About Dataset

This dataset contains information about used cars. This data can be used for a lot of purposes such as price prediction to exemplify the use of linear regression in Machine Learning.

The columns in the given dataset are as follows:

name

year

selling_price

km_driven

fuel

seller_type

transmission

Owner

https://www.kaggle.com/datasets/nehalbirla/vehicle-dataset-from-cardekho

Import libraries

In [87]:

```python
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
%matplotlib inline
import seaborn as sns
import warnings
warnings.filterwarnings("ignore")
```

Exploratry Data Analysis

In [88]:

```python
# Loading the car dataset
df = pd.read_csv("car data.csv")
df.head()
```

Out[88]:

	Car_Name	Year	Selling_Price	Present_Price	Kms_Driven	Fuel_Type	Seller_Type	Transmission
0	ritz	2014	3.35	5.59	27000	Petrol	Dealer	Manual
1	sx4	2013	4.75	9.54	43000	Diesel	Dealer	Manual
2	ciaz	2017	7.25	9.85	6900	Petrol	Dealer	Manual
3	wagon r	2011	2.85	4.15	5200	Petrol	Dealer	Manual
4	swift	2014	4.60	6.87	42450	Diesel	Dealer	Manual

In [89]:

```
# checking the no of rows and columns
df.shape
```

Out[89]:

```
(301, 9)
```

In [90]:

```
df.size
```

Out[90]:

```
2709
```

In [91]:

```
# Getting info about dataset
df.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 [92]:

```
df.describe().T
```

Out[92]:

	count	mean	std	min	25%	50%	75%	max
Year	301.0	2013.627907	2.891554	2003.00	2012.0	2014.0	2016.0	2018.0
Selling_Price	301.0	4.661296	5.082812	0.10	0.9	3.6	6.0	35.0
Present_Price	301.0	7.628472	8.644115	0.32	1.2	6.4	9.9	92.6
Kms_Driven	301.0	36947.205980	38886.883882	500.00	15000.0	32000.0	48767.0	500000.0
Owner	301.0	0.043189	0.247915	0.00	0.0	0.0	0.0	3.0

In [93]:

```
# Checking the missing values
df.isna().sum()
```

Out[93]:

```
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 [94]:

```
# Checking the unique categories in each Categorical column
print(df['Fuel_Type'].unique())
print(df['Seller_Type'].unique())
print(df['Transmission'].unique())
```

```
['Petrol' 'Diesel' 'CNG']
['Dealer' 'Individual']
['Manual' 'Automatic']
```

In [95]:

```
# Checking the distribution in each Categorical column
print(df.Fuel_Type.value_counts())
```

```
Fuel_Type
Petrol    239
Diesel     60
CNG         2
Name: count, dtype: int64
```

In [96]:

```
print(df["Seller_Type"].value_counts())
```

```
Seller_Type
Dealer        195
Individual    106
Name: count, dtype: int64
```

In [97]:

```
print(df["Transmission"].value_counts())
```

```
Transmission
Manual       261
Automatic     40
Name: count, dtype: int64
```

In [98]:

```
# Checking no of duplicate in each column
df[df.duplicated()]
```

Out[98]:

	Car_Name	Year	Selling_Price	Present_Price	Kms_Driven	Fuel_Type	Seller_Type	Transmissio
17	ertiga	2016	7.75	10.79	43000	Diesel	Dealer	Manua
93	fortuner	2015	23.00	30.61	40000	Diesel	Dealer	Automati

In [99]:

```
# Remove duplicates
df = df.drop_duplicates()
```

In [100…

```
df[df.duplicated()].sum()
```

Out[100]:

```
Car_Name           0
Year               0
Selling_Price    0.0
Present_Price    0.0
Kms_Driven         0
Fuel_Type          0
Seller_Type        0
Transmission       0
Owner              0
dtype: object
```

In [101…

```
df.shape
```

Out[101]:

```
(299, 9)
```

In [102…

```
df.size
```

Out[102]:

```
2691
```

Encoding the categorical column

In [103…

```
# Encoding "Fuel_Type" column
df.replace({'Fuel_Type' : {'Petrol':0,'Diesel':1,'CNG':2}},inplace = True)

# Encoding "Seller_Type" column
df.replace({'Seller_Type' : {'Dealer':0,'Individual':1}},inplace = True)

# Encoding "Transmission" column
df.replace({'Transmission' : {'Manual':0,'Automatic':1}},inplace = True)
```

