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Data Science & Business Analytics

PREDICTION USING SUPERVISED MACHINE LEARNING

Dataset used: http://bit.ly/w-data

TASK 1:

Based upon the number of hours of study, students' score (in %) is predicted. As only 2 variables are used (hours, score), simple linear regression is used with Python.

In [1]:
```
# Importing all the required libraries to this notebook:

import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
%matplotlib inline
```

In [2]:
```
# Reading data from remote link:

dataset = "http://bit.ly/w-data"
study_data = pd.read_csv(dataset)
print("Dataset imported successfully.")
```

```
Dataset imported successfully.
```

In [3]:
```
#Checking the dimension of the imported dataset:

study_data.shape
```

Out[3]:
```
(25, 2)
```

In [4]:
```
#Studying about the information of the data in the imported dataset:

study_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]:
```
#Checking for the null values(if any) in the imported dataset:

study_data.isnull()
```

Out[5]:

	Hours	Scores

	Hours	Scores
0	False	False
1	False	False
2	False	False
3	False	False
4	False	False
5	False	False
6	False	False
7	False	False
8	False	False
9	False	False
10	False	False
11	False	False
12	False	False
13	False	False
14	False	False
15	False	False
16	False	False
17	False	False
18	False	False
19	False	False
20	False	False
21	False	False
22	False	False
23	False	False
24	False	False

As all the values shows False, there are no null values in the imported dataset.

In [6]:
```
#Imported dataset:

study_data.head(25) #25 represents 25 numbers of data in the dataset.
```

Out[6]:

	Hours	Scores
0	2.5	21
1	5.1	47
2	3.2	27
3	8.5	75
4	3.5	30

	Hours	Scores
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

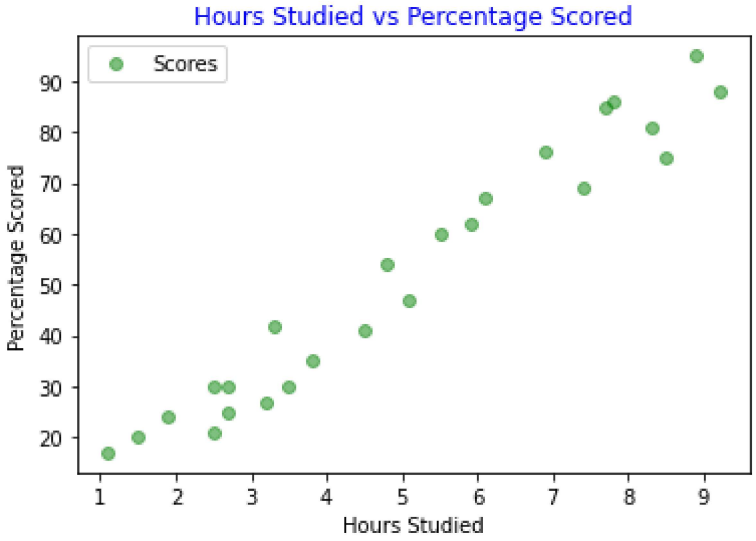
In [7]:
```
#Description of the imported dataset:

study_data.describe()
```

Out[7]:

	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 [8]:
```
# Plotting the distribution of scores on a 2-D graph to visualise the imported data:

study_data.plot(x='Hours', y='Scores', style='o',color='green', alpha=0.5)
plt.title('Hours Studied vs Percentage Scored', color='blue')
```

```
plt.xlabel('Hours Studied')
plt.ylabel('Percentage Scored')
plt.show()
```



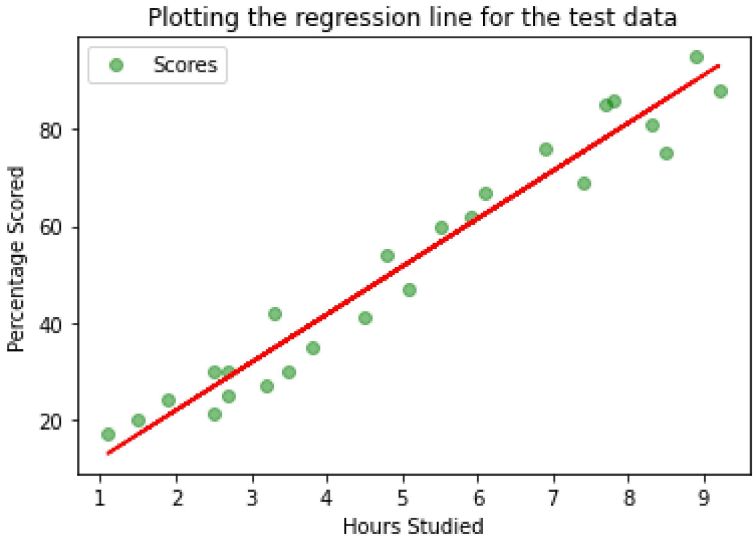
In [9]:
```
#dividing the data into "attributes" (inputs) and "labels" (outputs):

