In [1]:

```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
from sklearn.model_selection import train_test_split
from sklearn.metrics import accuracy_score
from sklearn.linear_model import LinearRegression
from  sklearn.linear_model import Lasso
from sklearn import metrics
```

In [2]:

```
 car_dataset = pd.read_csv(r"C:\Users\robin\Downloads\car_data.csv")
```

In [3]:

```
car_dataset.head(3)
```

Out[3]:

	Car_Name	Year	Selling_Price	Present_Price	Kms_Driven	Fuel_Type	Seller_Type	Trans
0	ritz	2014	3.35	5.59	27000	Petrol	Dealer	
1	sx4	2013	4.75	9.54	43000	Diesel	Dealer	
2	ciaz	2017	7.25	9.85	6900	Petrol	Dealer	

In [4]:

```
# cheaking number of row and columns
car_dataset.shape
```

Out[4]:

```
(301, 9)
```

In [5]:

```
car_dataset.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 301 entries, 0 to 300
Data columns (total 9 columns):
 #   Column         Non-Null Count  Dtype  
---  ------         --------------  -----  
 0   Car_Name       301 non-null    object 
 1   Year           301 non-null    int64  
 2   Selling_Price  301 non-null    float64
 3   Present_Price  301 non-null    float64
 4   Kms_Driven     301 non-null    int64  
 5   Fuel_Type      301 non-null    object 
 6   Seller_Type    301 non-null    object 
 7   Transmission   301 non-null    object 
 8   Owner          301 non-null    int64  
dtypes: float64(2), int64(3), object(4)
memory usage: 21.3+ KB
```

In [6]:
```
# cheaking the number of missing values
car_dataset.isnull().sum()
```

Out[6]:
```
Car_Name         0
Year             0
Selling_Price    0
Present_Price    0
Kms_Driven       0
Fuel_Type        0
Seller_Type      0
Transmission     0
Owner            0
dtype: int64
```

In [8]:
```
# number of values for categorical values
print(car_dataset.Fuel_Type.value_counts())
print(car_dataset.Seller_Type.value_counts())
print(car_dataset.Transmission.value_counts())
```

```
Petrol    239
Diesel     60
CNG         2
Name: Fuel_Type, dtype: int64
Dealer        195
Individual    106
Name: Seller_Type, dtype: int64
Manual       261
Automatic     40
Name: Transmission, dtype: int64
```

In [9]:
```
#encoding the categorical data
# we have label encoding categorical value replace the 1 and 0
car_dataset.replace({'Fuel_Type':{'Petrol':0, 'Diesel':1,'CNG':2}},inplace
car_dataset.replace({'Seller_Type':{'Dealer':0, 'Individual':1}},inplace=T
car_dataset.replace({'Transmission':{'Manual':0, 'Automatic':1}},inplace=T
```

In [11]:
```
car_dataset.head(3)
```

Out[11]:

	Car_Name	Year	Selling_Price	Present_Price	Kms_Driven	Fuel_Type	Seller_Type	Trans
0	ritz	2014	3.35	5.59	27000	0	0	
1	sx4	2013	4.75	9.54	43000	1	0	
2	ciaz	2017	7.25	9.85	6900	0	0	

In [12]:
```
#splitting our original data into train and test
x = car_dataset.drop(columns=['Car_Name','Selling_Price'],axis=1)
y = car_dataset['Selling_Price']
```

In [14]:

```
print(x)
```

```
     Year  Present_Price  Kms_Driven  Fuel_Type  Seller_Type  Transmissio
n  \
0    2014           5.59       27000          0            0
0
1    2013           9.54       43000          1            0
0
2    2017           9.85        6900          0            0
0
3    2011           4.15        5200          0            0
0
4    2014           6.87       42450          1            0
0
..    ...            ...         ...        ...          ...
...
296  2016          11.60       33988          1            0
0
297  2015           5.90       60000          0            0
0
298  2009          11.00       87934          0            0
0
299  2017          12.50        9000          1            0
0
300  2016           5.90        5464          0            0
0

     Owner
0        0
1        0
2        0
3        0
4        0
..     ...
296      0
297      0
298      0
299      0
300      0

[301 rows x 7 columns]
```

In [15]:

```
print(y)
```

```
0        3.35
1        4.75
2        7.25
3        2.85
4        4.60
       ...
296      9.50
297      4.00
298      3.35
299     11.50
300      5.30
Name: Selling_Price, Length: 301, dtype: float64
```