In [104…

```
df.head()
```

Out[104]:

	Car_Name	Year	Selling_Price	Present_Price	Kms_Driven	Fuel_Type	Seller_Type	Transmission
0	ritz	2014	3.35	5.59	27000	0	0	0
1	sx4	2013	4.75	9.54	43000	1	0	0
2	ciaz	2017	7.25	9.85	6900	0	0	0
3	wagon r	2011	2.85	4.15	5200	0	0	0
4	swift	2014	4.60	6.87	42450	1	0	0

Train Test Split

In [105…

```
# Split df into independent and Target variables
X = df.drop(columns=['Car_Name','Selling_Price'],axis=1)
Y = df['Selling_Price']
```

In [106…

```
print(X)
```

```
     Year  Present_Price  Kms_Driven  Fuel_Type  Seller_Type  Transmission  \
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

[299 rows x 7 columns]
```

In [107…

```
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: 299, dtype: float64
```

In [113…

```
# import train_test_split from model_selection module
from sklearn.model_selection import train_test_split
```

In [211…

```
X_train,X_test,Y_train,Y_test = train_test_split(X, Y, test_size = 0.1, random_stat
```

Building a ML Model

1. Linear Regression Model

In [212…

```
# Import Linear Regression Model library
from sklearn.linear_model import LinearRegression
```

In [213…

```
# Initilized Linear regression Model
lin_reg = LinearRegression()
```

In [214…

```
lin_reg.fit(X_train,Y_train)
```

Out[214]:

```
▾ LinearRegression
LinearRegression()
```

In [215…

```
# Evaluate the model
from sklearn import metrics

# Prediction on training dataset
train_predict = lin_reg.predict(X_train)
```

In [216…

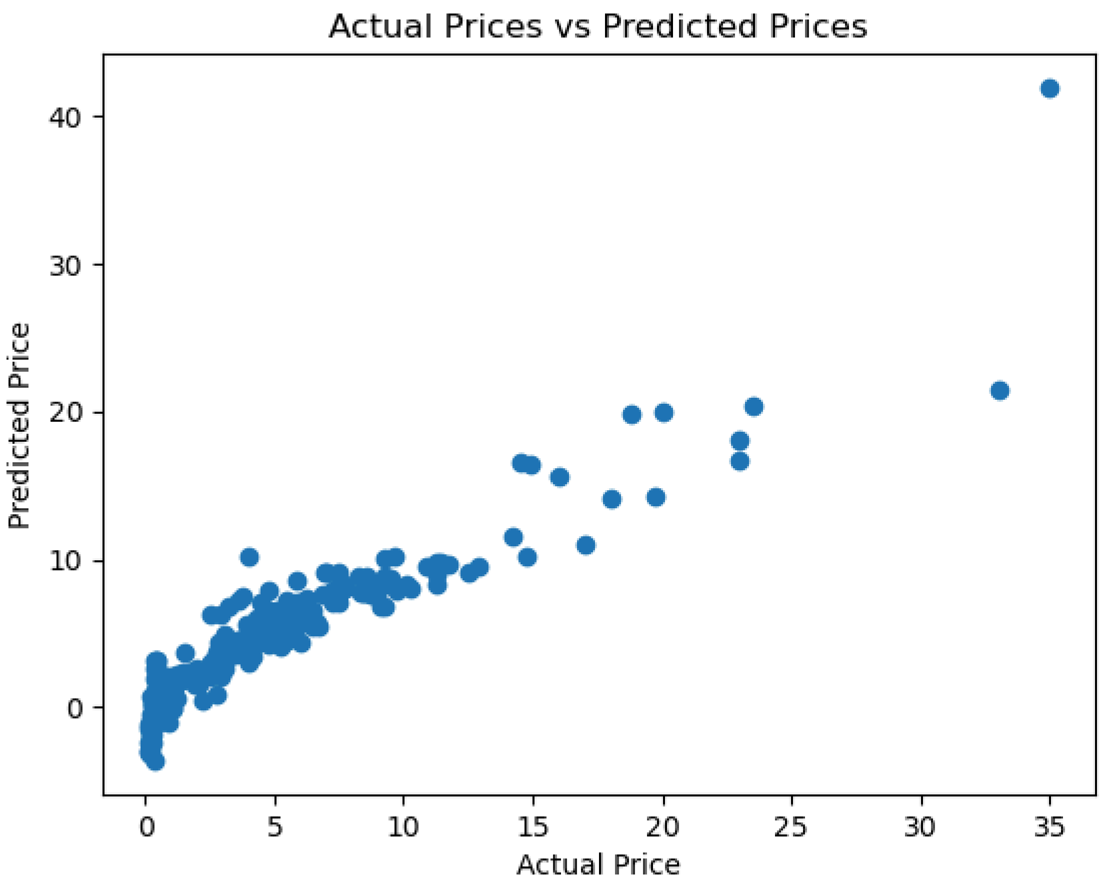
```
# R square Error
R2_score_train = metrics.r2_score(Y_train, train_predict)
print("R squared Error:",R2_score_train)
```

```
R squared Error: 0.8771123681040541
```

