SPRINT 1

Importing necessary libraries:

```
import numpy as np
import pandas as pd
import seaborn as sns
import matplotlib.pyplot as plt
%matplotlib inline
import re
from sklearn.model_selection import train_test_split
from sklearn.metrics import accuracy_score
from sklearn.linear_model import LinearRegression
from sklearn.ensemble import RandomForestRegressor
from sklearn.decomposition import PCA
```

Reading the dataset

```
cars = pd.read_csv("drive/MyDrive/Dataset/Car details.csv")
cars.head(10)
```

	name	year	selling_price	km_driven	fuel	seller_type	transmission	owner	mileage	engine	max_power	torque	seats
0	Maruti Swift Dzire VDI	2014	450000	145500	Diesel	Individual	Manual	First Owner	23.4 kmpl	1248 CC	74 bhp	190Nm@ 2000rpm	5.0
1	Skoda Rapid 1.5 TDI Ambition	2014	370000	120000	Diesel	Individual	Manual	Second Owner	21.14 kmpl	1498 CC	103.52 bhp	250Nm@ 1500-2500rpm	5.0
2	Honda City 2017-2020 EXi	2006	158000	140000	Petrol	Individual	Manual	Third Owner	17.7 kmpl	1497 CC	78 bhp	12.7@ 2,700(kgm@ rpm)	5.0
3	Hyundai i20 Sportz Diesel	2010	225000	127000	Diesel	Individual	Manual	First Owner	23.0 kmpl	1396 CC	90 bhp	22.4 kgm at 1750-2750rpm	5.0
4	Maruti Swift VXI BSIII	2007	130000	120000	Petrol	Individual	Manual	First Owner	16.1 kmpl	1298 CC	88.2 bhp	11.5@ 4,500(kgm@ rpm)	5.0
5	Hyundai Xcent 1.2 VTVT E Plus	2017	440000	45000	Petrol	Individual	Manual	First Owner	20.14 kmpl	1197 CC	81.86 bhp	113.75nm@ 4000rpm	5.0
6	Maruti Wagon R LXI DUO BSIII	2007	96000	175000	LPG	Individual	Manual	First Owner	17.3 km/kg	1061 CC	57.5 bhp	7.8@ 4,500(kgm@ rpm)	5.0
7	Maruti 800 DX BSII	2001	45000	5000	Petrol	Individual	Manual	Second Owner	16.1 kmpl	796 CC	37 bhp	59Nm@ 2500rpm	4.0
8	Toyota Etios VXD	2011	350000	90000	Diesel	Individual	Manual	First Owner	23.59 kmpl	1364 CC	67.1 bhp	170Nm@ 1800-2400rpm	5.0
9	Ford Figo Diesel Celebration Edition	2013	200000	169000	Diesel	Individual	Manual	First Owner	20.0 kmpl	1399 CC	68.1 bhp	160Nm@ 2000rpm	5.0

Cleaning the dataset

```
cars.isnull().sum()
```

Data collection & Preprocessing

SPRINT 1

```
name              0
year              0
selling_price     0
km_driven         0
fuel              0
seller_type       0
transmission      0
owner             0
mileage         221
engine          221
max_power       215
torque          222
seats           221
dtype: int64
```

```
cars.shape
```

```
(7906, 13)
```

```
res = '190Nm@ 2,000rpm'.replace(".", "")
res = res.replace(",", "")
a =  [int(s) for s in re.findall(r'\d+', res)]
a
```

```
[190, 2000]
```

```
torque_list = cars['torque'].to_list()
# torque_list[:2]
torque_rpm = []
def extractingRPM(x):
  for item in x:
    res = item.replace(".", "")
    res = res.replace(",", "")
    temp = [int(s) for s in re.findall(r'\d+', res)]
```

