Regression

February 28, 2022

[1]:
```
# All the library using on this dataset.

from sklearn.model_selection import train_test_split
from sklearn.linear_model import LinearRegression # The most important library␣
 ↪using on this project
from sklearn.metrics import r2_score
# The library to manipulation , cleaning the source dataset
import numpy as np
import pandas as pd
import seaborn as sns # Library to visualization clarity
import matplotlib.pyplot as plt # The library to compare the final result found␣
 ↪it.
```

[2]:
```
# Reading the data as dataframe by auxliar from pandas library
# Below we have describtion from the data for better understanding the␣
 ↪situation , printing the
# shape, information, description and erasing the useless values.
car_price = 'C:/Users/User/OneDrive/Python/dataset/curso-machine-learning-main/
 ↪curso-machine-learning-main/data/car_data.csv'
data = pd.read_csv(car_price)
data.sample(15)
```

[2]:

	Car_Name	Year	Selling_Price	Present_Price	Kms_Driven	\
90	corolla altis	2009	3.80	18.61	62000	
68	corolla altis	2011	4.35	13.74	88000	
74	etios cross	2014	4.90	8.93	83000	
265	jazz	2017	6.50	8.70	21200	
52	innova	2017	18.00	19.77	15000	
221	i20	2013	4.50	6.79	32000	
46	ritz	2013	2.65	4.89	64532	
8	ciaz	2016	8.75	8.89	20273	
195	Bajaj ct 100	2015	0.18	0.32	35000	
5	vitara brezza	2018	9.25	9.83	2071	
42	sx4	2008	1.95	7.15	58000	
169	Hero Splender iSmart	2015	0.40	0.54	14000	
267	city	2016	8.35	9.40	19434	
180	Hero Honda Passion Pro	2012	0.30	0.51	60000	

```
31                   ritz  2011           2.35           4.89       54200

    Fuel_Type Seller_Type Transmission  Owner
90     Petrol      Dealer       Manual      0
68     Petrol      Dealer       Manual      0
74     Diesel      Dealer       Manual      0
265    Petrol      Dealer       Manual      0
52     Diesel      Dealer    Automatic      0
221    Petrol      Dealer    Automatic      0
46     Petrol      Dealer       Manual      0
8      Diesel      Dealer       Manual      0
195    Petrol  Individual       Manual      0
5      Diesel      Dealer       Manual      0
42     Petrol      Dealer       Manual      0
169    Petrol  Individual       Manual      0
267    Diesel      Dealer       Manual      0
180    Petrol  Individual       Manual      0
31     Petrol      Dealer       Manual      0
```

[3]:
```
data.shape
```

[3]:
```
(301, 9)
```

[4]:
```
data.describe()
```

[4]:
```
              Year  Selling_Price  Present_Price     Kms_Driven       Owner
count   301.000000     301.000000     301.000000     301.000000  301.000000
mean   2013.627907       4.661296       7.628472   36947.205980    0.043189
std       2.891554       5.082812       8.644115   38886.883882    0.247915
min    2003.000000       0.100000       0.320000     500.000000    0.000000
25%    2012.000000       0.900000       1.200000   15000.000000    0.000000
50%    2014.000000       3.600000       6.400000   32000.000000    0.000000
75%    2016.000000       6.000000       9.900000   48767.000000    0.000000
max    2018.000000      35.000000      92.600000  500000.000000    3.000000
```