In [16]:

```
x_train,x_test,y_train,y_test = train_test_split(x,y,test_size=0.1,random_
# 0.1 means 10% in test data and 90% in train
```

In [17]:

```
print(x.shape,x_train.shape,x_test.shape)
```

```
(301, 7) (270, 7) (31, 7)
```

In [18]:

```
print(y.shape,y_train.shape,y_test.shape)
```

```
(301,) (270,) (31,)
```

Linear Regression

In [19]:

```
linear_regression = LinearRegression()
```

In [20]:

```
#traning the linear_regression  machine model
linear_regression.fit(x_train,y_train)
```

Out[20]:

```
LinearRegression()
```

In a Jupyter environment, please rerun this cell to show the HTML representation or trust the notebook.
On GitHub, the HTML representation is unable to render, please try loading this page with nbviewer.org.

In [21]:

```
# prediction on tranning data
x_train_prediciton = linear_regression.predict(x_train)
```

In [22]:

```
# Assuming y_train and x_train_prediction are defined
error_score = metrics.r2_score(y_train, x_train_prediciton)
```

In [23]:

```
print("R squared Error:",error_score)
```

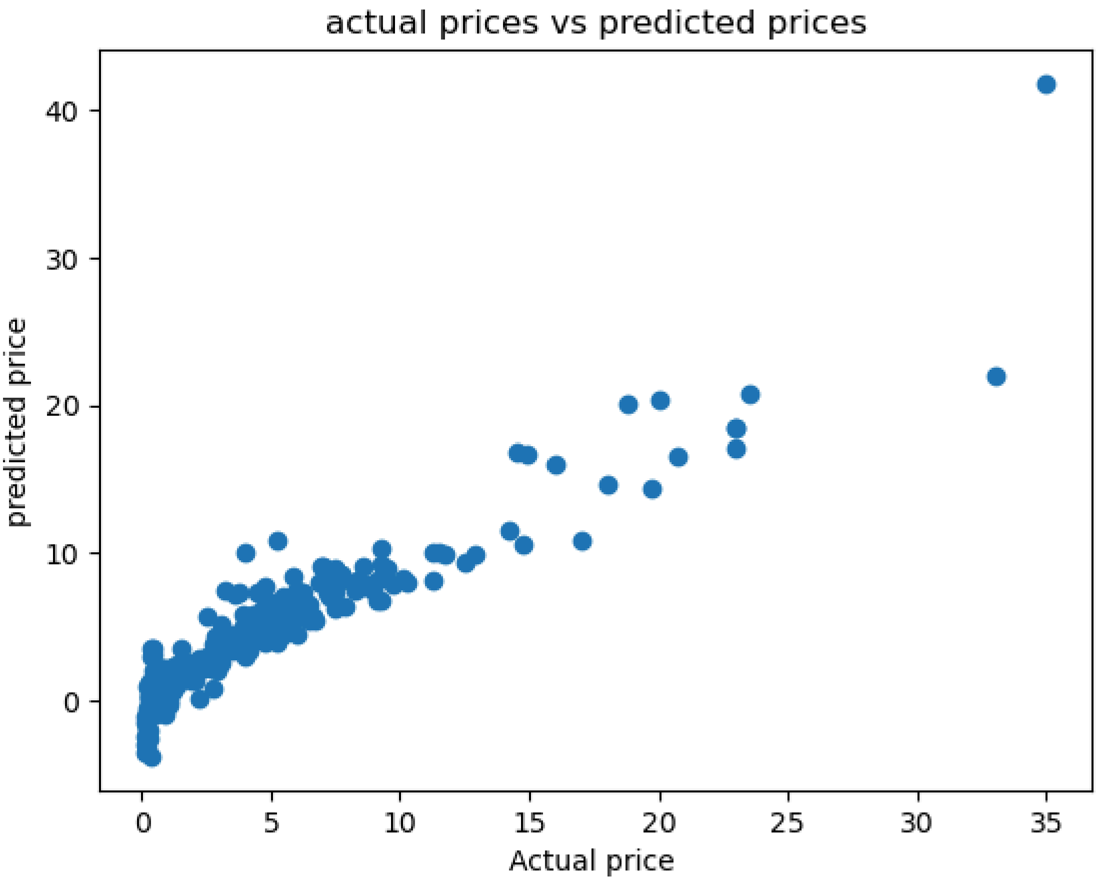
```
R squared Error: 0.8799451660493701
```