Data collection & Preprocessing

```
    torque_rpm.append(max(temp))

extractingRPM(torque_list)
print(torque_list[:2])
print(torque_rpm[:2])
```

```
['190Nm@ 2000rpm', '250Nm@ 1500-2500rpm']
[2000, 2500]
```

```
cars['torque_rpm'] = torque_rpm
cars.head(2)
```

	name	year	selling_price	km_driven	fuel	seller_type	transmission	owner	mileage	engine	max_power	torque	seats	torque_rpm
0	Maruti Swift Dzire VDI	2014	450000	145500	Diesel	Individual	Manual	First Owner	23.4 kmpl	1248 CC	74 bhp	190Nm@ 2000rpm	5.0	2000
1	Skoda Rapid 1.5 TDI Ambition	2014	370000	120000	Diesel	Individual	Manual	Second Owner	21.14 kmpl	1498 CC	103.52 bhp	250Nm@ 1500-2500rpm	5.0	2500

```
mil_list = cars['mileage'].to_list()
# torque_list[:2]
mil_kmpl = []
def extractingmil(x):
  for item in x:
    temp = []
    try:
      for s in item.split(" "):
        temp.append(float(s))
    except:
      pass
    mil_kmpl.append(max(temp))

extractingmil(mil_list)
print(mil_list[:2])
print(mil_kmpl[:2])
```

SPRINT 1

```
['23.4 kmpl', '21.14 kmpl']
[23.4, 21.14]
```

```
cars['mil_kmpl'] = mil_kmpl
cars.head(2)
```

	name	year	selling_price	km_driven	fuel	seller_type	transmission	owner	mileage	engine	max_power	torque	seats	torque_rpm	mil_kmpl
0	Maruti Swift Dzire VDI	2014	450000	145500	Diesel	Individual	Manual	First Owner	23.4 kmpl	1248 CC	74 bhp	190Nm@ 2000rpm	5.0	2000	23.40
1	Skoda Rapid 1.5 TDI Ambition	2014	370000	120000	Diesel	Individual	Manual	Second Owner	21.14 kmpl	1498 CC	103.52 bhp	250Nm@ 1500-2500rpm	5.0	2500	21.14

```
engine_list = cars['engine'].to_list()
# torque_list[:2]
engine_cc = []
def extractingEngine(x):
  for item in x:
    temp = []
    try:
      for s in item.split(" "):
        temp.append(float(s))
    except:
      pass
    engine_cc.append(max(temp))

extractingEngine(engine_list)
print(engine_list[:2])
print(engine_cc[:2])
```

```
['1248 CC', '1498 CC']
[1248.0, 1498.0]
```

```
cars['engine_cc'] = engine_cc
cars.head(2)
```

	name	year	selling_price	km_driven	fuel	seller_type	transmission	owner	mileage	engine	max_power	torque	seats	torque_rpm	mil_kmpl	engine_cc
0	Maruti Swift Dzire VDI	2014	450000	145500	Diesel	Individual	Manual	First Owner	23.4 kmpl	1248 CC	74 bhp	190Nm@ 2000rpm	5.0	2000	23.40	1248.0
1	Skoda Rapid 1.5 TDI Ambition	2014	370000	120000	Diesel	Individual	Manual	Second Owner	21.14 kmpl	1498 CC	103.52 bhp	250Nm@ 1500-2500rpm	5.0	2500	21.14	1498.0

Data collection & Preprocessing

SPRINT 1

```
power_list = cars['max_power'].to_list()
# torque_list[:2]
max_power = []
def extractingPower(x):
  for item in x:
    temp = []
    try:
      for s in item.split(" "):
        temp.append(float(s))
    except:
      pass
    max_power.append(max(temp))

extractingPower(power_list)
print(power_list[:2])
print(max_power[:2])
```

```
['74 bhp', '103.52 bhp']
[74.0, 103.52]
```

```
cars['max_power_new'] = max_power
cars.head(2)
```

	name	year	selling_price	km_driven	fuel	seller_type	transmission	owner	mileage	engine	max_power	torque	seats	torque_rpm	mil_kmpl	engine_cc	max_power_new
0	Maruti Swift Dzire VDI	2014	450000	145500	Diesel	Individual	Manual	First Owner	23.4 kmpl	1248 CC	74 bhp	190Nm@ 2000rpm	5.0	2000	23.40	1248.0	74.00
1	Skoda Rapid 1.5 TDI Ambition	2014	370000	120000	Diesel	Individual	Manual	Second Owner	21.14 kmpl	1498 CC	103.52 bhp	250Nm@ 1500-2500rpm	5.0	2500	21.14	1498.0	103.52

```
cars_new = cars.drop(['mileage', 'engine', 'max_power', 'torque'], axis
= 1)
cars_new.describe()
```

