# Problem Statement:

A real estate agent want to help to predict the house price for regions in USA.He gave us the dataset to work on to use Linear Regression modelCreate a Model that helps him to estimate of what the house would sell for

In [1]:
```
#import libraries
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
```

In [2]:
```
dataset
ad_csv(r"E:\154\fiat500_VehicleSelection_Dataset - fiat500_VehicleSelection_Dataset.csv",low_memory=False)[0:1500].dropna(
```

Out[2]:

| | ID | model | engine_power | age_in_days | km | previous_owners | lat | lon | price |
|---|---|---|---|---|---|---|---|---|---|
| **0** | 1.0 | lounge | 51.0 | 882.0 | 25000.0 | 1.0 | 44.907242 | 8.611559868 | 8900 |
| **1** | 2.0 | pop | 51.0 | 1186.0 | 32500.0 | 1.0 | 45.666359 | 12.24188995 | 8800 |
| **2** | 3.0 | sport | 74.0 | 4658.0 | 142228.0 | 1.0 | 45.503300 | 11.41784 | 4200 |
| **3** | 4.0 | lounge | 51.0 | 2739.0 | 160000.0 | 1.0 | 40.633171 | 17.63460922 | 6000 |
| **4** | 5.0 | pop | 73.0 | 3074.0 | 106880.0 | 1.0 | 41.903221 | 12.49565029 | 5700 |
| **...** | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| **1495** | 1496.0 | pop | 62.0 | 3347.0 | 80000.0 | 3.0 | 44.283878 | 11.88813972 | 7900 |
| **1496** | 1497.0 | pop | 51.0 | 1461.0 | 91055.0 | 3.0 | 44.508839 | 11.46907997 | 7450 |
| **1497** | 1498.0 | lounge | 51.0 | 397.0 | 15840.0 | 3.0 | 38.122070 | 13.36112022 | 10700 |
| **1498** | 1499.0 | sport | 51.0 | 1400.0 | 60000.0 | 1.0 | 45.802021 | 9.187789917 | 10800 |
| **1499** | 1500.0 | pop | 51.0 | 1066.0 | 53100.0 | 1.0 | 38.122070 | 13.36112022 | 8900 |

1500 rows × 9 columns

In [3]:
```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 1500 entries, 0 to 1499
Data columns (total 9 columns):
 #   Column           Non-Null Count  Dtype  
---  ------           --------------  -----  
 0   ID               1500 non-null   float64
 1   model            1500 non-null   object 
 2   engine_power     1500 non-null   float64
 3   age_in_days      1500 non-null   float64
 4   km               1500 non-null   float64
 5   previous_owners  1500 non-null   float64
 6   lat              1500 non-null   float64
 7   lon              1500 non-null   object 
 8   price            1500 non-null   object 
dtypes: float64(6), object(3)
memory usage: 105.6+ KB
```

In [4]:
```
#to display top 5 rows
df.head()
```

Out[4]:

| | ID | model | engine_power | age_in_days | km | previous_owners | lat | lon | price |
|---|---|---|---|---|---|---|---|---|---|
| **0** | 1.0 | lounge | 51.0 | 882.0 | 25000.0 | 1.0 | 44.907242 | 8.611559868 | 8900 |
| **1** | 2.0 | pop | 51.0 | 1186.0 | 32500.0 | 1.0 | 45.666359 | 12.24188995 | 8800 |
| **2** | 3.0 | sport | 74.0 | 4658.0 | 142228.0 | 1.0 | 45.503300 | 11.41784 | 4200 |
| **3** | 4.0 | lounge | 51.0 | 2739.0 | 160000.0 | 1.0 | 40.633171 | 17.63460922 | 6000 |
| **4** | 5.0 | pop | 73.0 | 3074.0 | 106880.0 | 1.0 | 41.903221 | 12.49565029 | 5700 |

# Data cleaning and Pre-Processing

In [5]:
```
#To find null values
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 1500 entries, 0 to 1499
Data columns (total 9 columns):
 #   Column           Non-Null Count  Dtype  
---  ------           --------------  -----  
 0   ID               1500 non-null   float64
 1   model            1500 non-null   object 
 2   engine_power     1500 non-null   float64
 3   age_in_days      1500 non-null   float64
 4   km               1500 non-null   float64
 5   previous_owners  1500 non-null   float64
 6   lat              1500 non-null   float64
 7   lon              1500 non-null   object 
 8   price            1500 non-null   object 
dtypes: float64(6), object(3)
memory usage: 105.6+ KB
```