Visualize the Actual and Predicted Prices(Train Set)

In [217…

```
plt.scatter(Y_train, train_predict)
plt.xlabel("Actual Price")
plt.ylabel("Predicted Price")
plt.title("Actual Prices vs Predicted Prices")
plt.show()
```



In [218…

```
# Prediction on training dataset
test_predict = lin_reg.predict(X_test)
```

In [219…

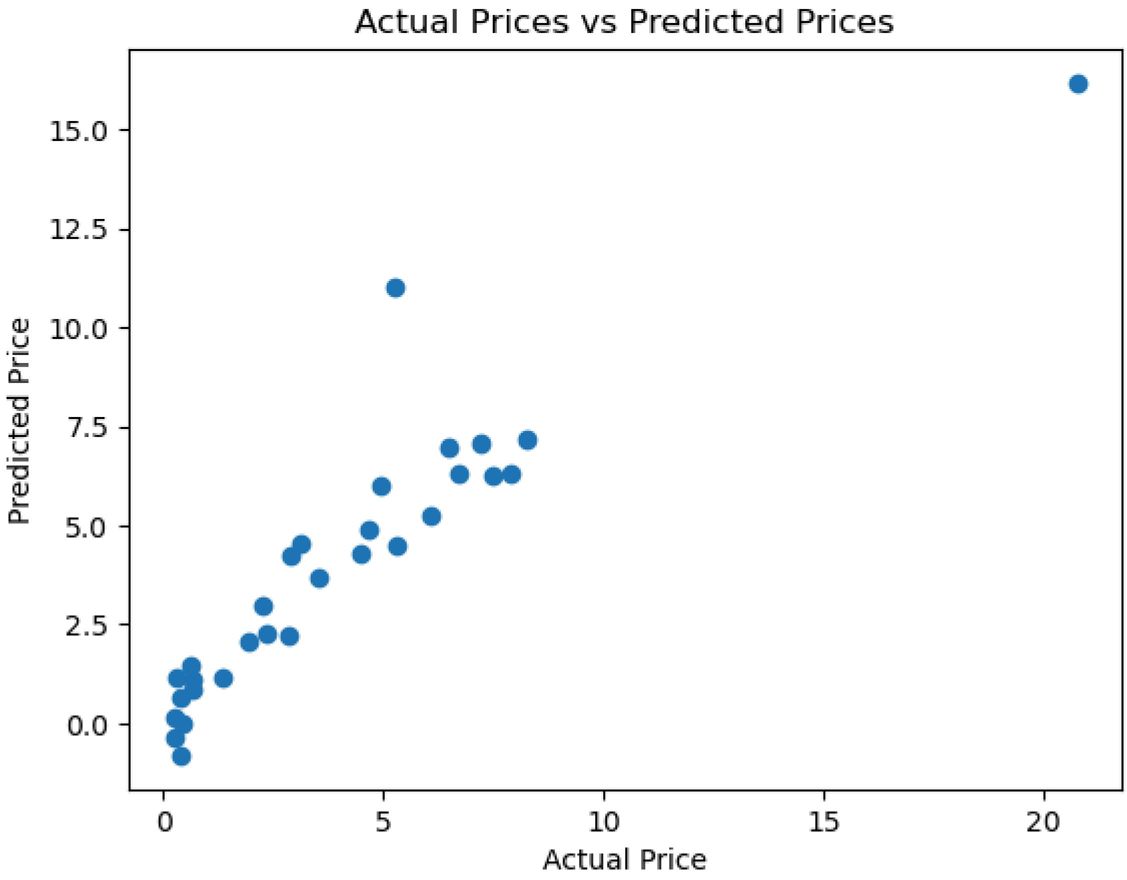
```
# R square Error
R2_score_test = metrics.r2_score(Y_test, test_predict)
print("R squared Error:",R2_score_test)
```

```
R squared Error: 0.8562516649198026
```