In [24]:

```
### Visualize the actucal price and predicted price
```

In [25]:

```
plt.scatter(y_train,x_train_prediciton)
plt.xlabel("Actual price ")
plt.ylabel("predicted price")
plt.title("actual prices vs predicted prices")
plt.show()
```



In [26]:

```
## Evaluate the test model
```

In [27]:

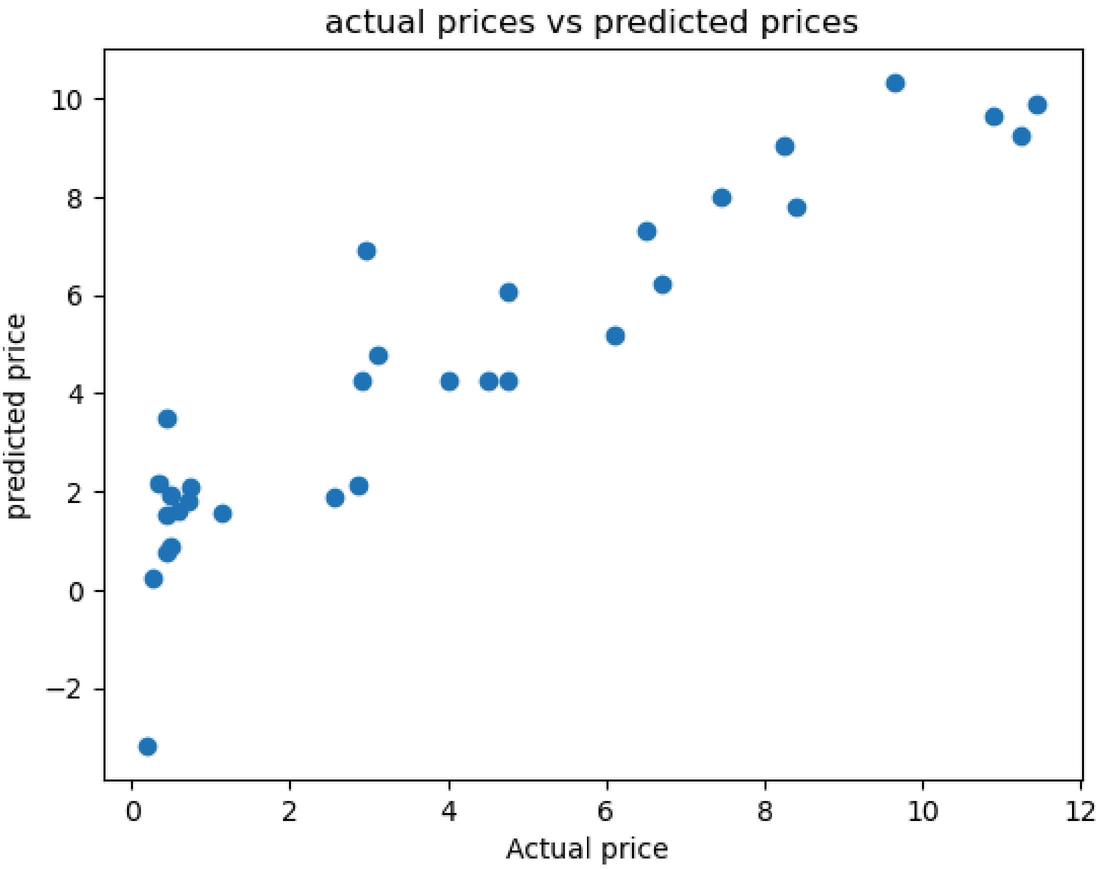
```
# prediction on test data
test_data_prediciton = linear_regression.predict(x_test)
```

In [28]:

```
# Assuming y_train and x_train_prediction are defined
error_score = metrics.r2_score(y_test, test_data_prediciton)
print("R squared Error:",error_score)
```

```
R squared Error: 0.8365766715026928
```

In [29]:
```
plt.scatter(y_test,test_data_prediciton)
plt.xlabel("Actual price ")
plt.ylabel("predicted price")
plt.title("actual prices vs predicted prices")
plt.show()
```



