In [4]:
```
import pandas as pd
import numpy as np
```

In [6]:
```
df = pd.read_csv('Housing.csv')
```

In [7]:
```
df
```

Out[7]:

	price	area	bedrooms	bathrooms	stories	mainroad	guestroom	basement	hot
0	13300000	7420	4	2	3	yes	no	no	
1	12250000	8960	4	4	4	yes	no	no	
2	12250000	9960	3	2	2	yes	no	yes	
3	12215000	7500	4	2	2	yes	no	yes	
4	11410000	7420	4	1	2	yes	yes	yes	
...	...	...	...	...	...	...	...	...	
540	1820000	3000	2	1	1	yes	no	yes	
541	1767150	2400	3	1	1	no	no	no	
542	1750000	3620	2	1	1	yes	no	no	
543	1750000	2910	3	1	1	no	no	no	
544	1750000	3850	3	1	2	yes	no	no	

545 rows × 13 columns

In [4]:
```
## DATA PREPROCESSING ##
```

In [8]:
```
df.head()
```

Out[8]:

	price	area	bedrooms	bathrooms	stories	mainroad	guestroom	basement	hotwa
0	13300000	7420	4	2	3	yes	no	no	
1	12250000	8960	4	4	4	yes	no	no	
2	12250000	9960	3	2	2	yes	no	yes	
3	12215000	7500	4	2	2	yes	no	yes	
4	11410000	7420	4	1	2	yes	yes	yes	

In [9]:
```
df.tail()
```

Out[9]:

	price	area	bedrooms	bathrooms	stories	mainroad	guestroom	basement	hotw
540	1820000	3000	2	1	1	yes	no	yes	
541	1767150	2400	3	1	1	no	no	no	
542	1750000	3620	2	1	1	yes	no	no	
543	1750000	2910	3	1	1	no	no	no	
544	1750000	3850	3	1	2	yes	no	no	

In [10]:
```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 545 entries, 0 to 544
Data columns (total 13 columns):
 #   Column            Non-Null Count  Dtype 
---  ------            --------------  ----- 
 0   price             545 non-null    int64 
 1   area              545 non-null    int64 
 2   bedrooms          545 non-null    int64 
 3   bathrooms         545 non-null    int64 
 4   stories           545 non-null    int64 
 5   mainroad          545 non-null    object
 6   guestroom         545 non-null    object
 7   basement          545 non-null    object
 8   hotwaterheating   545 non-null    object
 9   airconditioning   545 non-null    object
 10  parking           545 non-null    int64 
 11  prefarea          545 non-null    object
 12  furnishingstatus  545 non-null    object
dtypes: int64(6), object(7)
memory usage: 55.5+ KB
```

In [11]:
```
df.shape
```

Out[11]: (545, 13)

In [12]:
```
df.columns
```

Out[12]:
```
Index(['price', 'area', 'bedrooms', 'bathrooms', 'stories', 'mainroad',
       'guestroom', 'basement', 'hotwaterheating', 'airconditioning',
       'parking', 'prefarea', 'furnishingstatus'],
      dtype='object')
```