Visualize the Actual and Predicted Prices(Test Set)

In [220…

```
plt.scatter(Y_test, test_predict)
plt.xlabel("Actual Price")
plt.ylabel("Predicted Price")
plt.title("Actual Prices vs Predicted Prices")
plt.show()
```



2. Lasso Regression Model

In [221…

```
# Import Lasso Regression Model library
from sklearn.linear_model import Lasso
```

In [222…

```
# Initilized Lasso regression Model
lasso_reg = Lasso()
```

In [223…

```
lasso_reg.fit(X_train,Y_train)
```

Out[223]:

```
▾ Lasso
Lasso()
```

In [224…

```
# Prediction on training dataset
train_predict = lasso_reg.predict(X_train)
```

In [225…

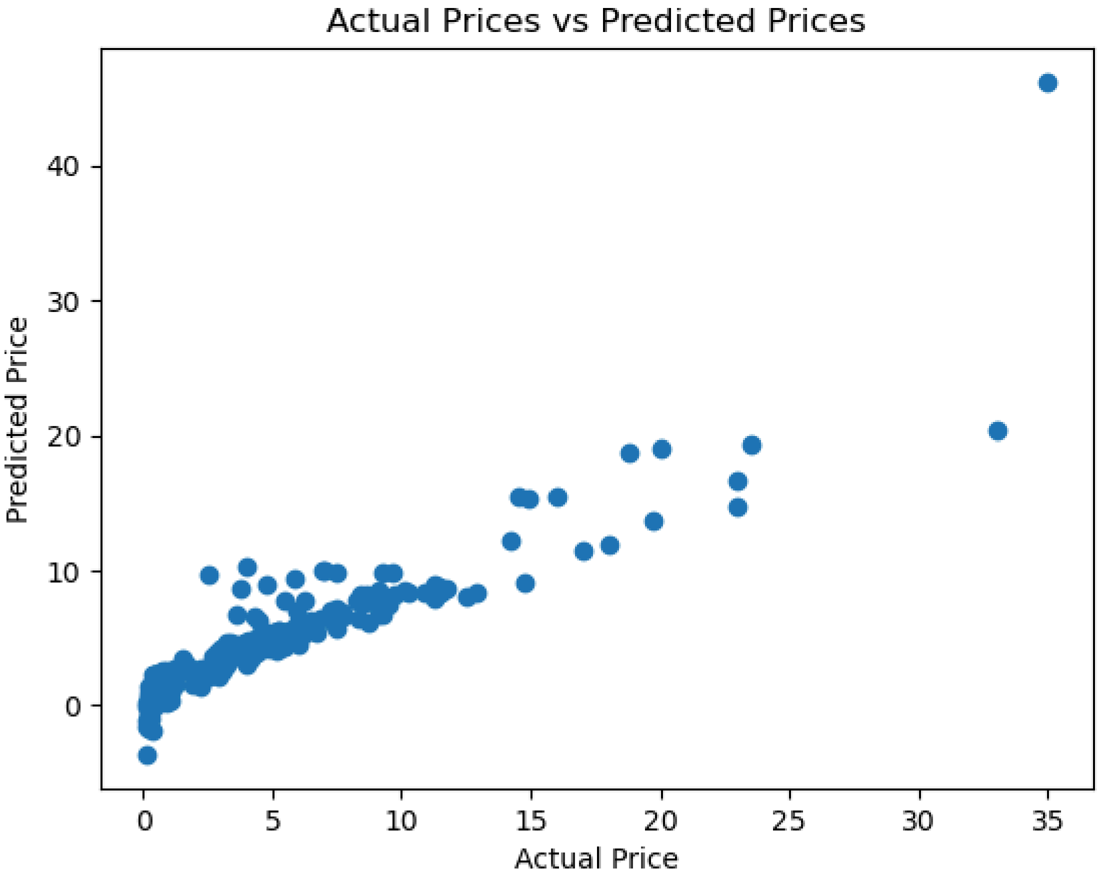
```
# R square Error
R2_score_train = metrics.r2_score(Y_train, train_predict)
print("R squared Error:",R2_score_train)
```

```
R squared Error: 0.8428090658179708
```