In [30]:
```
input_data = (2017,9.85,6900,0,0,0,0)

#changing the input_data type list to numpy array
input_data_as_numpy_array = np.array(input_data)

#reshape the np as we are predicting for one instance
input_data_reshape= input_data_as_numpy_array.reshape(1,-1)

prediction = linear_regression.predict(input_data_reshape)

print(prediction)
```

```
[7.07156998]

C:\Users\robin\anaconda3\lib\site-packages\sklearn\base.py:465: UserWarni
ng: X does not have valid feature names, but LinearRegression was fitted
with feature names
  warnings.warn(
```

In [31]:
```
## Lasso Regression
lass_reg_model = Lasso()
```

In [32]:

```
#traning the linear_regression  machine model
lass_reg_model.fit(x_train,y_train)
```

Out[32]:

```
Lasso()
```

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In [33]:

```
Traning_data_prediction =lass_reg_model.predict(x_train)
```

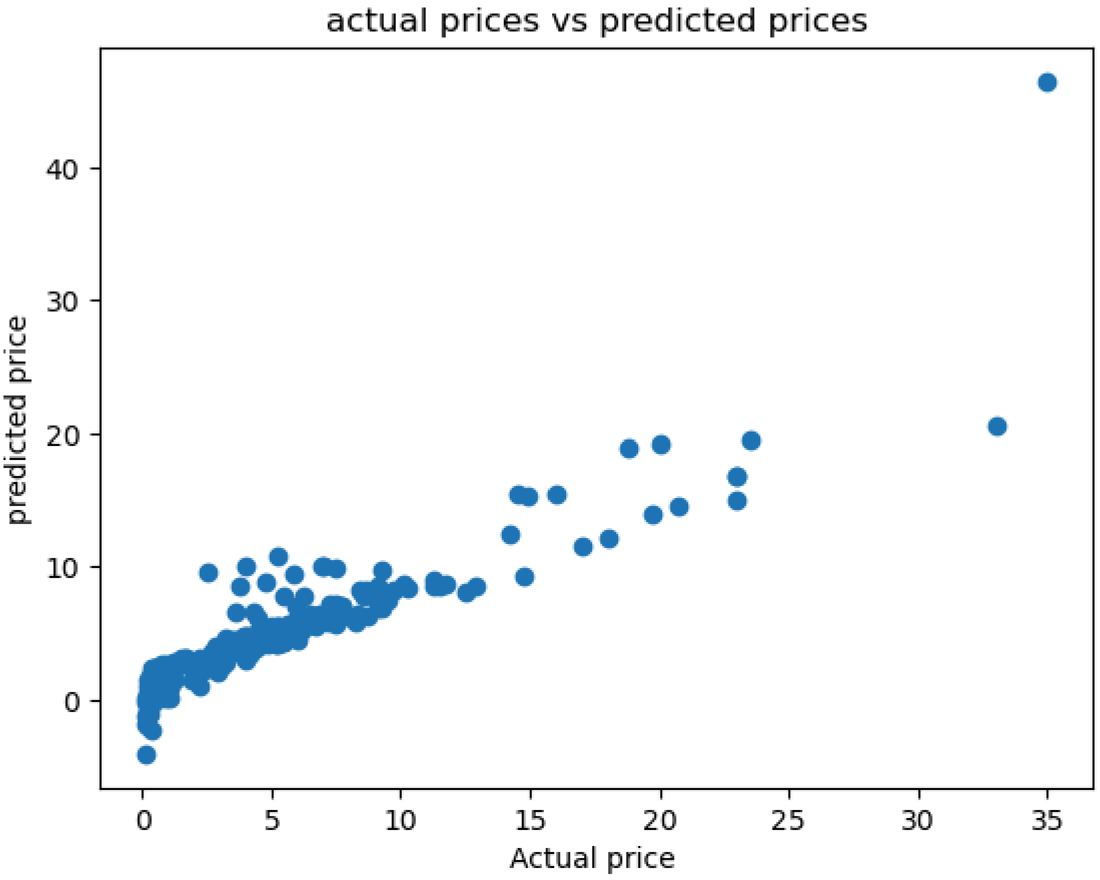
In [34]:

```
# Assuming y_train and x_train_prediction are defined
error_score1 = metrics.r2_score(y_train, Traning_data_prediction)
print("R squared Error:",error_score1)
```

```
R squared Error: 0.8427856123435794
```

In [35]:

```
plt.scatter(y_train,Traning_data_prediction)
plt.xlabel("Actual price ")
plt.ylabel("predicted price")
plt.title("actual prices vs predicted prices")
plt.show()
```

