Machine Learning

Lesson 1 HandsOn

Presented by Richmond Anku

Importing packages

```
import pandas as pd
from sklearn.linear_model import LinearRegression
from sklearn.model_selection import train_test_split
import matplotlib.pyplot as plt
%matplotlib inline
from sklearn import metrics
import numpy as np
from sklearn.model_selection import KFold
from sklearn.model_selection import cross_val_score
```

Importing 'Diamonds' dataset

```
diamonds = pd.read_csv ('C:/Users/Richmond/Desktop/WOZ-U/Machine Learning/HandsOn/ML repo/Diamonds.csv')
print (diamonds)
```

```
       Unnamed: 0  carat        cut color clarity  depth  table  price     x  \
0               0   0.23      Ideal     E     SI2   61.5   55.0    326  3.95
1               1   0.21    Premium     E     SI1   59.8   61.0    326  3.89
2               2   0.23       Good     E     VS1   56.9   65.0    327  4.05
3               3   0.29    Premium     I     VS2   62.4   58.0    334  4.20
4               4   0.31       Good     J     SI2   63.3   58.0    335  4.34
...           ...    ...        ...   ...     ...    ...    ...    ...   ...
53935       53935   0.72      Ideal     D     SI1   60.8   57.0   2757  5.75
53936       53936   0.72       Good     D     SI1   63.1   55.0   2757  5.69
53937       53937   0.70  Very Good     D     SI1   62.8   60.0   2757  5.66
53938       53938   0.86    Premium     H     SI2   61.0   58.0   2757  6.15
53939       53939   0.75      Ideal     D     SI2   62.2   55.0   2757  5.83
```

Step 1

- Import all required packages
- Import 'diamond' dataset

Recoding Cut to CutR

```
def Cut (series):

    if series == "Ideal":
        return 5

    if series == "Premium":
        return 4

    if series == "Very Good":
        return 3

    if series == "Good":
        return 2

    if series == "Fair":
        return 1


diamonds['cutR'] = diamonds['cut'].apply(Cut)
```

Recoding Color to ColorR

```
def Color (series):

    if series == "D":
        return 7

    if series == "E":
        return 6

    if series == "F":
        return 5

    if series == "G":
        return 4

    if series == "H":
        return 3

    if series == "I":
        return 2
```

Step 2

- Recode variable columns from string to float

- Recode Cut to CutR
- Recode color to colorR
- Recode clarity to clarityR

Step 3

- Create X and Y variables
- Subset predictor x variables as an array

Creating X and Y variables (subsetting into arrays)

```
x = diamonds[['carat', 'cutR', 'colorR', 'clarityR']]
y = diamonds['price']
```

Step 4

- Perform train-test split

Train-test split: 60/40

```
x_train, x_test, y_train, y_test = train_test_split(x,y, test_size = .4, random_state=101)
```

Step 5

- Create linear regression model and
- Fit to training data

Linear Regression Model

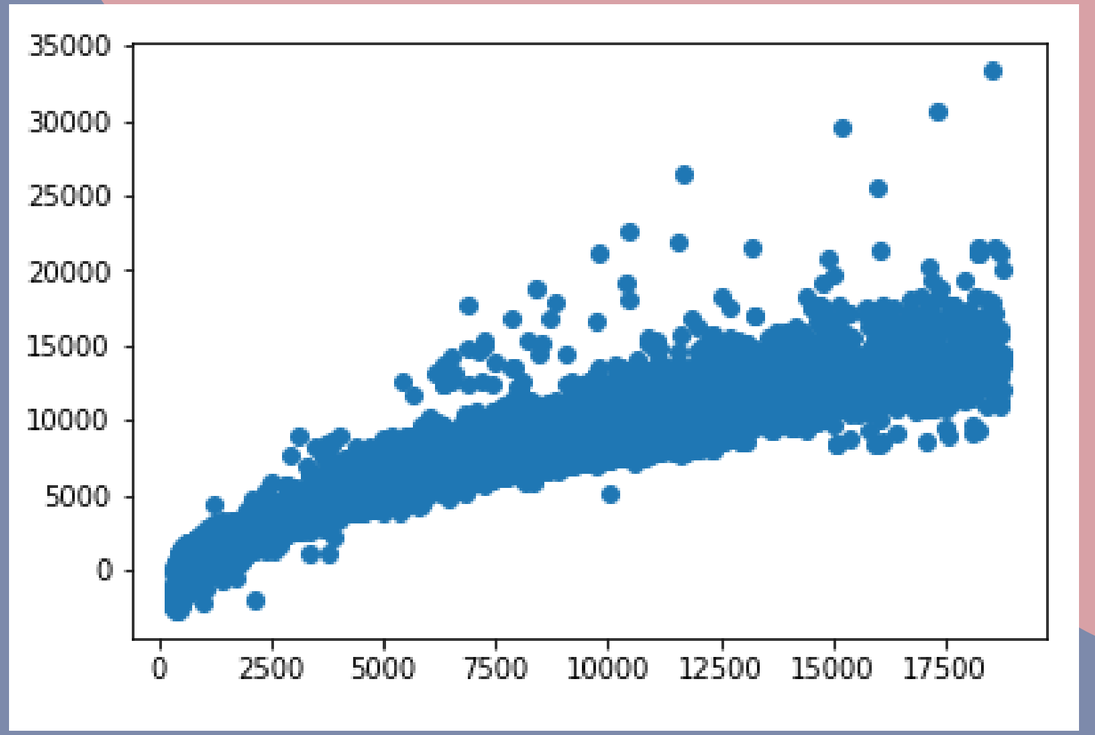
```
lm = LinearRegression()
lm.fit(x_train, y_train)
```

```
LinearRegression()
```

Step 6

- Perform prediction using the model

```
predictions = lm.predict(x_test)
predictions
```



Step 7

Plot a scatterplot of model predictions

Conclusions

- The accuracy of predictions of the model is about 90%

- The rmse value is far greater than zero (1240). Indicating that this model may not be a good fit.

Cross validation

- Upon cross validation, the accuracy values vary quite widely across each iteration. The second and third iterations give about 64% and 81% accuracy respectively.

- However, the 4th and 5th iterations are in the negative. This is indicative of the fact that the model does fit certain scenarios.

Model Accuracy Score

```
print("Score:", lm.score(x_test, y_test))

#The model predictions are accurate about 90% of the time.
```

```
Score: 0.9031757454166052
```

Root Mean Squared Error

```
np.sqrt(metrics.mean_squared_error(y_test, predictions))
```

```
1240.2262724895409
```

Cross Validation

```
print(cross_val_score(lm, x,y, cv=5))
```

```
[  0.09862808   0.63612892   0.81033106 -16.96778127  -0.9517348 ]
```

```
accuracy = cross_val_score(lm, x,y, cv=5)
print(accuracy)
print("Accuracy of Model with Cross Validation is:", accuracy.mean() * 100)
```

```
[  0.09862808   0.63612892   0.81033106 -16.96778127  -0.9517348 ]
Accuracy of Model with Cross Validation is: -327.48856026922664
```

Thank you!