In [13]:
```
df.duplicated().sum()
```

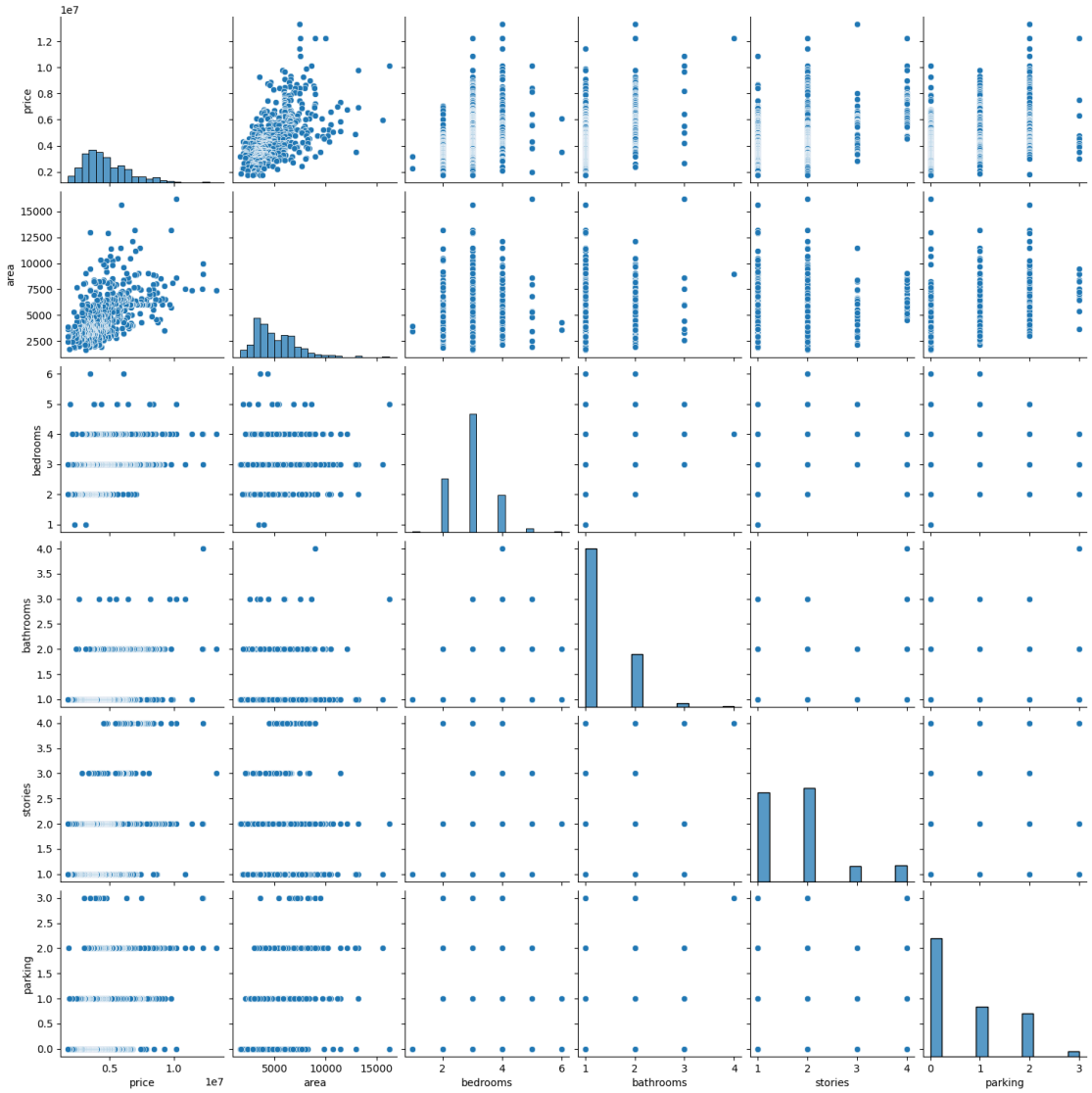
Out[13]: 0

In [14]:
```
df.isnull().sum()
```

Out[14]:
```
price             0
area              0
bedrooms          0
bathrooms         0
stories           0
mainroad          0
guestroom         0
basement          0
hotwaterheating   0
airconditioning   0
parking           0
prefarea          0
furnishingstatus  0
dtype: int64
```

In [15]:
```
## VISUALIZATION ##

import matplotlib.pyplot as plt
import seaborn as sns

sns.pairplot(df)
```

Out[15]: <seaborn.axisgrid.PairGrid at 0x1955c866160>



In [16]:
```
## CLASSIFICATION  OF CATEGORICAL DATA ##

print(df.mainroad.value_counts())
print(df.guestroom.value_counts())
print(df.basement.value_counts())
print(df.hotwaterheating.value_counts())
print(df.airconditioning.value_counts())
print(df.prefarea.value_counts())
print(df.furnishingstatus.value_counts())
```

```
yes    468
no      77
Name: mainroad, dtype: int64
no     448
yes     97
Name: guestroom, dtype: int64
no     354
yes    191
Name: basement, dtype: int64
no     520
yes     25
Name: hotwaterheating, dtype: int64
no     373
yes    172
Name: airconditioning, dtype: int64
no     417
yes    128
Name: prefarea, dtype: int64
semi-furnished    227
unfurnished       178
furnished         140
Name: furnishingstatus, dtype: int64
```

