                         32
                               7898
155
           27
                         32
                               8778
                         37
156
           30
                               6938
157
                         37
           30
                               7198
158
           34
                         36
                               7898
159
           38
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                               7788
160
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                         47
                               7738
161
           28
                         34
                               8358
162
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                               9258
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                         34
163
                               8058
164
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                         34
                               8238
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165
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                               9298
166
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                               9538
167
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                               8449
168
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                               9639
169
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                               9989
170
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171
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                              11549
172
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                              17669
173
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                               8948
174
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                         33
                              10698
175
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                               9988
176
           27
                         32
                              10898
           27
177
                         32
                              11248
178
           20
                         24
                              16558
179
                         24
           19
                              15998
180
           20
                         24
                              15690
           19
                         24
181
                              15750
[32 rows x 26 columns]
```

Volkswagen

```
auto[auto['make']=='volkswagen']
     symboling
                 normalized-losses
                                            make fuel-type aspiration \
182
                              122.0
                                     volkswagen
                                                    diesel
                                                                    std
             2
                              122.0
183
                                     volkswagen
                                                                    std
                                                       gas
              2
                               94.0
                                                    diesel
184
                                     volkswagen
                                                                    std
              2
                               94.0
185
                                     volkswagen
                                                        gas
                                                                   std
              2
186
                               94.0
                                     volkswagen
                                                                   std
                                                        gas
              2
187
                               94.0
                                     volkswagen
                                                    diesel
                                                                 turbo
             2
188
                               94.0
                                     volkswagen
                                                                   std
                                                       gas
              3
189
                                0.0
                                     volkswagen
                                                                   std
                                                        gas
```

190 191 192 193	3 0 0 0	25		volkswag volkswag volkswag volkswag	jen gas gen diesel	t	std std urbo std
	num-of-doors	body-style	drive	-wheels	engine-locati	on wh	eel-base
182	two	sedan		fwd	fro	nt	97.3
183	two	sedan		fwd	fro	nt	97.3
184	four	sedan		fwd	fro	nt	97.3
185	four	sedan		fwd	fro	nt	97.3
186	four	sedan		fwd	fro	nt	97.3
187	four	sedan		fwd	fro	nt	97.3
188	four	sedan		fwd	fro	nt	97.3
189	two	convertible		fwd	fro	nt	94.5
190	two	hatchback		fwd	fro	nt	94.5
191	four	sedan		fwd	fro	nt	100.4
192	four	sedan		fwd	fro	nt	100.4
193	four	wagon		fwd	fro	nt	100.4
hors	engine-size sepower \	fuel-system	bore		e compression-		
182 52	97	idi	3.01	3.40)	23.0	
183 85	109	mpfi	3.19	3.40)	9.0	
184	97	idi	3.01	3.40)	23.0	
52 185	109	mpfi	3.19	3.40)	9.0	
85 186	109	mpfi	3.19	3.40)	9.0	
85 187	97	idi	3.01			23.0	
68							
188 100	109	mpfi	3.19			10.0	
189	109	mpfi	3.19	3.40		8.5	

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90
190
              109
                          mpfi 3.19
                                         3.40
                                                              8.5
90
191
              136
                                                              8.5
                          mpfi 3.19
                                         3.40
110
              97
                                3.01
192
                           idi
                                         3.40
                                                            23.0
68
193
              109
                          mpfi 3.19
                                         3.40
                                                              9.0
88
     peak-rpm city-mpg highway-mpg
                                      price
182
         4800
                                       7775
                     37
                                  46
183
         5250
                     27
                                  34
                                       7975
184
         4800
                     37
                                  46
                                       7995
185
         5250
                     27
                                  34
                                       8195
186
         5250
                     27
                                  34
                                       8495
                     37
                                  42
187
         4500
                                       9495
188
         5500
                     26
                                  32
                                       9995
189
         5500
                     24
                                  29
                                      11595
190
         5500
                     24
                                  29
                                       9980
                     19
                                  24
191
         5500
                                      13295
192
         4500
                     33
                                  38
                                      13845
                     25
193
         5500
                                  31
                                      12290
[12 rows x 26 columns]
# median of volks
median volkswagen = auto[auto['make']=='volkswagen']['normalized-
losses | .median()
median volkswagen
94.0
auto.loc[(auto['make']=='volkswagen') & (auto['normalized-losses']==0)
,'normalized-losses'] = median volkswagen
auto[auto['make']=='volkswagen']
     symboling normalized-losses
                                           make fuel-type aspiration \
182
                             122.0
                                     volkswagen
                                                    diesel
                                                                   std
              2
183
                             122.0
                                     volkswagen
                                                                   std
                                                       gas
              2
184
                              94.0
                                     volkswagen
                                                    diesel
                                                                   std
              2
                              94.0
185
                                     volkswagen
                                                                   std
                                                       gas
             2
186
                              94.0
                                     volkswagen
                                                       gas
                                                                   std
             2
187
                              94.0
                                     volkswagen
                                                    diesel
                                                                 turbo
             2
188
                              94.0
                                     volkswagen
                                                                   std
                                                       gas
             3
189
                              94.0
                                     volkswagen
                                                                   std
                                                       gas
              3
                             256.0
190
                                     volkswagen
                                                       gas
                                                                   std
             0
191
                               94.0
                                     volkswagen
                                                       gas
                                                                   std
192
              0
                              94.0
                                     volkswagen
                                                    diesel
                                                                 turbo
```

193	0	ğ	94.0	volkswag	gen gas	std
	num-of-doors	body-style	drive	-wheels	engine-location	wheel-base
182	two	sedan		fwd	front	97.3
183	two	sedan		fwd	front	97.3
184	four	sedan		fwd	front	97.3
185	four	sedan		fwd	front	97.3
186	four	sedan		fwd	front	97.3
187	four	sedan		fwd	front	97.3
188	four	sedan		fwd	front	97.3
189	two	convertible		fwd	front	94.5
190	two	hatchback		fwd	front	94.5
191	four	sedan		fwd	front	100.4
192	four	sedan		fwd	front	100.4
193	four	wagon		fwd	front	100.4
	engine-size	fuel-system	bore	stroke	e compression-rat	io
hors	sepower \	·			·	
182	97	idi	3.01	3.40) 23	. 0
52 183	109	mpfi	3.19	3.40	9	.0
85 184	97	idi	3.01	3.40) 23	.0
52 185	109	mpfi	3.19	3.40	9	.0
85 186	109	mpfi	3.19	3.40	9	.0
85 187	97	idi	3.01	3.40) 23	.0
68 188	109	mpfi	3.19	3.40) 10	.0
100 189	109	mpfi	3.19	3.40) 8	.5
90 190 90	109	mpfi	3.19	3.40) 8	.5
90						

191 110	1	136	mpfi	3.19	3.40	8.5	
192		97	idi	3.01	3.40	23.0	
68 193	1	L09	mpfi	3.19	3.40	9.0	
88							
		city-mpg	highway	-mpg	price		
182	4800	37		46	7775		
183	5250	27		34	7975		
184	4800	37		46	7995		
185	5250	27		34	8195		
186	5250	27		34	8495		
187	4500	37		42	9495		
188	5500	26		32	9995		
189	5500	24		29	11595		
190	5500	24		29	9980		
191	5500	19		24	13295		
192	4500	33		38	13845		
193	5500	25		31	12290		
[12	rows x 26	columns]					

VW is actually very fine

Volvo

auto[a	auto['make	']=='volvo']				
	symboling	normalized-losses	make	fuel-type	aspiration	num-of-
doors 194	-2	103.0	volvo	gas	std	
four			_	J		
195 four	-1	74.0	volvo	gas	std	
196	-2	103.0	volvo	gas	std	
four	_		_	-		
197 four	-1	74.0	volvo	gas	std	
198	-2	103.0	volvo	gas	turbo	
four	1	74.0			l	
199 four	-1	74.0	volvo	gas	turbo	
200	-1	95.0	volvo	gas	std	
four	1	05.0	volvo	~~	+	
201 four	-1	95.0	volvo	gas	turbo	

