In [1]:
```
import pandas as pd
import seaborn as sns
import matplotlib.pyplot as plt
import numpy as np
sns.set_theme(color_codes=True)
```

In [2]:
```
df = pd.read_csv('Diamond Price Prediction.csv')
df
```

Out[2]:

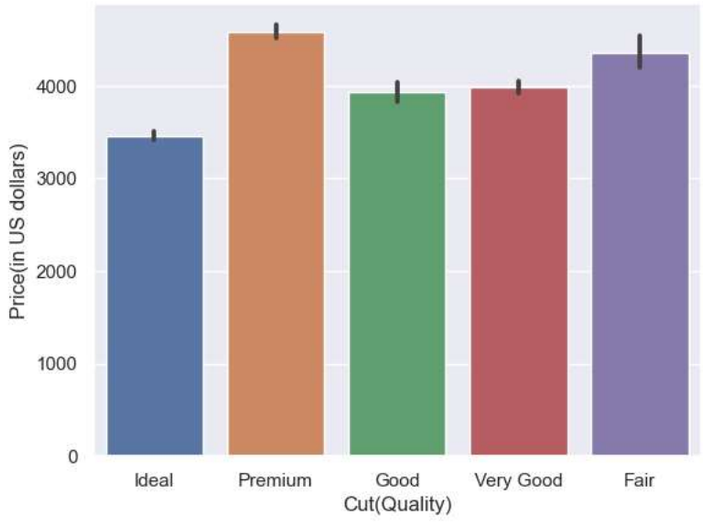
	Carat(Weight of Daimond)	Cut(Quality)	Color	Clarity	Depth	Table	Price(in US dollars)	X(length)	Y(width)	Z(Depth)
0	0.23	Ideal	E	SI2	61.5	55.0	326	3.95	3.98	2.43
1	0.21	Premium	E	SI1	59.8	61.0	326	3.89	3.84	2.31
2	0.23	Good	E	VS1	56.9	65.0	327	4.05	4.07	2.31
3	0.29	Premium	I	VS2	62.4	58.0	334	4.20	4.23	2.63
4	0.31	Good	J	SI2	63.3	58.0	335	4.34	4.35	2.75
...	...	...	...	...	...	...	...	...	...	...
53935	0.72	Ideal	D	SI1	60.8	57.0	2757	5.75	5.76	3.50
53936	0.72	Good	D	SI1	63.1	55.0	2757	5.69	5.75	3.61
53937	0.70	Very Good	D	SI1	62.8	60.0	2757	5.66	5.68	3.56
53938	0.86	Premium	H	SI2	61.0	58.0	2757	6.15	6.12	3.74
53939	0.75	Ideal	D	SI2	62.2	55.0	2757	5.83	5.87	3.64

53940 rows × 10 columns

Exploratory Data Analysis

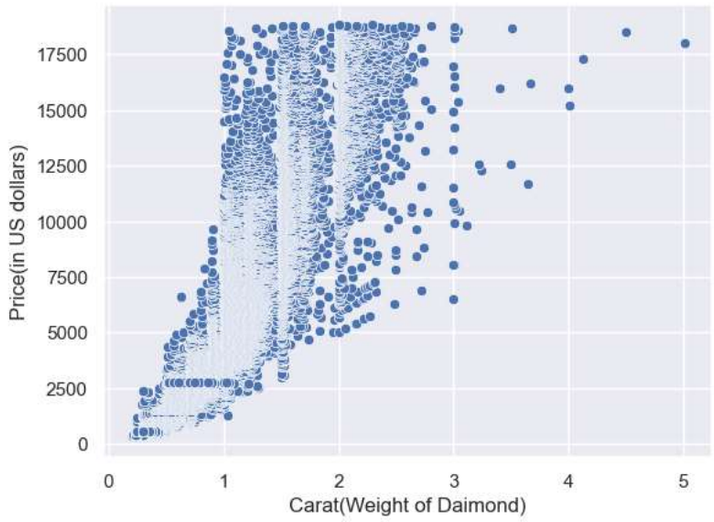
In [3]:
```
sns.barplot(data=df, x="Cut(Quality)", y="Price(in US dollars)")
#Premium Quality has the highest price for diamond
```

Out[3]:
```
<AxesSubplot:xlabel='Cut(Quality)', ylabel='Price(in US dollars)'>
```