Visualize the Actual and Predicted Prices(Train Set)

In [226…

```
plt.scatter(Y_train, train_predict)
plt.xlabel("Actual Price")
plt.ylabel("Predicted Price")
plt.title("Actual Prices vs Predicted Prices")
plt.show()
```



In [227…

```
# Prediction on training dataset
test_predict = lasso_reg.predict(X_test)
```

In [228…

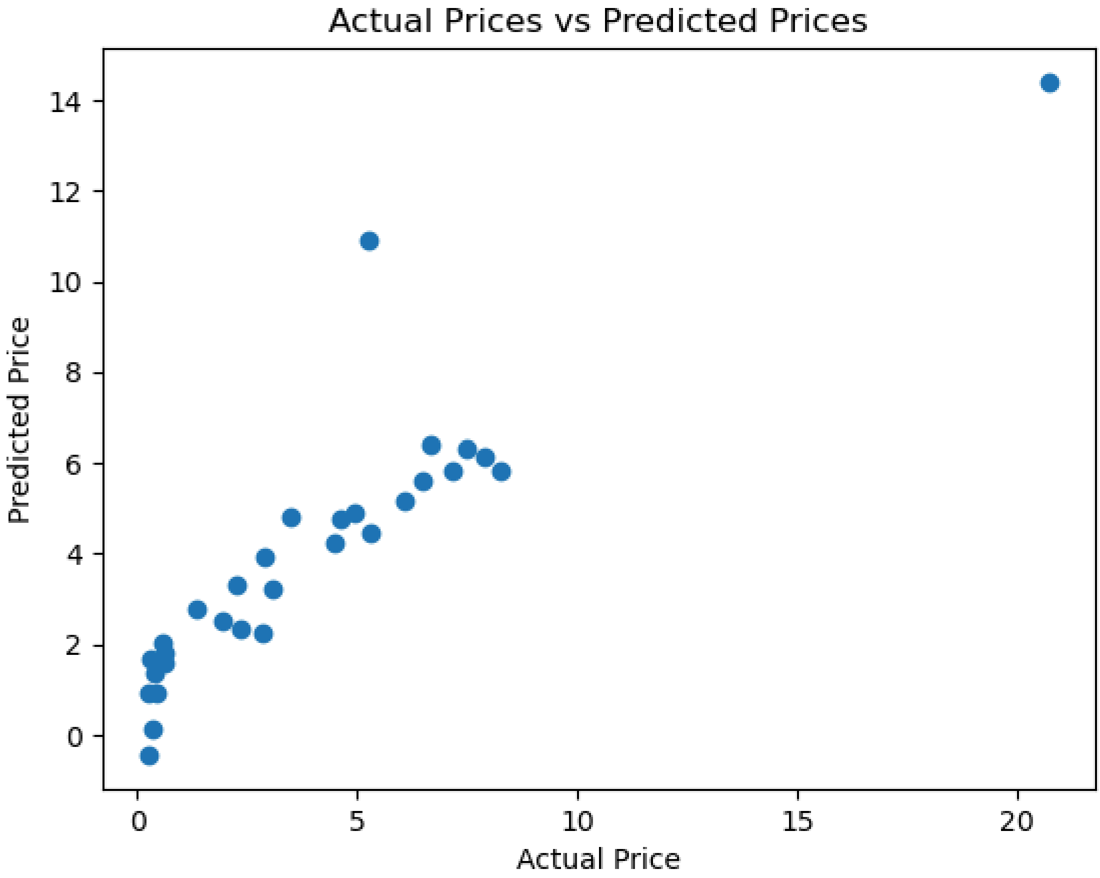
```
# R square Error
R2_score_test = metrics.r2_score(Y_test, test_predict)
print("R squared Error:",R2_score_test)
```

```
R squared Error: 0.7933398240755692
```

Visualize the Actual and Predicted Prices(Test Set)

In [229…

```
plt.scatter(Y_test, test_predict)
plt.xlabel("Actual Price")
plt.ylabel("Predicted Price")
plt.title("Actual Prices vs Predicted Prices")
plt.show()
```


Actual Prices vs Predicted Prices
Predicted Price
14
12
10
8
6
4
2
0
0
5
10
15
20
Actual Price

```
In [ ]:
```

```
In [ ]:
```