Data collection & Preprocessing

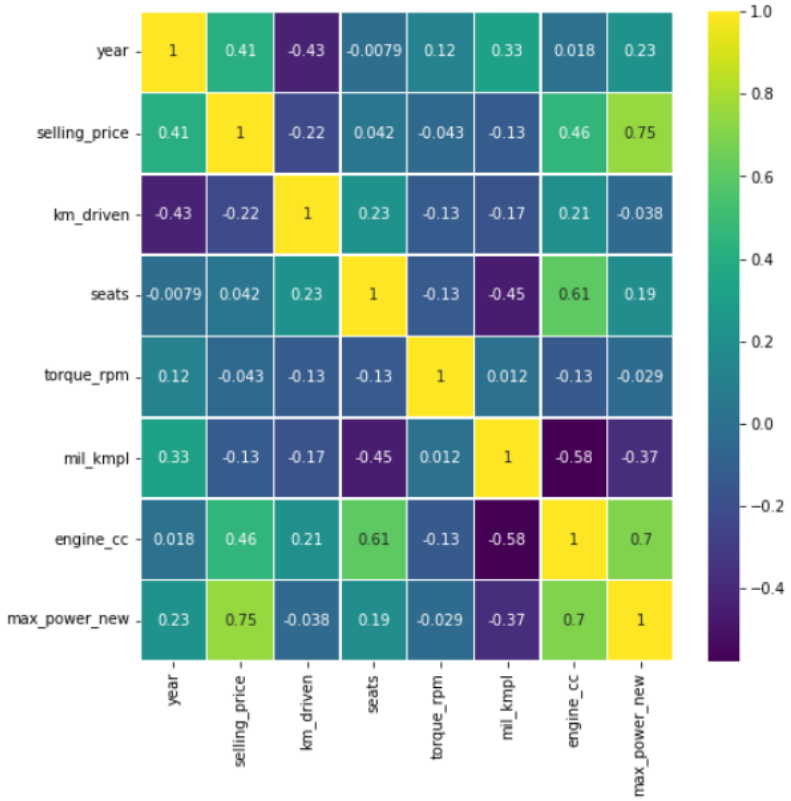
SPRINT 1

	year	selling_price	km_driven	seats	torque_rpm	mil_kmpl	engine_cc	max_power_new
count	7906.000000	7.906000e+03	7.906000e+03	7906.000000	7906.000000	7906.000000	7906.000000	7906.000000
mean	2013.983936	6.498137e+05	6.918866e+04	5.416393	3474.631419	19.419861	1458.708829	91.587374
std	3.863695	8.135827e+05	5.679230e+04	0.959208	2579.612132	4.036263	503.893057	35.747216
min	1994.000000	2.999900e+04	1.000000e+00	2.000000	400.000000	0.000000	624.000000	32.800000
25%	2012.000000	2.700000e+05	3.500000e+04	5.000000	2500.000000	16.780000	1197.000000	68.050000
50%	2015.000000	4.500000e+05	6.000000e+04	5.000000	3000.000000	19.300000	1248.000000	82.000000
75%	2017.000000	6.900000e+05	9.542500e+04	5.000000	4000.000000	22.320000	1582.000000	102.000000
max	2020.000000	1.000000e+07	2.360457e+06	14.000000	43639.000000	42.000000	3604.000000	400.000000

Normalization of data

```
plt.figure(figsize=(8,8))
sns.heatmap(cars_new.corr(),annot=True,cmap='viridis',linewidths=.5)
```

```
<matplotlib.axes._subplots.AxesSubplot at 0x7f0276bffc10>
```



