In [1]:
```
import pandas as pd
```

In [2]:
```
data=pd.read_csv("/home/placement/Downloads/fiat500.csv")
```

In [3]:
```
data.describe()
```

Out[3]:

| | ID | engine_power | age_in_days | km | previous_owners | lat | lon | price |
|---|---|---|---|---|---|---|---|---|
| **count** | 1538.000000 | 1538.000000 | 1538.000000 | 1538.000000 | 1538.000000 | 1538.000000 | 1538.000000 | 1538.000000 |
| **mean** | 769.500000 | 51.904421 | 1650.980494 | 53396.011704 | 1.123537 | 43.541361 | 11.563428 | 8576.003901 |
| **std** | 444.126671 | 3.988023 | 1289.522278 | 40046.830723 | 0.416423 | 2.133518 | 2.328190 | 1939.958641 |
| **min** | 1.000000 | 51.000000 | 366.000000 | 1232.000000 | 1.000000 | 36.855839 | 7.245400 | 2500.000000 |
| **25%** | 385.250000 | 51.000000 | 670.000000 | 20006.250000 | 1.000000 | 41.802990 | 9.505090 | 7122.500000 |
| **50%** | 769.500000 | 51.000000 | 1035.000000 | 39031.000000 | 1.000000 | 44.394096 | 11.869260 | 9000.000000 |
| **75%** | 1153.750000 | 51.000000 | 2616.000000 | 79667.750000 | 1.000000 | 45.467960 | 12.769040 | 10000.000000 |
| **max** | 1538.000000 | 77.000000 | 4658.000000 | 235000.000000 | 4.000000 | 46.795612 | 18.365520 | 11100.000000 |

In [4]:
```
data.head()
```

Out[4]:

| | ID | model | engine_power | age_in_days | km | previous_owners | lat | lon | price |
|---|---|---|---|---|---|---|---|---|---|
| **0** | 1 | lounge | 51 | 882 | 25000 | 1 | 44.907242 | 8.611560 | 8900 |
| **1** | 2 | pop | 51 | 1186 | 32500 | 1 | 45.666359 | 12.241890 | 8800 |
| **2** | 3 | sport | 74 | 4658 | 142228 | 1 | 45.503300 | 11.417840 | 4200 |
| **3** | 4 | lounge | 51 | 2739 | 160000 | 1 | 40.633171 | 17.634609 | 6000 |
| **4** | 5 | pop | 73 | 3074 | 106880 | 1 | 41.903221 | 12.495650 | 5700 |

In [5]:
```
data1=data.drop(['lat','lon','ID'],axis=1)
```

In [6]:
```
data1
```

Out[6]:

| | model | engine_power | age_in_days | km | previous_owners | price |
|---|---|---|---|---|---|---|
| **0** | lounge | 51 | 882 | 25000 | 1 | 8900 |
| **1** | pop | 51 | 1186 | 32500 | 1 | 8800 |
| **2** | sport | 74 | 4658 | 142228 | 1 | 4200 |
| **3** | lounge | 51 | 2739 | 160000 | 1 | 6000 |
| **4** | pop | 73 | 3074 | 106880 | 1 | 5700 |
| **...** | ... | ... | ... | ... | ... | ... |
| **1533** | sport | 51 | 3712 | 115280 | 1 | 5200 |
| **1534** | lounge | 74 | 3835 | 112000 | 1 | 4600 |
| **1535** | pop | 51 | 2223 | 60457 | 1 | 7500 |
| **1536** | lounge | 51 | 2557 | 80750 | 1 | 5990 |
| **1537** | pop | 51 | 1766 | 54276 | 1 | 7900 |

1538 rows × 6 columns

In [7]:
```
data1.shape
```

Out[7]:
```
(1538, 6)
```

In [8]:
```
data1=pd.get_dummies(data1)
```

In [9]:
```
data1
```

Out[9]:

| | engine_power | age_in_days | km | previous_owners | price | model_lounge | model_pop | model_sport |
|---|---|---|---|---|---|---|---|---|
| **0** | 51 | 882 | 25000 | 1 | 8900 | 1 | 0 | 0 |
| **1** | 51 | 1186 | 32500 | 1 | 8800 | 0 | 1 | 0 |
| **2** | 74 | 4658 | 142228 | 1 | 4200 | 0 | 0 | 1 |
| **3** | 51 | 2739 | 160000 | 1 | 6000 | 1 | 0 | 0 |
| **4** | 73 | 3074 | 106880 | 1 | 5700 | 0 | 1 | 0 |
| **...** | ... | ... | ... | ... | ... | ... | ... | ... |
| **1533** | 51 | 3712 | 115280 | 1 | 5200 | 0 | 0 | 1 |
| **1534** | 74 | 3835 | 112000 | 1 | 4600 | 1 | 0 | 0 |
| **1535** | 51 | 2223 | 60457 | 1 | 7500 | 0 | 1 | 0 |
| **1536** | 51 | 2557 | 80750 | 1 | 5990 | 1 | 0 | 0 |
| **1537** | 51 | 1766 | 54276 | 1 | 7900 | 0 | 1 | 0 |

1538 rows × 8 columns

In [10]:
```
data1.shape
```

Out[10]:
```
(1538, 8)
```

In [11]:
```
y=data1['price']
x=data1.drop('price',axis=1)   #
```

In [12]:
```
y
```

Out[12]:
```
0       8900
1       8800
2       4200
3       6000
4       5700
        ...
1533    5200
1534    4600
1535    7500
1536    5990
1537    7900
Name: price, Length: 1538, dtype: int64
```

In [13]:
```
from sklearn.model_selection import train_test_split
x_train,x_test,y_train,y_test = train_test_split(x,y,test_size=0.33,random_state=42) #split data into testir
```

In [14]:
```
x_test.head(5)
```

Out[14]:

| | engine_power | age_in_days | km | previous_owners | model_lounge | model_pop | model_sport |
|---|---|---|---|---|---|---|---|
| **481** | 51 | 3197 | 120000 | 2 | 0 | 1 | 0 |
| **76** | 62 | 2101 | 103000 | 1 | 0 | 1 | 0 |
| **1502** | 51 | 670 | 32473 | 1 | 1 | 0 | 0 |
| **669** | 51 | 913 | 29000 | 1 | 1 | 0 | 0 |
| **1409** | 51 | 762 | 18800 | 1 | 1 | 0 | 0 |

In [15]:
```
x_train.shape
```

Out[15]:
```
(1030, 7)
```

In [16]:
```
y_train
```

Out[16]:
```
527      9990
129      9500
602      7590
331      8750
323      9100
        ...
1130    10990
1294     9800
860      5500
1459     9990
1126     8900
Name: price, Length: 1030, dtype: int64
```

In [17]:
```
y_test.head()
```

Out[17]:
```
481     7900
76      7900
1502    9400
669     8500
1409    9700
Name: price, dtype: int64
```

In [18]:
```
y_train.shape
```

Out[18]:
```
(1030,)
```

In [19]:
```
from sklearn.linear_model import LinearRegression
reg=LinearRegression()  #creating object of LinearRegression
reg.fit(x_train,y_train) #training and fitting LR object using training data
```

Out[19]:
```
LinearRegression()
```

In [20]:
```
ypred=reg.predict(x_test)
```

In [21]:
```
ypred
```

Out[21]:
```
array([ 5867.6503378 ,  7133.70142341,  9866.35776216,  9723.28874535,
       10039.59101162,  9654.07582608,  9673.14563045, 10118.70728123,
        9903.85952664,  9351.55828437, 10434.34963575,  7732.26255693,
        7698.67240131,  6565.95240435,  9662.90103518, 10373.20344286,
        9599.94844451,  7699.34400418,  4941.33017994, 10455.2719478 ,
       10370.51555682, 10391.60424404,  7529.06622456,  9952.37340054,
        7006.13845729,  9000.1780961 ,  4798.36770637,  6953.10376491,
        7810.39767825,  9623.80497535,  7333.52158317,  5229.18705519,
        5398.21541073,  5157.65652129,  8948.63632836,  5666.62365159,
        9822.1231461 ,  8258.46551788,  6279.2040404 ,  8457.38443276,
        9773.86444066,  6767.04074749,  9182.99904787, 10210.05195479,
        8694.90545226, 10328.43369248,  9069.05761443,  8866.7826029 ,
        7058.39787506,  9073.33877162,  9412.68162121, 10293.69451263,
       10072.49011135,  6748.5794244 ,  9785.95841801,  9354.09969973,
        9507.9444386 , 10443.01608254,  9795.31884316,  7197.84932877,
       10108.31707235,  7009.6597206 ,  9853.90699412,  7146.87414965,
        6417.69133992,  9996.97382441,  9781.18795953,  8515.83255277,
        8456.30006203,  6499.76668237,  7768.57829985,  6832.86406122,
        8347.96113362, 10439.02404036,  7356.43463051,  8562.56562053,
```

In [22]:
```
from sklearn.metrics import r2_score
r2_score(y_test,ypred)
```

Out[22]:
```
0.8415526986865394
```

In [23]:
```
from sklearn.metrics import mean_squared_error      #calculating MSE
mean_squared_error(ypred,y_test)
```

Out[23]:
```
581887.727391353
```

In [24]:
```
n=581887.727391353
print(n**(1/2))
```

```
762.8156575420782
```

In [25]:
```
y_test.head(10)
```

Out[25]:
```
481      7900
76       7900
1502     9400
669      8500
1409     9700
1414     9900
1089     9900
1507     9950
970     10700
1198     8999
Name: price, dtype: int64
```

In [26]:
```
ypred
```

Out[26]:
```
array([ 5867.6503378 ,  7133.70142341,  9866.35776216,  9723.28874535,
       10039.59101162,  9654.07582608,  9673.14563045, 10118.70728123,
        9903.85952664,  9351.55828437, 10434.34963575,  7732.26255693,
        7698.67240131,  6565.95240435,  9662.90103518, 10373.20344286,
        9599.94844451,  7699.34400418,  4941.33017994, 10455.2719478 ,
       10370.51555682, 10391.60424404,  7529.06622456,  9952.37340054,
        7006.13845729,  9000.1780961 ,  4798.36770637,  6953.10376491,
        7810.39767825,  9623.80497535,  7333.52158317,  5229.18705519,
        5398.21541073,  5157.65652129,  8948.63632836,  5666.62365159,
        9822.1231461 ,  8258.46551788,  6279.2040404 ,  8457.38443276,
        9773.86444066,  6767.04074749,  9182.99904787, 10210.05195479,
        8694.90545226, 10328.43369248,  9069.05761443,  8866.7826029 ,
        7058.39787506,  9073.33877162,  9412.68162121, 10293.69451263,
       10072.49011135,  6748.5794244 ,  9785.95841801,  9354.09969973,
        9507.9444386 , 10443.01608254,  9795.31884316,  7197.84932877,
       10108.31707235,  7009.6597206 ,  9853.90699412,  7146.87414965,
        6417.69133992,  9996.97382441,  9781.18795953,  8515.83255277,
        8456.30006203,  6499.76668237,  7768.57829985,  6832.86406122,
        8347.96113362, 10439.02404036,  7356.43463051,  8562.56562053,
```

In [27]:
```
Results=pd.DataFrame(columns=['price','predicted'])
Results['price']=y_test
Results['predicted']=ypred
Results.head(15)
```

Out[27]:

| | price | predicted |
|---|---|---|
| **481** | 7900 | 5867.650338 |
| **76** | 7900 | 7133.701423 |
| **1502** | 9400 | 9866.357762 |
| **669** | 8500 | 9723.288745 |
| **1409** | 9700 | 10039.591012 |
| **1414** | 9900 | 9654.075826 |
| **1089** | 9900 | 9673.145630 |
| **1507** | 9950 | 10118.707281 |
| **970** | 10700 | 9903.859527 |
| **1198** | 8999 | 9351.558284 |
| **1088** | 9890 | 10434.349636 |
| **576** | 7990 | 7732.262557 |
| **965** | 7380 | 7698.672401 |
| **1488** | 6800 | 6565.952404 |
| **1432** | 8900 | 9662.901035 |

In [28]:
```
Results['diff']=Results.apply(lambda row: row.price - row.predicted,axis=1) #Difference
```

In [29]:
```
Results
```

Out[29]:

| | price | predicted | diff |
|---|---|---|---|
| **481** | 7900 | 5867.650338 | 2032.349662 |
| **76** | 7900 | 7133.701423 | 766.298577 |
| **1502** | 9400 | 9866.357762 | -466.357762 |
| **669** | 8500 | 9723.288745 | -1223.288745 |
| **1409** | 9700 | 10039.591012 | -339.591012 |
| **...** | ... | ... | ... |
| **291** | 10900 | 10032.665135 | 867.334865 |
| **596** | 5699 | 6281.536277 | -582.536277 |
| **1489** | 9500 | 9986.327508 | -486.327508 |
| **1436** | 6990 | 8381.517020 | -1391.517020 |
| **575** | 10900 | 10371.142553 | 528.857447 |

508 rows × 3 columns

In [ ]:
```

```