X = study_data.iloc[:, :-1].values
y = study_data.iloc[:, 1].values
```

In [10]:
```
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=
```

In [11]:
```
#Splitting the data into training and test sets:

from sklearn.linear_model import LinearRegression
regressor = LinearRegression()
regressor.fit(X_train, y_train)
print("Training of the model is complete.")
```

```
Training of the model is complete.
```

In [12]:
```
# Plotting the regression line:

line = regressor.coef_*X+regressor.intercept_

# Plotting for the test data:

study_data.plot(x='Hours', y='Scores', style='o',color='green', alpha=0.5)
plt.plot(X, line, color = 'red')
plt.title('Plotting the regression line for the test data')
plt.xlabel('Hours Studied')
plt.ylabel('Percentage Scored')
plt.show()
```



In [13]:
```
print("Hours(Test data):") # Testing data - In Hours
print(X_test)
y_pred = regressor.predict(X_test) # Predicting the scores
print("Predicted scores(Test data):")
for item in y_pred:
    print(item)
```

```
Hours(Test data):
[[1.5]
 [3.2]
 [7.4]
 [2.5]
 [5.9]]
Predicted scores(Test data):
16.884144762398037
33.73226077948984
75.35701799818723
26.794801243040276
60.491033277223885
```

In [14]:
```
# Comparing the Actual and Predicted values(in table):

compare= pd.DataFrame({'Actual': y_test, 'Predicted': y_pred})
compare
```

Out[14]:

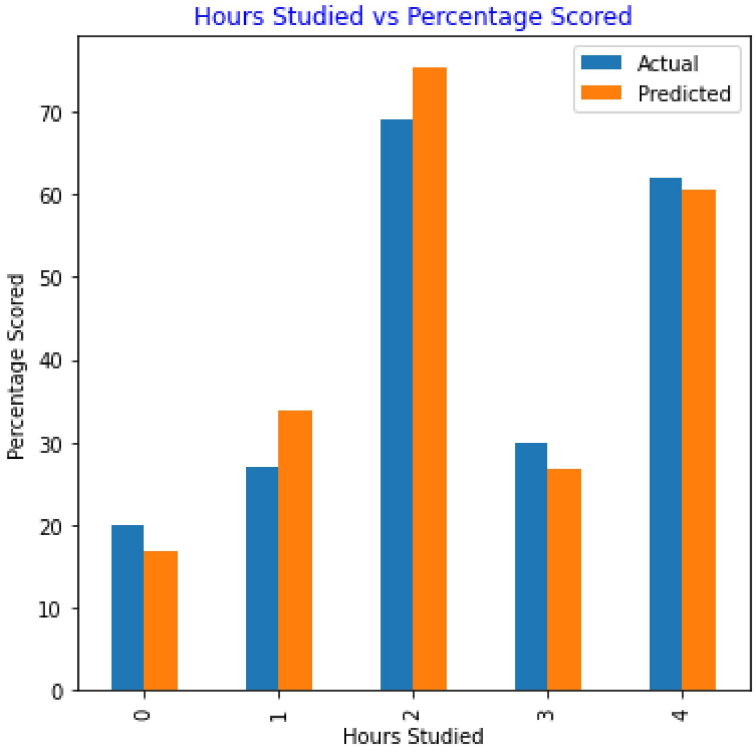
	Actual	Predicted
0	20	16.884145
1	27	33.732261
2	69	75.357018
3	30	26.794801
4	62	60.491033

In [15]:
```
# Checking the goodness of the fit test:

from sklearn import metrics
print('Accuracy of the Actual and Predicted R-squared is:', metrics.r2_score(y_test,
```

```
Accuracy of the Actual and Predicted R-squared is: 0.9454906892105356
```

In [16]:

```
#Comparing the Actual and Predicted values(in graph):

compare.plot(kind="bar", figsize=(6,6))
plt.title('Hours Studied vs Percentage Scored',color='blue')
plt.xlabel('Hours Studied')
plt.ylabel('Percentage Scored')
plt.show()
```



In [17]:

```
#Evaluating the model:

from sklearn.metrics import mean_squared_error,mean_absolute_error
mae = np.sqrt(metrics.mean_squared_error(y_test, y_pred))
mse = metrics.mean_squared_error(y_test, y_pred)
rmse = np.sqrt(metrics.mean_squared_error(y_test, y_pred))

print("Mean Absolute Error= ",mae)
print("Mean Squared Error= ",mse)
print("Root Mean Squared Error = ",rmse)
```

```
Mean Absolute Error=  4.6474476121003665
Mean Squared Error=  21.5987693072174
Root Mean Squared Error =  4.6474476121003665
```

In [18]:

```
#Testing with my own data:

hours = 9.25
result = regressor.predict([[hours]])
print("A student might score {} marks if he/she studies for {} hours a day".format(r
```

```
A student might score 93.69 marks if he/she studies for 9.25 hours a day
```