Finding categorical data

```
cars_new['fuel'].value_counts()
```

```
Diesel    4299
Petrol    3520
CNG         52
LPG         35
Name: fuel, dtype: int64
```

```
cars_new['seller_type'].value_counts()
```

```
Individual          6563
Dealer              1107
Trustmark Dealer     236
Name: seller_type, dtype: int64
```

```
cars_new['transmission'].value_counts()
```

```
Manual       6865
Automatic    1041
Name: transmission, dtype: int64
```

```
cars_new['owner'].value_counts()
```

```
First Owner             5215
Second Owner            2016
Third Owner              510
Fourth & Above Owner     160
Test Drive Car             5
Name: owner, dtype: int64
```

Converting categorical data

```
def ref1(x):
  if x == 'Manual':
    return 1
  else:
    return 0
cars_new['transmission'] = cars_new['transmission'].map(ref1)
```

SPRINT 1

```
def ref2(x):
  if x == 'Individual':
    return 1
  elif x == 'Dealer':
    return 0
  else:
    return -1
cars_new['seller_type'] = cars_new['seller_type'].map(ref2)

def ref3(x):
  if x == 'Petrol':
    return 1
  elif x == 'Diesel':
    return 0
  else:
    return -1
cars_new['fuel'] = cars_new['fuel'].map(ref3)

owners = pd.get_dummies(cars_new['owner'])
X = pd.concat([cars_new, owners], axis=1)
X.head()
```

	name	year	selling_price	km_driven	fuel	seller_type	transmission	owner	seats	torque_rpm	mil_kmpl	engine_cc	max_power_new	First Owner	Fourth & Above Owner	Second Owner	Test Drive Car	Third Owner
0	Maruti Swift Dzire VDI	2014	450000	145500	0	1	1	First Owner	5.0	2000	23.40	1248.0	74.00	1	0	0	0	0
1	Skoda Rapid 1.5 TDI Ambition	2014	370000	120000	0	1	1	Second Owner	5.0	2500	21.14	1498.0	103.52	0	0	1	0	0
2	Honda City 2017-2020 EXi	2006	158000	140000	1	1	1	Third Owner	5.0	2700	17.70	1497.0	78.00	0	0	0	0	1
3	Hyundai i20 Sportz Diesel	2010	225000	127000	0	1	1	First Owner	5.0	2750	23.00	1396.0	90.00	1	0	0	0	0
4	Maruti Swift VXI BSIII	2007	130000	120000	1	1	1	First Owner	5.0	4500	16.10	1298.0	88.20	1	0	0	0	0

Data collection & Preprocessing

SPRINT 1

Splitting the data into dependent and independent variables.

```
y = X['selling_price']
X = X.drop(['selling_price', 'name', 'owner'], axis = 1)
X
```

	year	km_driven	fuel	seller_type	transmission	seats	torque_rpm	mil_kmpl	engine_cc	max_power_new	First Owner	Fourth & Above Owner	Second Owner	Test Drive Car	Third Owner
0	2014	145500	0	1	1	5.0	2000	23.40	1248.0	74.00	1	0	0	0	0
1	2014	120000	0	1	1	5.0	2500	21.14	1498.0	103.52	0	0	1	0	0
2	2006	140000	1	1	1	5.0	2700	17.70	1497.0	78.00	0	0	0	0	1
3	2010	127000	0	1	1	5.0	2750	23.00	1396.0	90.00	1	0	0	0	0
4	2007	120000	1	1	1	5.0	4500	16.10	1298.0	88.20	1	0	0	0	0
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
8123	2013	110000	1	1	1	5.0	4000	18.50	1197.0	82.85	1	0	0	0	0
8124	2007	119000	0	1	1	5.0	2750	16.80	1493.0	110.00	0	1	0	0	0
8125	2009	120000	0	1	1	5.0	2000	19.30	1248.0	73.90	1	0	0	0	0
8126	2013	25000	0	1	1	5.0	3000	23.57	1396.0	70.00	1	0	0	0	0
8127	2013	25000	0	1	1	5.0	3000	23.57	1396.0	70.00	1	0	0	0	0

7906 rows × 15 columns