[5]:
```
data.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
```

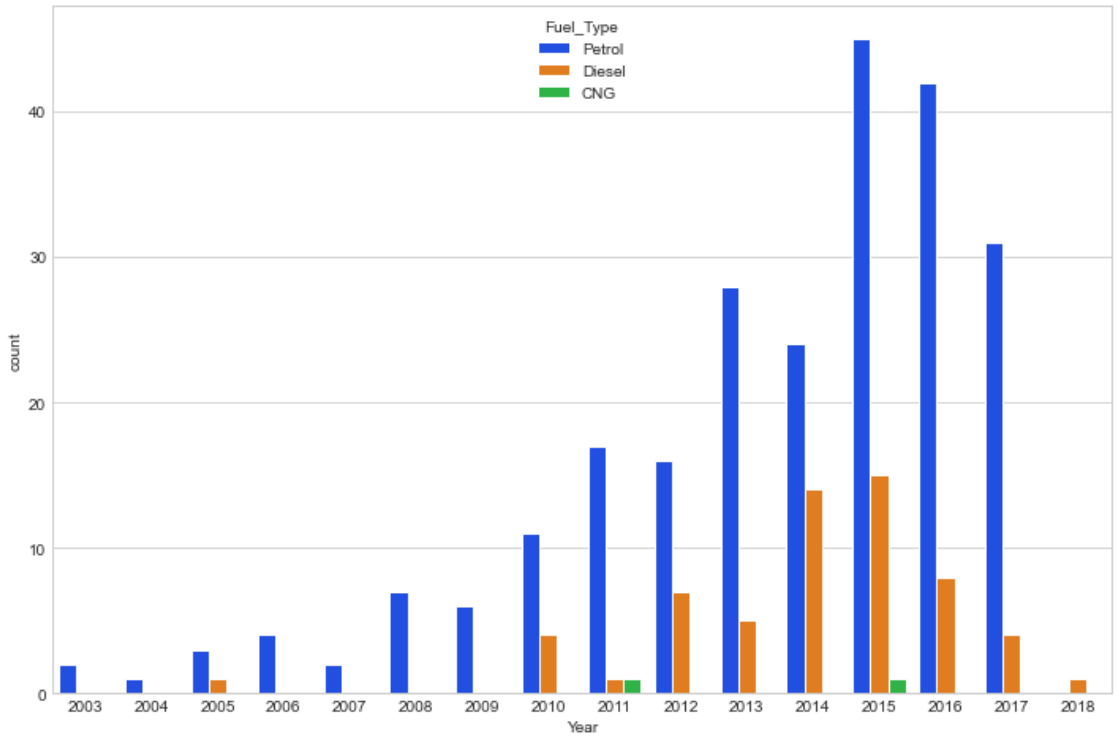
```
 5   Fuel_Type      301 non-null    object
 6   Seller_Type    301 non-null    object
 7   Transmission   301 non-null    object
 8   Owner          301 non-null    int64
dtypes: float64(2), int64(3), object(4)
memory usage: 21.3+ KB
```

[6]:
```
data.isna().sum()
```

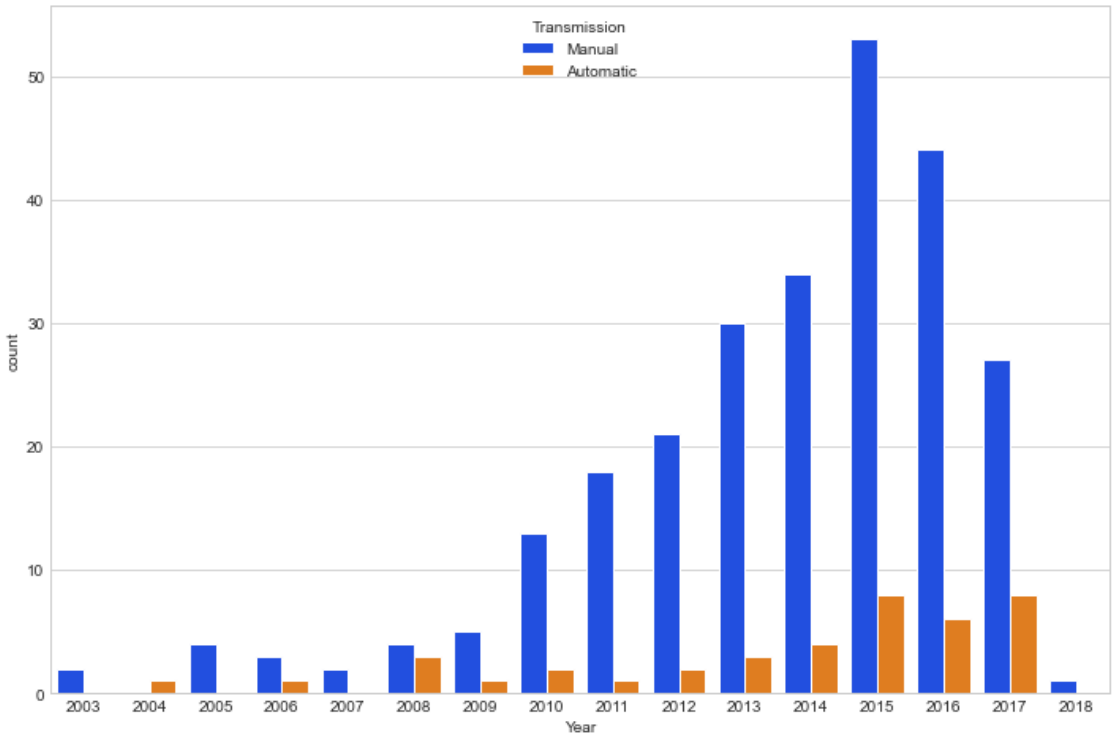
[6]:
```
Car_Name         0
Year             0
Selling_Price    0
Present_Price    0
Kms_Driven       0
Fuel_Type        0
Seller_Type      0
Transmission     0
Owner            0
dtype: int64
```

0.0.1 Seaborn library to data analysis

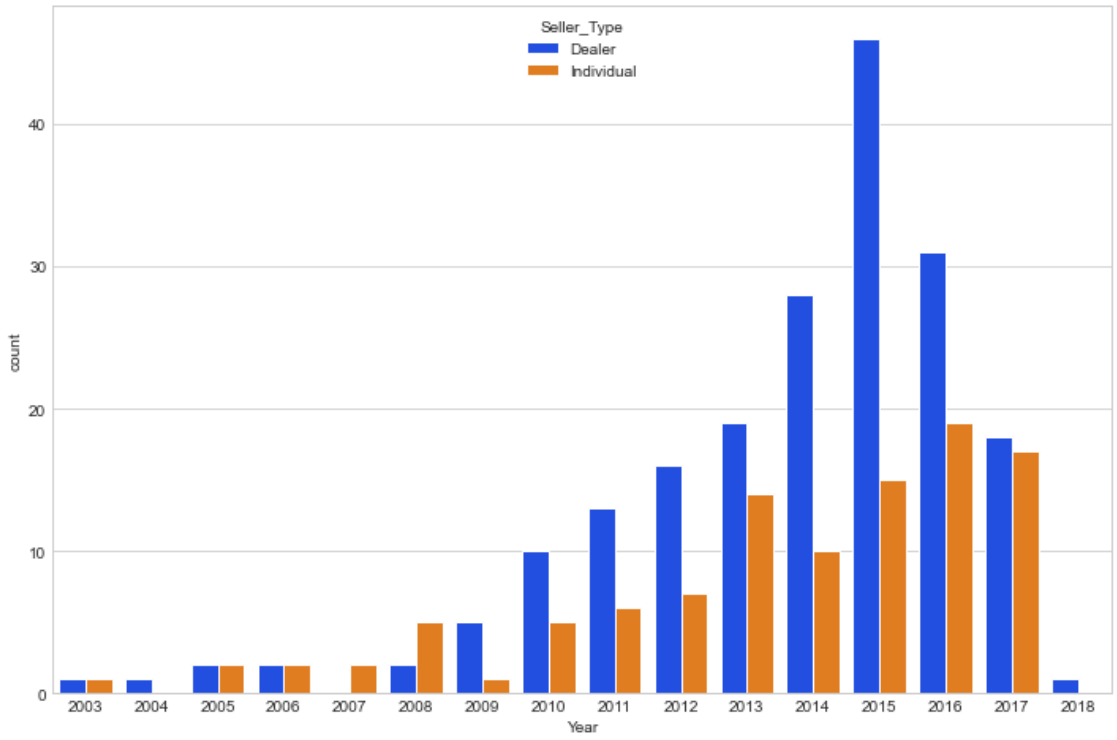
[7]:
```
# On this cell we make use from the powerfull library seaborn for better
 ↪understaing by graphs from the dataset.
plt.style.use('seaborn-whitegrid')
sns.set_palette('bright')
plt.figure(figsize=(12,8))
sns.countplot(x="Year", hue= 'Fuel_Type', edgecolor="1", data=data)
plt.show()
```