In [17]:
```
df['bedrooms'].value_counts()
```

Out[17]:
```
3    300
2    136
4     95
5     10
6      2
1      2
Name: bedrooms, dtype: int64
```

In [18]:
```
df['bathrooms'].value_counts()
```

Out[18]:
```
1    401
2    133
3     10
4      1
Name: bathrooms, dtype: int64
```

In [19]:
```
df['stories'].value_counts()
```

Out[19]:
```
2    238
1    227
4     41
3     39
Name: stories, dtype: int64
```

In [20]:
```
df['parking'].value_counts()
```

Out[20]:
```
0    299
1    126
2    108
3     12
Name: parking, dtype: int64
```

In [21]:
```
df['area'].value_counts()
```

Out[21]:
```
6000    24
3000    14
4500    13
4000    11
5500     9
        ..
6862     1
4815     1
9166     1
6321     1
3620     1
Name: area, Length: 284, dtype: int64
```

In [23]:
```
## CHANGING THE CATEGORICAL ATTRIBUTES INTO NUMERIC DATA FOR BETTER ANALYS

df.replace({'mainroad':{'yes':0,'no':1}},inplace=True)
df.replace({'guestroom':{'yes':0,'no':1}},inplace=True)
df.replace({'basement':{'yes':0,'no':1}},inplace=True)
df.replace({'hotwaterheating':{'yes':0,'no':1}},inplace=True)
df.replace({'airconditioning':{'yes':0,'no':1}},inplace=True)
df.replace({'prefarea.value':{'yes':0,'no':1}},inplace=True)
df.replace({'furnishingstatus':{'furnished':0,'semi-furnished':1,'unfurnis
```

In [24]:
```
## hot encoding ##
df = pd.get_dummies(df,drop_first=True)
df
```

Out[24]:

	price	area	bedrooms	bathrooms	stories	mainroad	guestroom	basement	hot
0	13300000	7420	4	2	3	0	1	1	
1	12250000	8960	4	4	4	0	1	1	
2	12250000	9960	3	2	2	0	1	0	
3	12215000	7500	4	2	2	0	1	0	
4	11410000	7420	4	1	2	0	0	0	
...	...	...	...	...	...	...	...	...	
540	1820000	3000	2	1	1	0	1	0	
541	1767150	2400	3	1	1	1	1	1	
542	1750000	3620	2	1	1	0	1	1	
543	1750000	2910	3	1	1	1	1	1	
544	1750000	3850	3	1	2	0	1	1	

545 rows × 13 columns

In [25]:

```
## Splitting the data ##

x = df.drop(['price'], axis=1)
y = df['price']
print(len(x), len(y))
print(x)
print(y)
print(x.shape)
print(y.shape)
```

```
545 545
     area  bedrooms  bathrooms  stories  mainroad  guestroom  basement
\
0    7420         4          2        3         0          1         1
1    8960         4          4        4         0          1         1
2    9960         3          2        2         0          1         0
3    7500         4          2        2         0          1         0
4    7420         4          1        2         0          0         0
..    ...       ...        ...      ...       ...        ...       ...
540  3000         2          1        1         0          1         0
541  2400         3          1        1         1          1         1
542  3620         2          1        1         0          1         1
543  2910         3          1        1         1          1         1
544  3850         3          1        2         0          1         1

     hotwaterheating  airconditioning  parking  furnishingstatus  prefar
ea_yes
0                  1                0        2                 0
1
1                  1                0        3                 0
0
2                  1                1        2                 1
1
3                  1                0        3                 0
1
4                  1                0        2                 0
0
..               ...              ...      ...               ...
...
540                1                1        2                 2
0
541                1                1        0                 1
0
542                1                1        0                 2
0
543                1                1        0                 0
0
544                1                1        0                 2
0

[545 rows x 12 columns]
0      13300000
1      12250000
2      12250000
3      12215000
4      11410000
         ...
540     1820000
541     1767150
542     1750000
543     1750000
544     1750000
Name: price, Length: 545, dtype: int64
(545, 12)
(545,)
```

In [26]:
```
## Training and Test Data ##
from sklearn.model_selection import train_test_split
x_train, x_test, y_train, y_test=train_test_split(x,y,test_size=1/10,rando
```

In [27]:
```
## Linear Regression ##

from sklearn.linear_model import LinearRegression
model = LinearRegression()
model.fit(x_train,y_train)
model.score(x_test,y_test)
```