	_				_			_	
202 four	-1		95	0.0	volvo	ga	as	sto	
203	-1		95	6.0	volvo	diese	1د	turbo	
four			33		10110	u_cs.		carbo	
204	-1		95	0.0	volvo	ga	as	turbo	
four									
	body otylo de	بطير ميران			location	, de o	al bass		anaina
size	body-style dr \	ive-wne	eets eng	ııne	- tocation	wnee	et-base		engine-
194	sedan		rwd		front		104.3		
141	5644.1						20.15		
195	wagon		rwd		front		104.3		
141									
196	sedan		rwd		front		104.3		
141 197	Wagon		rwd		front		104.3		
141	wagon		i wu		11011		104.3		
198	sedan		rwd		front		104.3		
130									
199	wagon		rwd		front		104.3		
130									
200	sedan		rwd		front		109.1		
141 201	sedan		rwd		front		109.1		
141	Seuan		ı wu		110110		109.1		
202	sedan		rwd		front		109.1		
173									
203	sedan		rwd		front		109.1		
145					C		100 1		
204 141	sedan		rwd		front		109.1		
141									
	fuel-system	bore	stroke	com	pression-	ratio	horsepo	ower	peak-rpm
\									
194	mpfi	3.78	3.15			9.5		114	5400
195	mpfi	3.78	3.15			9.5		114	5400
133	IIIP11	3.70	3.13			3.3			3400
196	mpfi	3.78	3.15			9.5		114	5400
107	6.1	2 70	2 1 5			0 5			F 400
197	mpfi	3.78	3.15			9.5		114	5400
198	mpfi	3.62	3.15			7.5		162	5100
130		3102	3113			, , ,		102	3100
199	mpfi	3.62	3.15			7.5		162	5100
200	c :	2 70	2 15			0 5		114	F 400
200	mpfi	3.78	3.15			9.5		114	5400
201	mpfi	3.78	3.15			8.7		160	5300

202	mpfi	3.58	2.87	8.8	134	5500
203	idi	3.01	3.40	23.0	106	4800
204	mpfi	3.78	3.15	9.5	114	5400
194 195 196 197 198 199 200 201 202 203 204	city-mpg high 23 23 24 24 17 17 23 19 18 26 19	way-mpg 28 28 28 28 22 22 28 25 23 27 25	price 12940 13415 15985 16515 18420 18950 16845 19045 21485 22470 22625			
	rows x 26 col		22023			