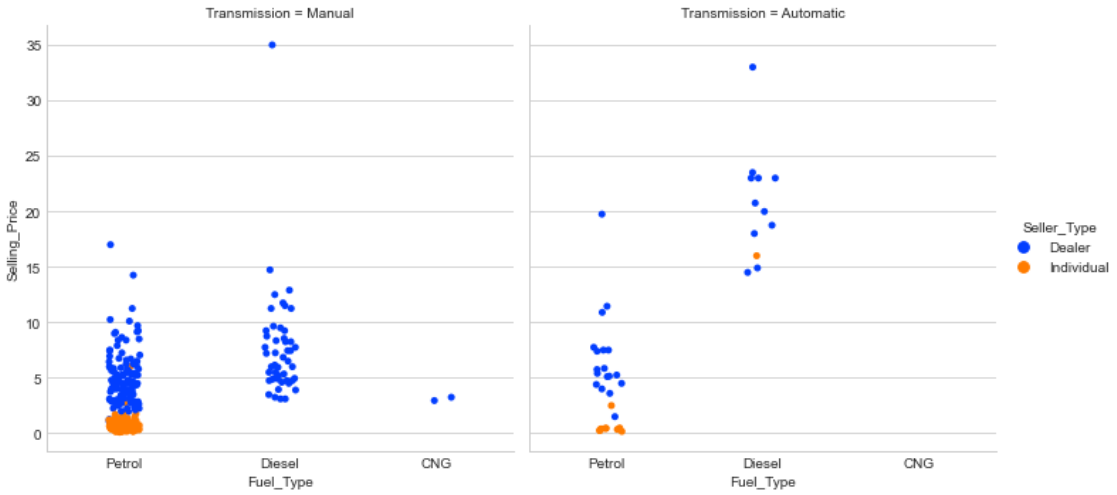
[8]:
```
plt.figure(figsize=(12,8))
sns.countplot(x="Year", hue= 'Transmission', edgecolor="1",  data=data)
plt.show()
```



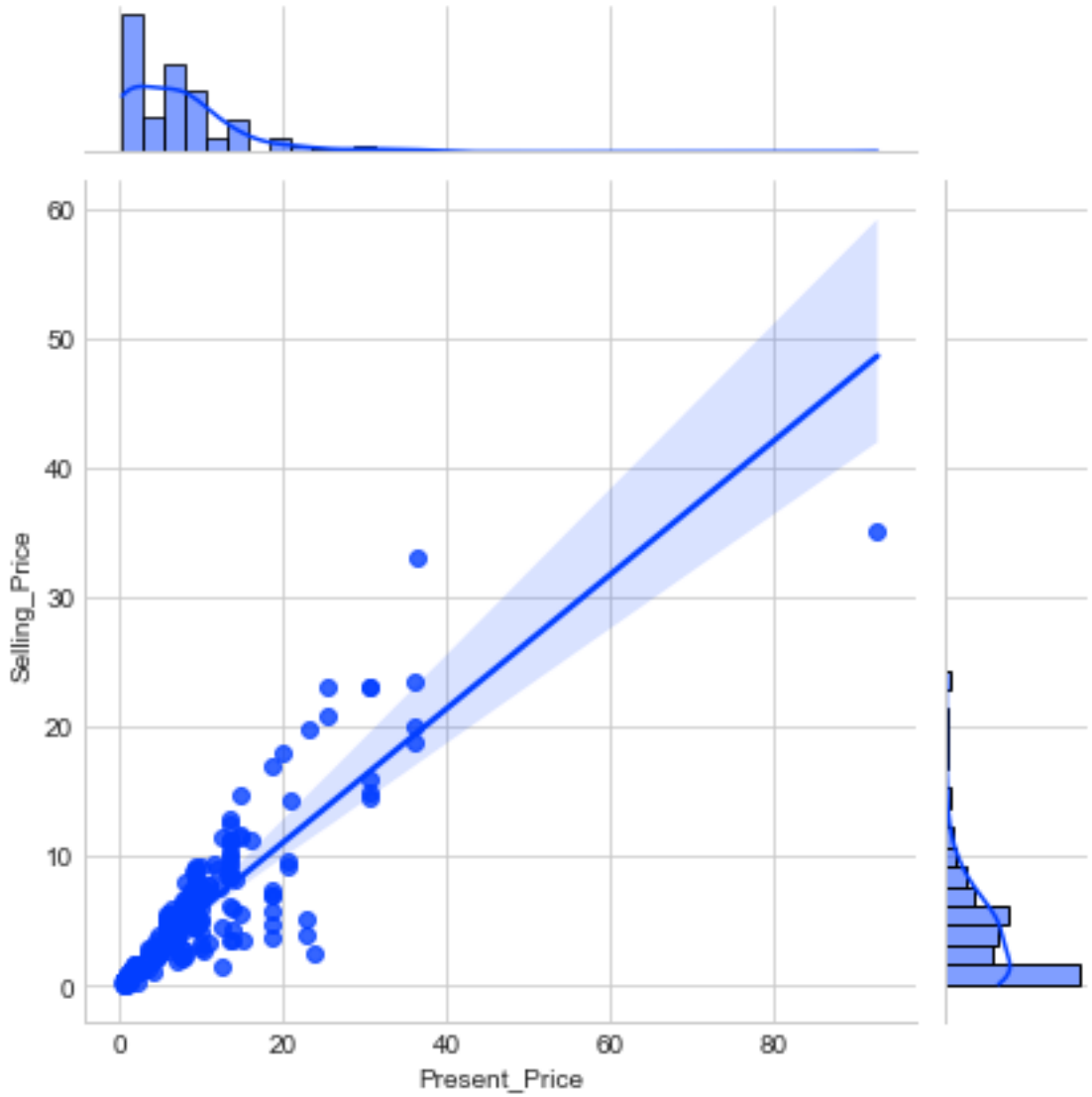
[9]:
```
plt.figure(figsize=(12,8))
sns.countplot(x="Year", hue= 'Seller_Type', edgecolor="1", data=data)
plt.show()
```