Out[27]:
```
0.6167018298753526
```

In [28]:
```
from sklearn.linear_model import LinearRegression
regressor = LinearRegression()
regressor.fit(x_train, y_train)
```

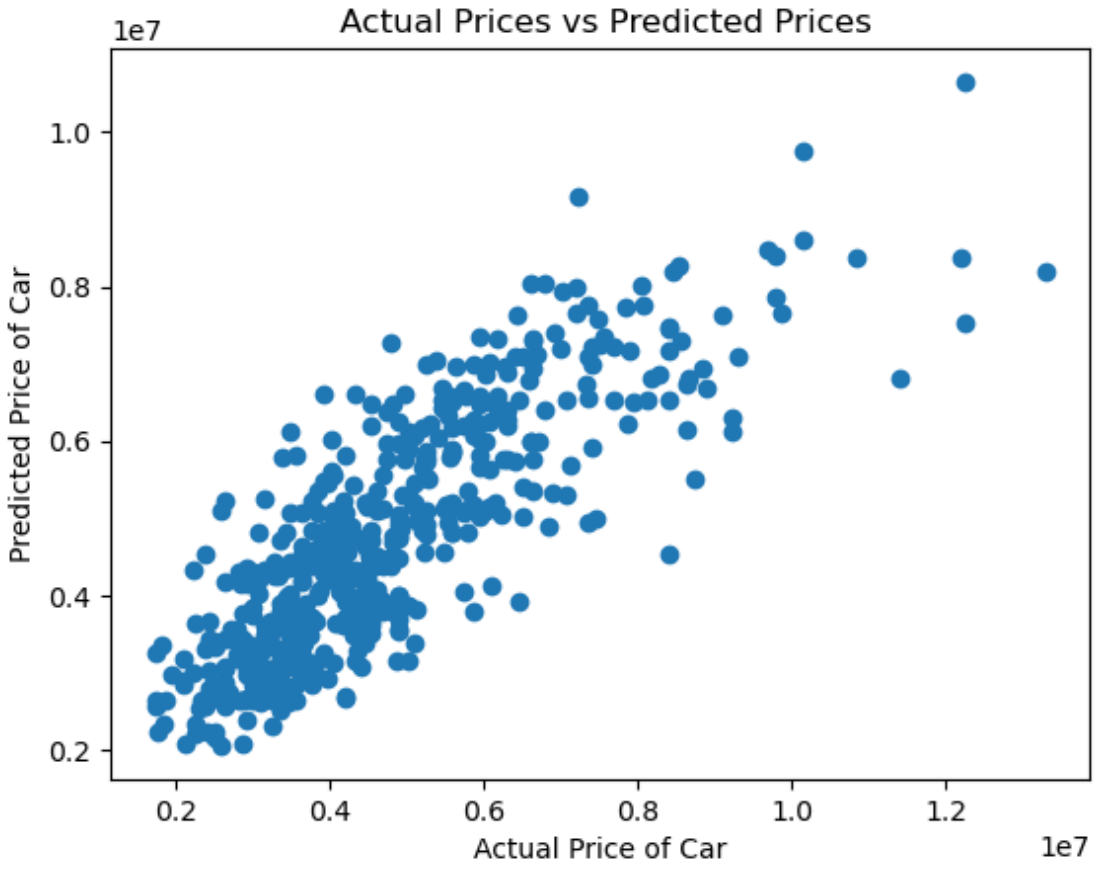
Out[28]:
```
LinearRegression()
```

In [29]:
```
t_data_predic = regressor.predict(x_train)
```

In [30]:
```
## Error Calculation ##

from sklearn import metrics
error_score = metrics.r2_score(y_train, t_data_predic)
print("R squared Error : ", error_score)
```

```
R squared Error :  0.6836517746805287
```