Volvo a good one

We now tend to those missing values in the normalised column which does not have any kind of values of whatsoever and then now we insert in the median or mode or mean into the empty values

```
final_median_nrml_lss = auto['normalized-losses'].median()
final median nrml lss
118.0
auto.loc[(auto['normalized-losses']==0), 'normalized-losses'] =
final median nrml lss
auto.isna().sum()
symboling
                     0
normalized-losses
                     0
                      0
make
                     0
fuel-type
                     0
aspiration
                     2
num-of-doors
body-style
```

```
drive-wheels
                     0
engine-location
                     0
wheel-base
                     0
                     0
lenath
                     0
width
height
                     0
                     0
curb-weight
engine-type
                     0
num-of-cylinders
                     0
                     0
engine-size
                     0
fuel-system
                     4
bore
                     4
stroke
                     0
compression-ratio
                     2
horsepower
                     2
peak-rpm
                     0
city-mpg
                     0
highway-mpg
                     0
price
dtype: int64
auto['num-of-doors'].replace('two',2,inplace=True)
auto['num-of-doors'].replace('four',4,inplace=True)
auto['num-of-doors'].unique()
array([ 2., 4., nan, 109.])
auto['num-of-doors'].median()
4.0
auto['num-of-doors'] = auto['num-of-doors'].fillna(4)
auto['num-of-doors'].unique()
array([ 2., 4., 109.])
auto['num-of-doors'].dtype
dtype('float64')
auto.isna().sum()
symboling
                     0
normalized-losses
                     0
make
                     0
                     0
fuel-type
                     0
aspiration
num-of-doors
                     0
                     0
body-style
```

```
drive-wheels
engine-location
                          0
wheel-base
                          0
lenath
                          0
                          0
width
height
                          0
curb-weight
                          0
engine-type
                          0
num-of-cylinders
                          0
engine-size
                          0
                          0
fuel-system
                          4
bore
                          4
stroke
                          0
compression-ratio
horsepower
                          2
                          2
peak-rpm
                          0
city-mpg
                          0
highway-mpg
                          0
price
dtype: int64
auto['bore'].isna().sum()
4
auto['bore'].unique()
array(['3.47', '2.68', '3.19', '3.13', '3.50', '3.31', '3.62', '2.91', '3.03', '2.97', '3.34', '3.60', '2.92', '3.15', '3.43', '3.63', '3.54', '3.08', nan, '3.39', '3.76', 109, '3.58', '3.46',
'3.80',
         '3.78', '3.17', '3.35', '3.59', '2.99', '3.33', '3.70', '3.61',
         '3.94', '3.74', '2.54', '3.05', '3.27', '3.24', '3.01'],
       dtype=object)
median of bore = auto['bore'].median()
auto['bore'] = auto['bore'].fillna(median of bore).astype(float)
auto['bore'].isna().sum()
auto['stroke'].isna().sum()
4
auto['stroke'].unique()
array(['2.68', '3.47', '3.40', '2.80', '3.19', '3.39', '3.03', '3.11', '3.23', '3.46', '3.90', '3.41', '3.07', '3.58', '4.17', '2.76',
         '3.15', nan, '3.16', 109, '3.64', '3.10', '3.35', '3.12',
```

```
median of stroke = auto['stroke'].median()
median of stroke
3.29
auto['stroke'] = auto['stroke'].fillna(median of stroke).astype(float)
auto['stroke'].isna().sum()
0
auto['horsepower'].isna().sum()
0
median of HP = auto['horsepower'].median()
median of HP
95.0
auto['horsepower'].dtype
dtype('float64')
auto['horsepower'] =
auto['horsepower'].fillna(median of HP).astype(float)
auto['horsepower'].isna().sum()
0
auto['peak-rpm'].isna().sum()
0
auto['peak-rpm'].unique()
array([5000., 5500., 5800., 4250., 5400., 5100., 4800., 6000., 4750.,
      4650., 109., 4350., 4500., 5200., 4150., 5600., 5900., 5250.,
      4900., 4400., 6600., 4200., 5300.])
median_of_pkrpm = auto['peak-rpm'].median()
median of pkrpm
5200.0
auto['peak-rpm'] = auto['peak-
rpm'].fillna(median of pkrpm).astype(float)
auto['peak-rpm'].isna().sum()
```

```
0
auto.isna().sum()
symboling
                       0
normalized-losses
                       0
make
                       0
fuel-type
                       0
aspiration
                       0
                       0
num-of-doors
body-style
                       0
                       0
drive-wheels
engine-location
                       0
wheel-base
                       0
length
                       0
                       0
width
height
                       0
curb-weight
                       0
                       0
engine-type
num-of-cylinders
                       0
engine-size
                       0
                       0
fuel-system
                       0
bore
                       0
stroke
                       0
compression-ratio
                       0
horsepower
                       0
peak-rpm
                       0
city-mpg
                       0
highway-mpg
price
                       0
dtype: int64
auto
                 normalized-losses
     symboling
                                              make fuel-type aspiration \
0
                                      alfa-romero
                               118.0
                                                          gas
                                                                      std
1
              3
                               118.0
                                      alfa-romero
                                                                      std
                                                          gas
2
              1
                               118.0
                                      alfa-romero
                                                                      std
                                                          gas
3
              2
                               164.0
                                              audi
                                                                      std
                                                          gas
4
              2
                               164.0
                                              audi
                                                                      std
                                                          gas
                                                          . . .
200
                                95.0
             - 1
                                             volvo
                                                                      std
                                                          gas
201
             - 1
                                95.0
                                             volvo
                                                          gas
                                                                    turbo
202
             - 1
                                95.0
                                             volvo
                                                                      std
                                                          gas
203
             - 1
                                95.0
                                             volvo
                                                       diesel
                                                                    turbo
204
             - 1
                                95.0
                                             volvo
                                                          gas
                                                                    turbo
     num-of-doors
                      body-style drive-wheels engine-location
base
0
               2.0
                     convertible
                                                           front
                                            rwd
```

88.6							
1		2.0	convertible		rwd	front	
88.6							
2		2.0	hatchback		rwd	front	
94.5							
3		4.0	sedan		fwd	front	
99.8							
4		4.0	sedan		4wd	front	
99.4							
200		4.0	sedan		rwd	front	
109.1							
201		4.0	sedan		rwd	front	
109.1							
202		4.0	sedan		rwd	front	
109.1							
203		4.0	sedan		rwd	front	
109.1							
204		4.0	sedan		rwd	front	
109.1							
(engine	-size	fuel-system	bore	stroke	compression-ratio	
horse	oower	\					
0		130	mpfi	3.47	2.68	9.0	
111.0							
1		130	mpfi	3.47	2.68	9.0	
111.0							
2		152	mpfi	2.68	3.47	9.0	
154.0							
3		109	mpfi	3.19	3.40	10.0	
102.0							
4		136	mpfi	3.19	3.40	8.0	
115.0							
							•
200		141	mpfi	3.78	3.15	9.5	
114.0							
201		141	mpfi	3.78	3.15	8.7	
160.0		170		2 52	2 2-		
202		173	mpfi	3.58	2.87	8.8	
134.0				0.00			
203		145	idi	3.01	3.40	23.0	
106.0		7.4-	. .				
204		141	mpfi	3.78	3.15	9.5	
114.0							
			man a la distribu				
		om city			price		
0	5000	. 0	21	27	13495		

```
1
       5000.0
                    21
                                  27
                                      16500
2
                    19
       5000.0
                                  26
                                      16500
3
       5500.0
                    24
                                  30
                                     13950
4
       5500.0
                    18
                                  22
                                      17450
200
       5400.0
                    23
                                  28
                                     16845
201
       5300.0
                    19
                                      19045
                                  25
202
       5500.0
                     18
                                  23
                                      21485
                                      22470
203
       4800.0
                    26
                                  27
204
       5400.0
                    19
                                  25
                                     22625
[201 rows x 26 columns]
auto['engine-type'].unique()
array(['dohc', 'ohcv', 'ohc', 'l', 'rotor', 109, 'ohcf'],
dtype=object)
auto['num-of-cylinders'].unique()
array(['four', 'six', 'five', 'three', 'twelve', 'two', 109, 'eight'],
      dtype=object)
auto['num-of-cylinders'].dtype
dtype('0')
!pip install word2number
Defaulting to user installation because normal site-packages is not
writeable
Requirement already satisfied: word2number in c:\users\preda\appdata\
roaming\python\python311\site-packages (1.1)
from word2number import w2n
auto['num-of-cylinders'] = auto['num-of-cylinders'].astype(str)
auto['num-of-cylinders'] = auto['num-of-
cylinders'].apply(w2n.word to num)
auto['num-of-cylinders'].dtype
dtype('int64')
auto
                normalized-losses
     symboling
                                           make fuel-type aspiration \
0
                                    alfa-romero
                                                                  std
             3
                             118.0
                                                       gas
1
             3
                             118.0
                                    alfa-romero
                                                       gas
                                                                  std
2
             1
                             118.0
                                    alfa-romero
                                                       gas
                                                                  std
3
             2
                             164.0
                                           audi
                                                       gas
                                                                  std
4
                             164.0
                                           audi
                                                       gas
                                                                  std
```

200 201 202 203 204	-1 -1 -1 -1 -1	9! 9! 9! 9!	5.0 5.0 5.0 5.0 5.0	vol vol vol	lvo gas lvo gas lvo diesel	std turbo std turbo turbo
num-o base 0	f-doors \ 2.0	<pre>body-style convertible</pre>	drive	e-wheels rwd	<pre>engine-location front</pre>	
88.6	2.0	convertible		rwd	front	
88.6 2 94.5	2.0	hatchback		rwd	front	
94.5 3 99.8	4.0	sedan		fwd	front	
99.4	4.0	sedan		4wd	front	
200 109.1	4.0	sedan		rwd	front	
201 109.1	4.0	sedan		rwd	front	
202 109.1	4.0	sedan		rwd	front	
203 109.1	4.0	sedan		rwd	front	
204 109.1	4.0	sedan		rwd	front	
	e-size	fuel-system	bore	stroke	compression-rat	io
horsepower	130	mpfi	3.47	2.68	Q	0.0
111.0	130	mpfi	3.47	2.68	Ç	0.0
111.0	152	mpfi	2.68	3.47	Q	0.0
154.0 3	109	mpfi	3.19	3.40	16	0.0
102.0 4 115.0	136	mpfi	3.19	3.40	8	3.0
200 114.0	141	mpfi	3.78	3.15	Q	0.5
201	141	mpfi	3.78	3.15	3	3.7

```
160.0
                          mpfi 3.58
              173
                                         2.87
                                                             8.8
202
134.0
                                                            23.0
203
              145
                           idi 3.01
                                         3.40
106.0
                          mpfi 3.78
204
              141
                                         3.15
                                                              9.5
114.0
     peak-rpm city-mpg
                         highway-mpg
                                       price
0
       5000.0
                     21
                                   27
                                       13495
1
       5000.0
                     21
                                   27
                                       16500
2
       5000.0
                     19
                                   26
                                       16500
3
       5500.0
                     24
                                   30
                                       13950
4
       5500.0
                     18
                                   22
                                       17450
200
       5400.0
                     23
                                   28
                                       16845
201
       5300.0
                     19
                                       19045
                                   25
202
       5500.0
                                   23
                                       21485
                     18
203
       4800.0
                     26
                                   27
                                       22470
204
       5400.0
                     19
                                   25
                                       22625
[201 rows x 26 columns]
auto.to_csv('automobiles.csv',index=False)
```