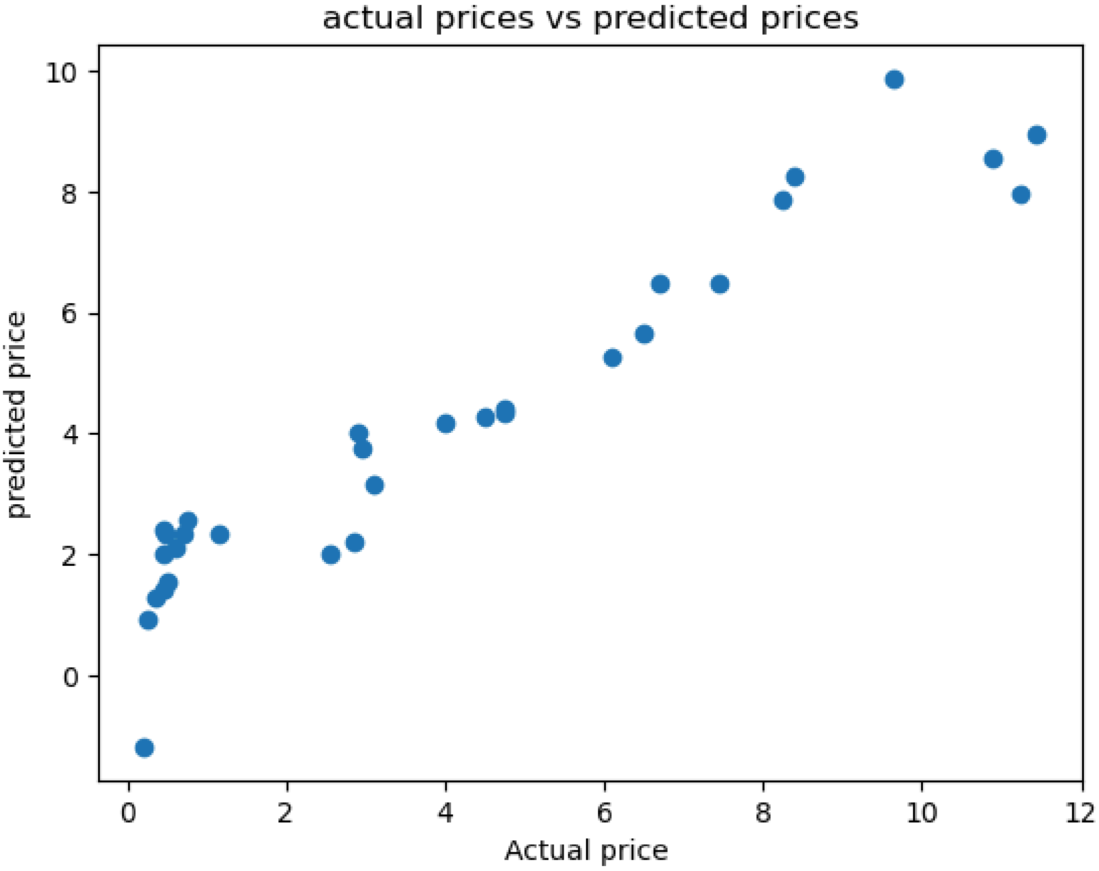


In [36]:
```
# prediction on test data
test_data_prediciton = lass_reg_model.predict(x_test)## Evaluate the test
```

In [37]:
```
# Assuming y_train and x_train_prediction are defined
error_score = metrics.r2_score(y_test, test_data_prediciton)
print("R squared Error:",error_score)
```

```
R squared Error: 0.8709167941173195
```

In [38]:
```
plt.scatter(y_test,test_data_prediciton)
plt.xlabel("Actual price ")
plt.ylabel("predicted price")
plt.title("actual prices vs predicted prices")
plt.show()
```



In [39]:

```
input_data = (2017,9.85,6900,0,0,0,0)

#changing the input_data type list to numpy array
input_data_as_numpy_array = np.array(input_data)

#reshape the np as we are predicting for one instance
input_data_reshape= input_data_as_numpy_array.reshape(1,-1)

prediction = lass_reg_model.predict(input_data_reshape)

print(prediction)
```

```
[7.16105963]

C:\Users\robin\anaconda3\lib\site-packages\sklearn\base.py:465: UserWarni
ng: X does not have valid feature names, but Lasso was fitted with featur
e names
  warnings.warn(
```

In [ ]:

```

```