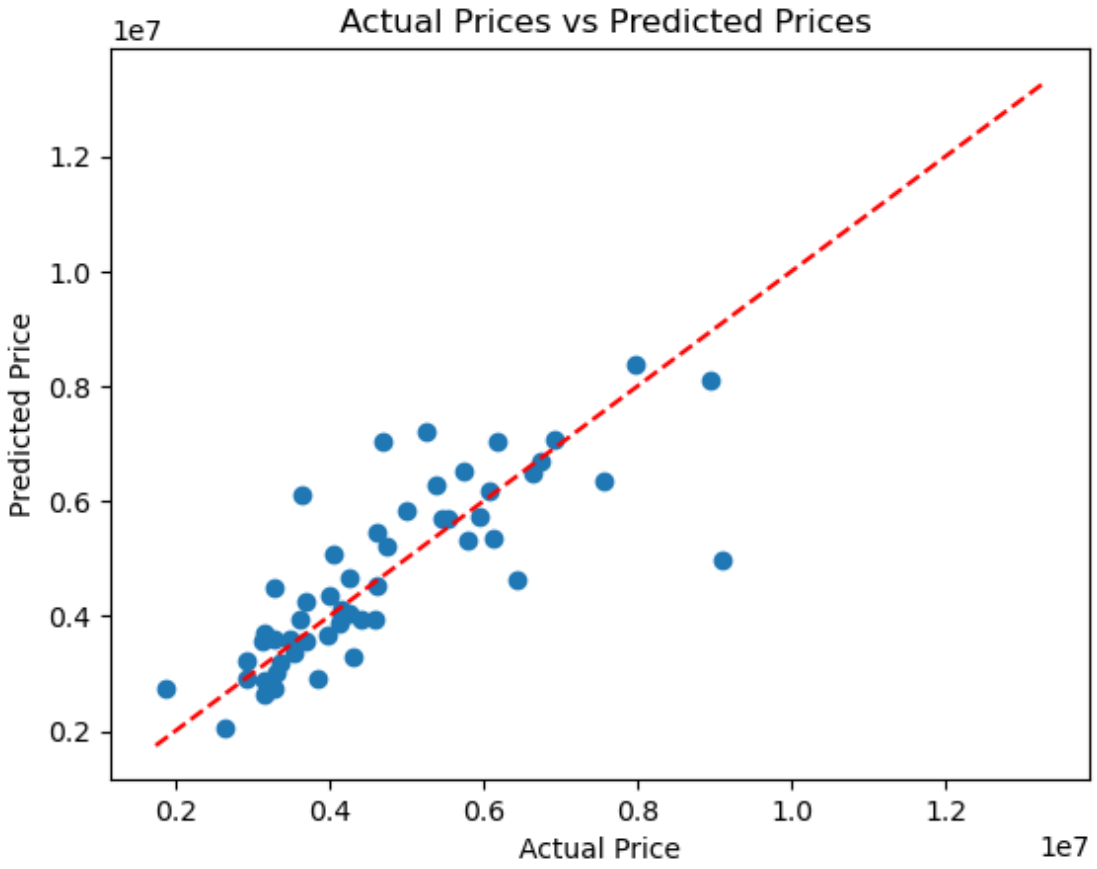
In [31]:
```
## Plotting THE data ##

plt.scatter(y_train, t_data_predic)
plt.xlabel("Actual Price of Car")
plt.ylabel("Predicted Price of Car")
plt.title(" Actual Prices vs Predicted Prices")
plt.show()
```



In [32]:
```
 ## prediction on Test data ##
t_data_predic = regressor.predict(x_test)
```

In [33]:
```
plt.scatter(y_test, t_data_predic)
plt.xlabel("Actual Price")
plt.ylabel("Predicted Price")
plt.title(" Actual Prices vs Predicted Prices")
plt.show()
```

In [35]:
```
plt.scatter(y_test, t_data_predic)
plt.xlabel("Actual Price")
plt.ylabel("Predicted Price")
plt.title(" Actual Prices vs Predicted Prices")
plt.plot([min(y_train), max(y_train)], [min(y_train), max(y_train)], 'r--
plt.show()
```



In [36]:
```
b = regressor.coef_
print("Coefficient :",b)
```

```
Coefficient : [ 2.47133589e+02  1.19610191e+05  1.01501859e+06  4.425545
54e+05
 -4.13328625e+05 -4.03165037e+05 -3.37574049e+05 -1.05647054e+06
 -8.85606823e+05  2.63424448e+05 -1.96010630e+05  6.69004383e+05]
```

In [37]:
```
a = regressor.intercept_
print("Intercept :",a)
```

```
Intercept : 3132124.8084780285
```