The Sparks Foundation- GRIP- Data Science and Business Analytics- August 2021

Task 1- Prediction Using Supervised ML

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Simple Linear Regression

In this regression task we will predict the percentage of marks that a student is expected to score based upon the number of hours they studied. This is a simple linear regression task as it involves just two variables.

Data sample: http://bit.ly/w-data

In [1]:
```
#import all the required libraries
import numpy as np
import pandas as pd
from sklearn.linear_model import LinearRegression
import matplotlib.pyplot as plt
%matplotlib inline
from sklearn.model_selection import train_test_split
import seaborn as sns
```

In [2]:
```
#read the data and display
student_data = pd.read_csv("http://bit.ly/w-data")
print(student_data.shape)
student_data
```

```
(25, 2)
```

Out[2]:

	Hours	Scores
0	2.5	21
1	5.1	47
2	3.2	27
3	8.5	75
4	3.5	30
5	1.5	20
6	9.2	88
7	5.5	60
8	8.3	81
9	2.7	25
10	7.7	85
11	5.9	62
12	4.5	41
13	3.3	42
14	1.1	17
15	8.9	95
16	2.5	30
17	1.9	24
18	6.1	67
19	7.4	69
20	2.7	30
21	4.8	54
22	3.8	35
23	6.9	76
24	7.8	86

In [3]:
```
#an insight into the data
student_data.describe()
```

Out[3]:

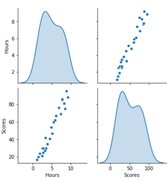
	Hours	Scores
count	25.000000	25.000000
mean	5.012000	51.480000
std	2.525094	25.286887
min	1.100000	17.000000
25%	2.700000	30.000000
50%	4.800000	47.000000
75%	7.400000	75.000000
max	9.200000	95.000000

In [4]:
```
student_data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 25 entries, 0 to 24
Data columns (total 2 columns):
 #   Column  Non-Null Count  Dtype  
---  ------  --------------  -----  
 0   Hours   25 non-null     float64
 1   Scores  25 non-null     int64  
dtypes: float64(1), int64(1)
memory usage: 528.0 bytes
```

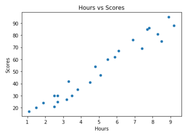
In [5]:
```
#data visualisation
#a plot to understand correlation between the attributes 'Marks Percentage' and 'Hours studied'
student_data_plot = student_data.iloc[:, 0:20]
sns.pairplot(student_data_plot, diag_kind = 'kde')
```

Out[5]: <seaborn.axisgrid.PairGrid at 0x20ac7a0c688>



In [6]:
```
#scatter plot
student_data.plot(kind='scatter', x='Hours', y='Scores')
plt.title('Hours vs Scores')
```

Out[6]: Text(0.5, 1.0, 'Hours vs Scores')



In [7]:
```
#splitting the dataset into dependent and independent variables
X = student_data.iloc[:, :-1].values
y = student_data.iloc[:, 1].values
```

In [8]:
```
#splitting the dataset into training and testing sets
X_train,X_test,y_train,y_test = train_test_split(X, y, test_size=0.3, random_state=0)
print(X_train.shape)
print(X_test.shape)
```

```
(17, 1)
(8, 1)
```

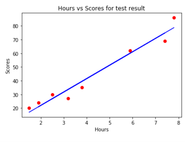
In [9]:
```
#Fit Linear model
student_regression_model = LinearRegression().fit(X_train, y_train)
```

In [10]:
```
#predicting the results
print(X_test)
student_pred = student_regression_model.predict(X_test)
```

```
[[1.5]
 [3.2]
 [7.4]
 [2.5]
 [5.9]
 [3.8]
 [1.9]
 [7.8]]
```

In [11]:
```
#visualise the training set prediction
plt.scatter(X_train, y_train, color='red')
plt.plot(X_train, student_regression_model.predict(X_train), color='blue')
plt.title('Hours vs Scores for training result')
plt.xlabel('Hours')
plt.ylabel('Scores')
plt.show()
```

In [12]:
```
#visualise the test set prediction
plt.scatter(X_test, y_test, color='red')
plt.plot(X_test, student_regression_model.predict(X_test), color='blue')
plt.title('Hours vs Scores for test result')
plt.xlabel('Hours')
plt.ylabel('Scores')
plt.show()
```



In [13]:
```
#comparing actual vs predicted
df = pd.DataFrame({'Actual': y_test, 'Predicted': student_pred})
df
```

Out[13]:

	Actual	Predicted
0	20	17.053665
1	27	33.694229
2	69	74.806209
3	30	26.842232
4	62	60.123359
5	35	39.567369
6	24	20.969092
7	86	78.721636

In [14]:
```
#Testing/Predicting with our own data
hours = 9.25
own_pred = student_regression_model.predict([[hours]])
print("If a student studies for 9.25 hours per day then he/she can score", own_pred[0], "%")
```

```
If a student studies for 9.25 hours per day then he/she can score 92.91505723477056 %
```

In [15]:
```
#Checking the scores of training and testing model
print(student_regression_model.score(X_train, y_train))
print(student_regression_model.score(X_test, y_test))
```

```
0.9484997422695115
0.9568211104435257
```

In [16]:
```
#Checking the mean absolute error of the model
from sklearn import metrics
print('Mean Absolute Error:',
      metrics.mean_absolute_error(y_test, student_pred))
```

```
Mean Absolute Error: 4.419727808027652
```

In [17]:
```
#Checking the accuracy of the model
from sklearn.metrics import r2_score
r2_score(y_test, student_pred)
print("Accuracy of the model is:", r2_score(y_test, student_pred)*100, '%')
```

```
Accuracy of the model is: 95.68211104435257 %
```

In [ ]:
```

```