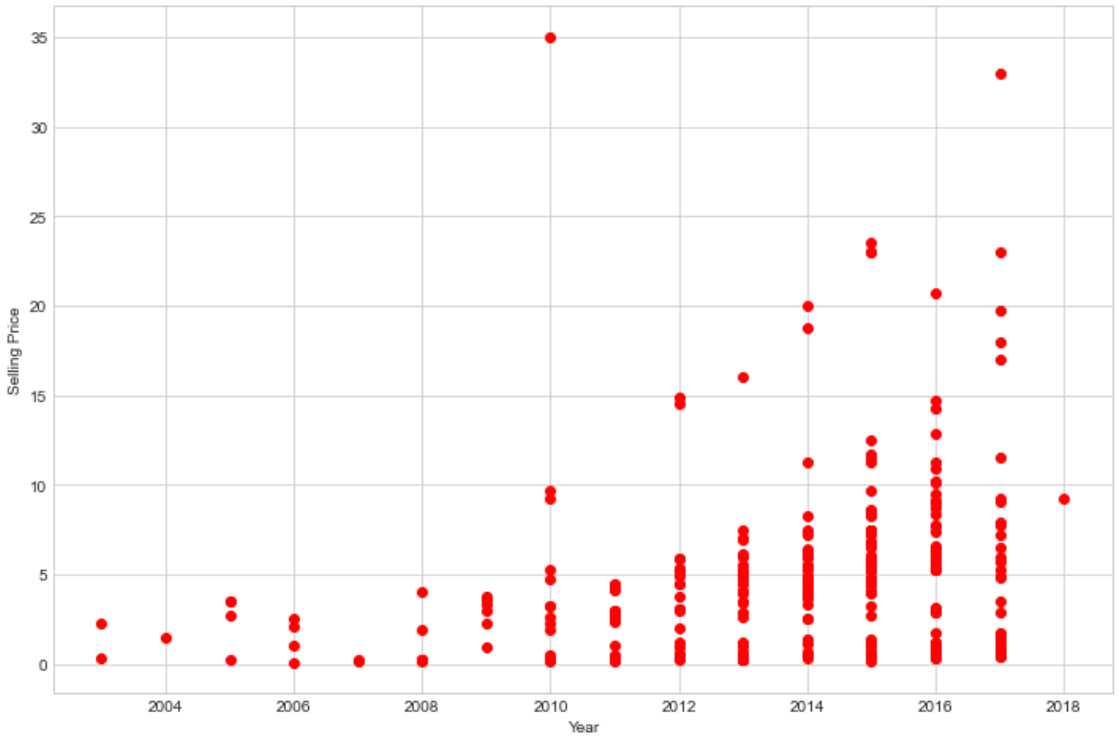
[10]:
```
sns.catplot(x="Fuel_Type", y="Selling_Price", hue = 'Seller_Type', col =␣
↪'Transmission',  kind = 'strip', data = data)
plt.show()
```