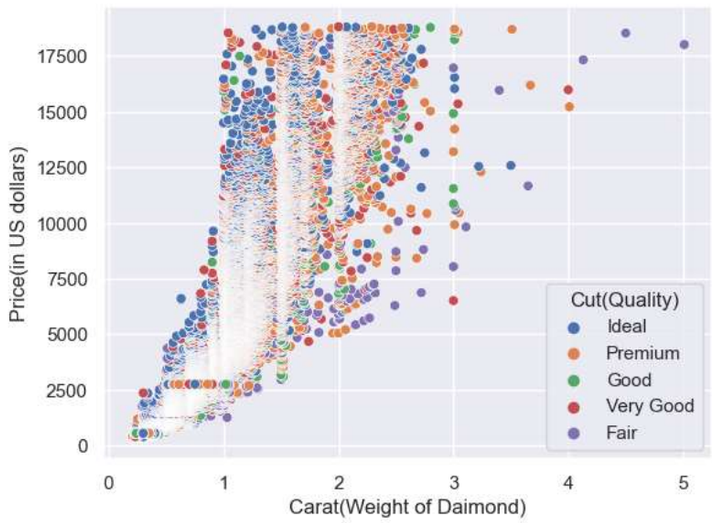
In [4]:
```
sns.scatterplot(data=df, x="Carat(Weight of Daimond)", y="Price(in US dollars)")
```

Out[4]:
```
<AxesSubplot:xlabel='Carat(Weight of Daimond)', ylabel='Price(in US dollars)'>
```



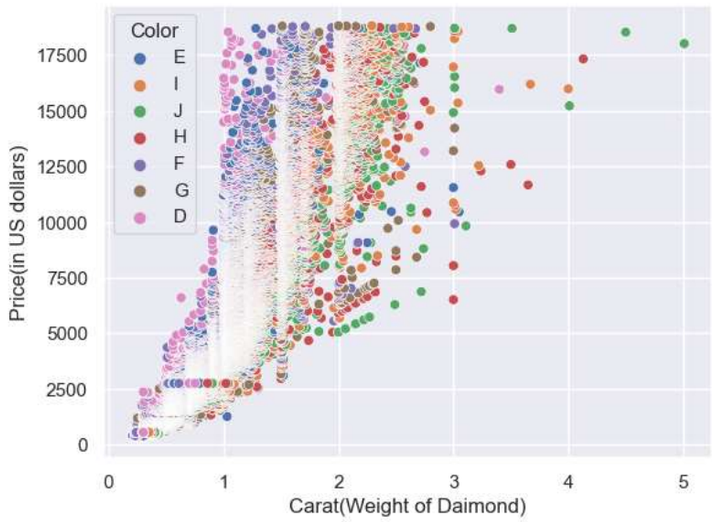
In [5]:
```
sns.scatterplot(data=df, x="Carat(Weight of Daimond)", y="Price(in US dollars)", hue="Cut(Quality)", palette="deep")
```

Out[5]:
```
<AxesSubplot:xlabel='Carat(Weight of Daimond)', ylabel='Price(in US dollars)'>
```



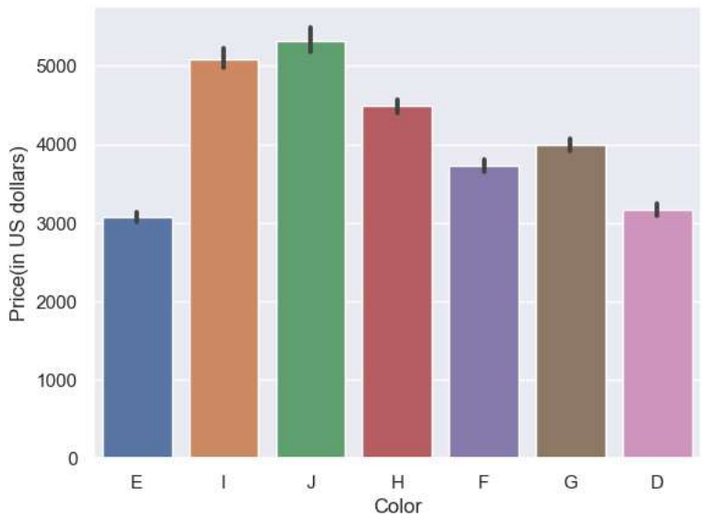
In [6]:
```
sns.scatterplot(data=df, x="Carat(Weight of Daimond)", y="Price(in US dollars)", hue="Color", palette="deep")
```

Out[6]:
```
<AxesSubplot:xlabel='Carat(Weight of Daimond)', ylabel='Price(in US dollars)'>
```



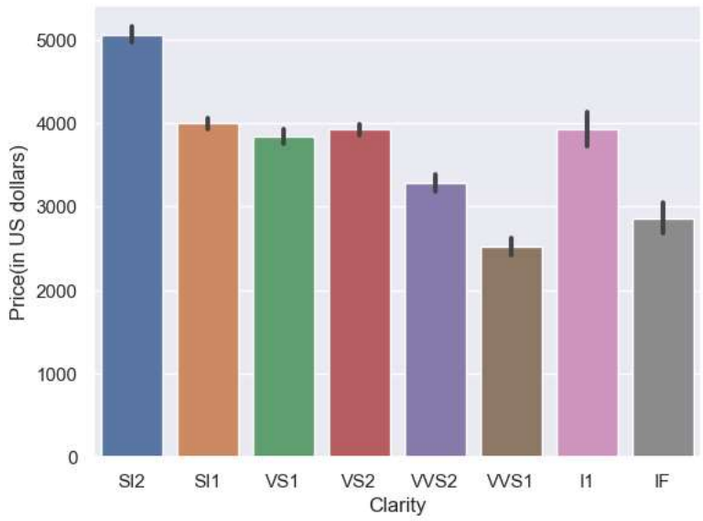
In [7]:
```
sns.barplot(data=df, x="Color", y="Price(in US dollars)")
```