In [6]:
```
# To display summary of statistics
df.describe()
```

Out[6]:

| | ID | engine_power | age_in_days | km | previous_owners | lat |
|---|---|---|---|---|---|---|
| **count** | 1500.000000 | 1500.000000 | 1500.000000 | 1500.000000 | 1500.000000 | 1500.000000 |
| **mean** | 750.500000 | 51.875333 | 1641.629333 | 53074.900000 | 1.126667 | 43.545904 |
| **std** | 433.157015 | 3.911606 | 1288.091104 | 39955.013731 | 0.421197 | 2.112907 |
| **min** | 1.000000 | 51.000000 | 366.000000 | 1232.000000 | 1.000000 | 36.855839 |
| **25%** | 375.750000 | 51.000000 | 670.000000 | 20000.000000 | 1.000000 | 41.802990 |
| **50%** | 750.500000 | 51.000000 | 1035.000000 | 38720.000000 | 1.000000 | 44.360376 |
| **75%** | 1125.250000 | 51.000000 | 2616.000000 | 78170.250000 | 1.000000 | 45.467960 |
| **max** | 1500.000000 | 77.000000 | 4658.000000 | 235000.000000 | 4.000000 | 46.795612 |

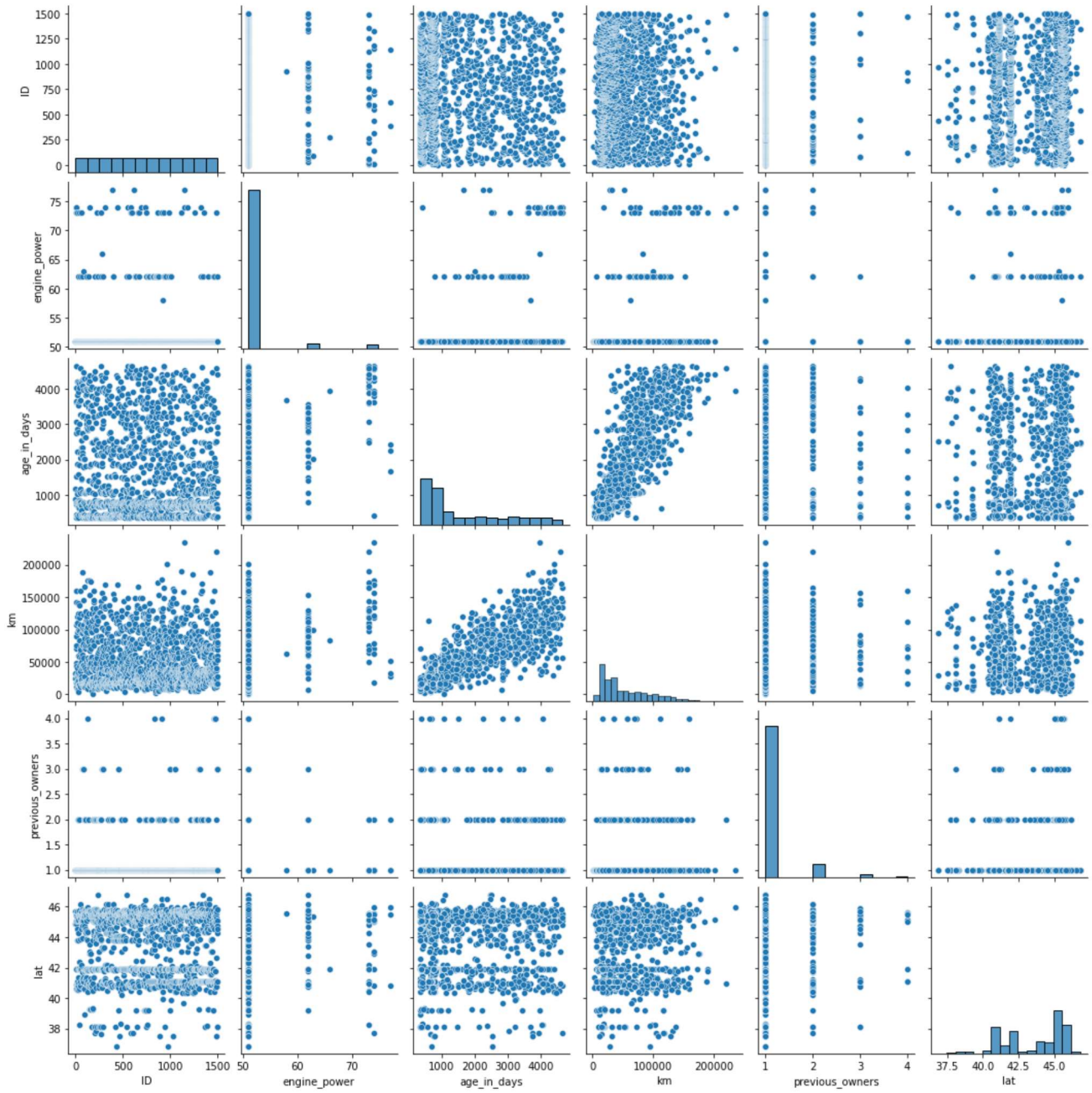
In [7]:
```
#To Display column heading
df.columns
```