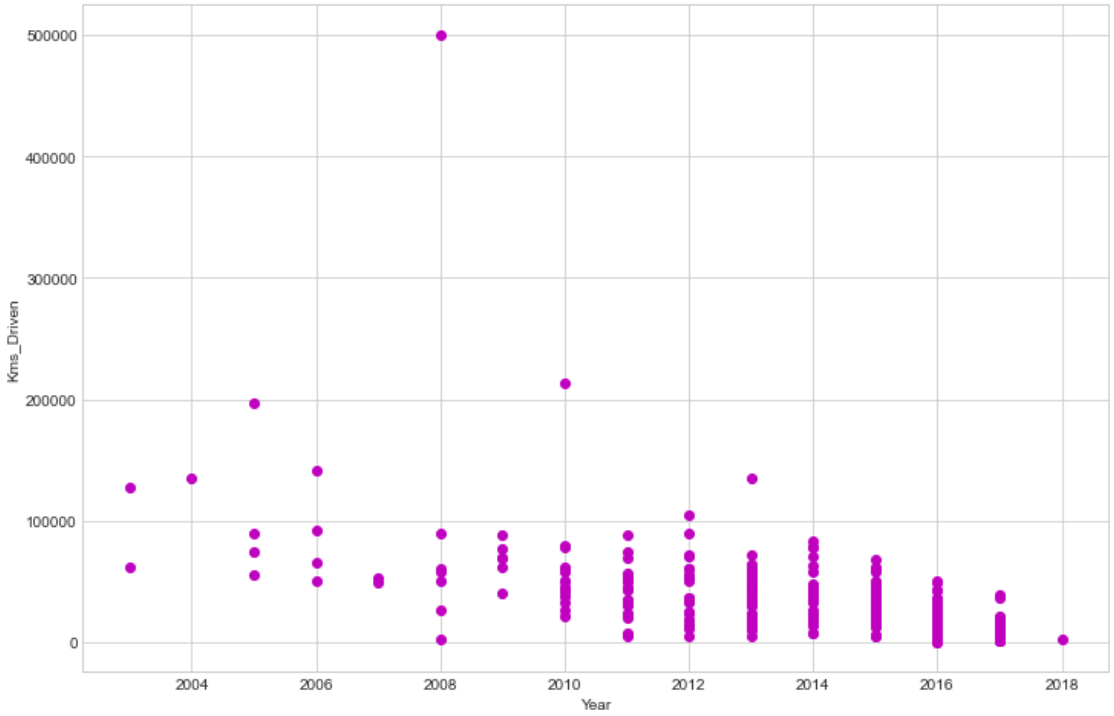
[11]:
```
sns.jointplot(x="Present_Price", y="Selling_Price", kind = 'reg', data=data)
plt.show()
```



[12]:
```
plt.figure(figsize=(12,8))
plt.scatter(data['Year'], data['Selling_Price'],  color='red')
plt.xlabel("Year")
plt.ylabel("Selling Price")
plt.show()
#  On this samples as shown , we have a large increased of selling price␣
 ↪between 2014 and 2017
```



[13]:
```
plt.figure(figsize=(12,8))
plt.scatter(data['Year'], data['Kms_Driven'],  color='m')
plt.xlabel("Year")
plt.ylabel("Kms_Driven")
plt.show()
# For curiosity and contrast from the plot above, since the selling price␣
 ↪growth , the necessity and
# utilify from the vehicules goes down.
```



[14]:
```
data['Transmission'].replace({'Manual': 0, 'Automatic': 1}, inplace=True)
data['Seller_Type'].replace({'Dealer': 0, 'Individual': 1}, inplace=True)
data['Fuel_Type'].replace({'Petrol': 0, 'Diesel': 1, 'CNG': 2}, inplace=True)
data.sample(10)
```

[14]:

	Car_Name	Year	Selling_Price	Present_Price	Kms_Driven	Fuel_Type	Seller_Type	Transmission	Owner
127	Bajaj Avenger 150	2016	0.75	0.80	7000	0	1	0	0
32	swift	2014	4.95	7.49	39000	1	0	0	0
270	city	2011	4.10	10.00	69341	0	0	0	0
0	ritz	2014	3.35	5.59	27000	0	0	0	0
20	alto k10	2016	2.85	3.95	25000	0	0	0	0
289	city	2016	10.11	13.60	10980	0	0	0	0
265	jazz	2017	6.50	8.70	21200	0	0	0	0
37	800	2003	0.35	2.28	127000	0	0	0	0
230	verna	2013	6.15	9.40	45000	1	0	0	0
229	i20	2012	3.10	6.79	52132	0	0	0	0

```
265          0            0            0       0
37           0            1            0       0
230          1            0            0       0
229          1            0            0       0
```

[15]:
```
y = data[['Selling_Price']]
X = data[['Year', 'Present_Price', 'Kms_Driven', 'Fuel_Type', 'Seller_Type',␣
 ↪'Transmission', 'Owner']]
```

[16]:
```
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.25)
print('Train')
print("X_train: ",X_train.shape)
print("y_train: ",y_train.shape)

print('\nTest')
print("X_test: ",X_test.shape)
print("y_test: ",y_test.shape)
```

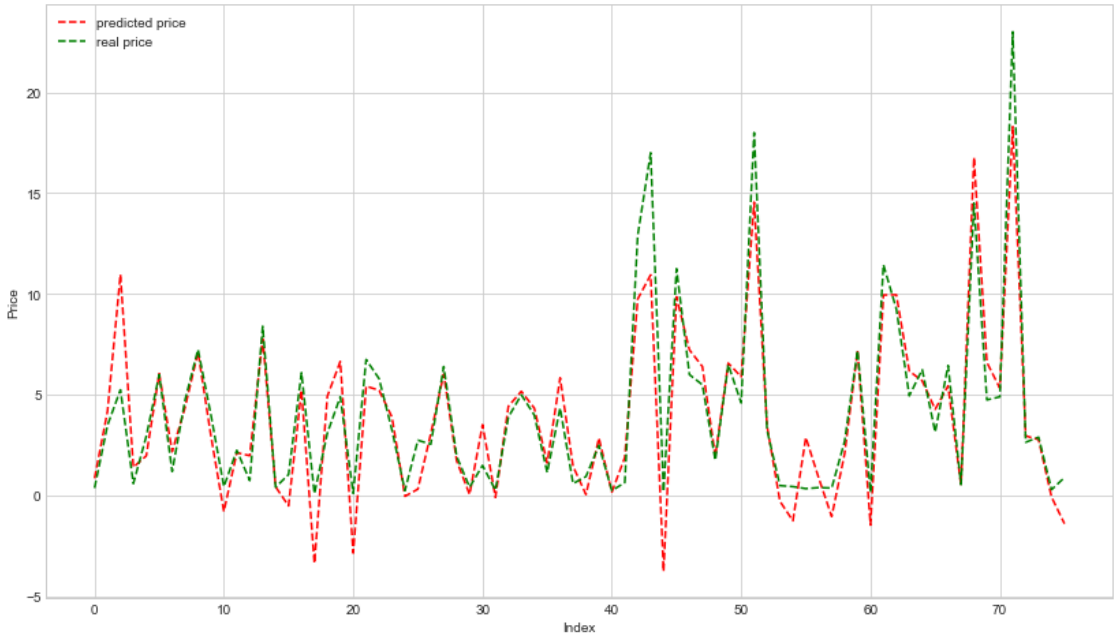
```
Train
X_train:  (225, 7)
y_train:  (225, 1)

Test
X_test:  (76, 7)
y_test:  (76, 1)
```

[17]:
```
model = LinearRegression()
model.fit(X_train, y_train)
y_pred = model.predict(X_test)
```

[18]:
```
plt.figure(figsize=(14,8))
plt.plot(range(y_pred.shape[0]), y_pred,'r--')
plt.plot(range(y_test.shape[0]), y_test,'g--')
plt.legend(['predicted price', 'real price'])
plt.ylabel('Price')
plt.xlabel('Index')

plt.show()
```



[19]:
```
from sklearn.metrics import r2_score

print('R2-score: ', r2_score(y_test, y_pred))
```

```
R2-score:  0.8483463634198904
```

[ ]:
```

```