Out[7]:
```
<AxesSubplot:xlabel='Color', ylabel='Price(in US dollars)'>
```



In [8]:
```
sns.barplot(data=df, x="Clarity", y="Price(in US dollars)")
#SI2 has the highest clarity price
```

Out[8]:
```
<AxesSubplot:xlabel='Clarity', ylabel='Price(in US dollars)'>
```



Data Preprocessing

In [9]:
```
df.dtypes
```

Out[9]:
```
Carat(Weight of Daimond)    float64
Cut(Quality)                 object
Color                        object
Clarity                      object
Depth                       float64
Table                       float64
Price(in US dollars)          int64
X(length)                   float64
Y(width)                    float64
Z(Depth)                    float64
dtype: object
```

In [10]:
```
df['Cut(Quality)'].unique()
```

Out[10]:
```
array(['Ideal', 'Premium', 'Good', 'Very Good', 'Fair'], dtype=object)
```

In [11]:
```
df['Color'].unique()
```

Out[11]:
```
array(['E', 'I', 'J', 'H', 'F', 'G', 'D'], dtype=object)
```

In [12]:
```
df['Clarity'].unique()
```

Out[12]:
```
array(['SI2', 'SI1', 'VS1', 'VS2', 'VVS2', 'VVS1', 'I1', 'IF'],
      dtype=object)
```

In [13]:
```
from sklearn import preprocessing
label_encoder = preprocessing.LabelEncoder()
df['Cut(Quality)']= label_encoder.fit_transform(df['Cut(Quality)'])
df['Cut(Quality)'].unique()
```

Out[13]:
```
array([2, 3, 1, 4, 0])
```

In [14]:
```
from sklearn import preprocessing
label_encoder = preprocessing.LabelEncoder()
df['Color']= label_encoder.fit_transform(df['Color'])
df['Color'].unique()
```

Out[14]:
```
array([1, 5, 6, 4, 2, 3, 0])
```

In [15]:
```
from sklearn import preprocessing
label_encoder = preprocessing.LabelEncoder()
df['Clarity']= label_encoder.fit_transform(df['Clarity'])
df['Clarity'].unique()
```

Out[15]:
```
array([3, 2, 4, 5, 7, 6, 0, 1])
```

Machine Learning Model Building

In [16]:
```
X = df.drop('Price(in US dollars)', axis=1)
y = df['Price(in US dollars)']
```

In [17]:
```
from sklearn.model_selection import train_test_split
X_train, X_test, y_train, y_test = train_test_split(X,y, test_size=0.2, random_state=0)
```

Decision Tree Regressor

In [18]:
```
from sklearn.tree import DecisionTreeRegressor
dtree = DecisionTreeRegressor(random_state=0)
dtree.fit(X_train, y_train)
```

Out[18]:
```
DecisionTreeRegressor(random_state=0)
```

In [19]:
```
from sklearn import metrics
import math
y_pred = dtree.predict(X_test)
mae = metrics.mean_absolute_error(y_test, y_pred)
mse = metrics.mean_squared_error(y_test, y_pred)
r2 = metrics.r2_score(y_test, y_pred)
rmse = math.sqrt(mse)

print('MAE is {}'.format(mae))
print('MSE is {}'.format(mse))
print('R2 score is {}'.format(r2))
print('RMSE score is {}'.format(rmse))
```

```
MAE is 354.16439562476825
MSE is 524367.0390480163
R2 score is 0.9669204129976543
RMSE score is 724.1319210254553
```

Random Forest Regressor

In [20]:
```
from sklearn.ensemble import RandomForestRegressor
rf = RandomForestRegressor(random_state=0)
rf.fit(X_train, y_train)
```

Out[20]:
```
RandomForestRegressor(random_state=0)
```

In [21]:
```
from sklearn import metrics
import math
y_pred = rf.predict(X_test)
mae = metrics.mean_absolute_error(y_test, y_pred)
mse = metrics.mean_squared_error(y_test, y_pred)
r2 = metrics.r2_score(y_test, y_pred)
rmse = math.sqrt(mse)

print('MAE is {}'.format(mae))
print('MSE is {}'.format(mse))
print('R2 score is {}'.format(r2))
print('RMSE score is {}'.format(rmse))
```

```
MAE is 266.16424879973925
MSE is 294799.9292444162
R2 score is 0.9814026069879784
RMSE score is 542.9548132620395
```

R2 Score Comparison :

```
Decision Tree Regressor : 96.69 %
Random Forest Regressor : 98.14 %
```