Out[7]:
```
Index(['ID', 'model', 'engine_power', 'age_in_days', 'km', 'previous_owners',
       'lat', 'lon', 'price'],
      dtype='object')
```

# EDA and VISUALIZATION

In [8]:
```
sns.pairplot(df)
```

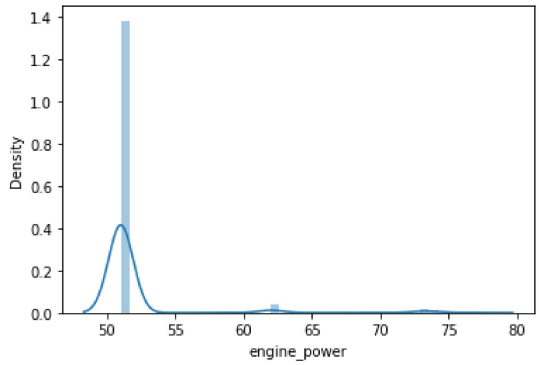
Out[8]:
```
<seaborn.axisgrid.PairGrid at 0x15e6c4b1be0>
```



In [9]:
```
sns.distplot(df['engine_power'])
```

```
C:\ProgramData\Anaconda3\lib\site-packages\seaborn\distributions.py:2557: FutureWarning: `distplot` is a deprecated func
tion and will be removed in a future version. Please adapt your code to use either `displot` (a figure-level function wi
th similar flexibility) or `histplot` (an axes-level function for histograms).
  warnings.warn(msg, FutureWarning)
```

Out[9]: <AxesSubplot:xlabel='engine_power', ylabel='Density'>

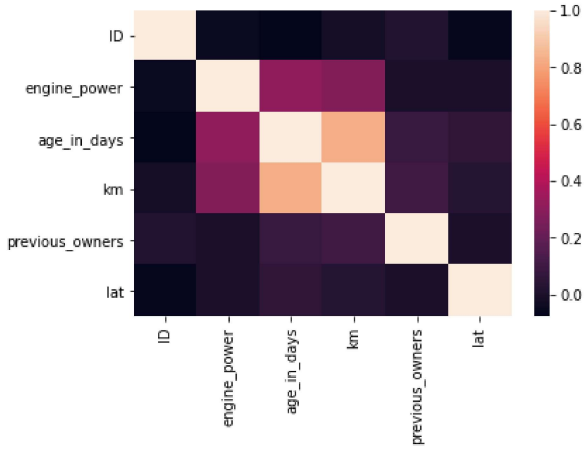



In [10]:
```
df1=df[['ID', 'model', 'engine_power', 'age_in_days', 'km', 'previous_owners',
       'lat', 'lon', 'price']]
```

## Plot Using Heat Map

In [11]:
```
sns.heatmap(df1.corr())
```

Out[11]: <AxesSubplot:>




# To Train The Model-Model Building

we are going to train Linera Regression Model;We need to split out data into two variables x and y where x is independent variable(input) and y is dependent on x(output) we could ignore address column as it required for our model

In [18]:
```
x=df1[['ID',  'previous_owners',
       'lat']]
y=df1['engine_power']
```

## To Split my dataset into training and test data

In [19]:
```
from sklearn.model_selection import train_test_split
x_train,x_test,y_train,y_test=train_test_split(x,y,test_size=0.3)
```

In [20]:
```
from sklearn.linear_model import LinearRegression
lr= LinearRegression()
lr.fit(x_train,y_train)
```

Out[20]:
```
LinearRegression()
```

In [21]:
```
lr.intercept_
```

Out[21]:
```
51.18994469203002
```

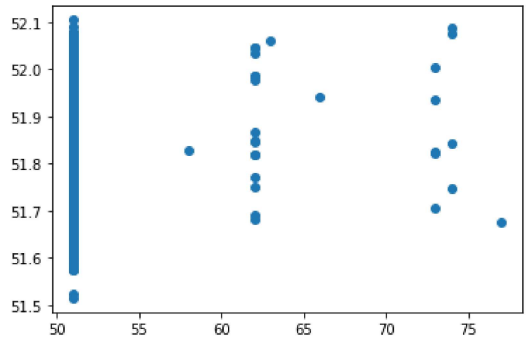
In [22]:
```
coeff = pd.DataFrame(lr.coef_,x.columns,columns=['Co-efficient'])
coeff
```

Out[22]:

| | Co-efficient |
|---|---|
| **ID** | -0.000281 |
| **previous_owners** | 0.024198 |
| **lat** | 0.019190 |

In [23]:
```
prediction = lr.predict(x_test)
plt.scatter(y_test,prediction)
```

Out[23]:
```
<matplotlib.collections.PathCollection at 0x15e6ee48610>
```




In [24]:
```
lr.score(x_test,y_test)
```

Out[24]:
```
0.003306158787058977
```

In [ ]:

In [ ]: