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TASK 01: Prediction using Supervised Machine Learning

In this task we have to predict the percentage of a student based on the number of hours studied by the student.

Importing the required Libraries

In [9]:
```
# Importing all the required libraries

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

Importing the dataset

In [10]:
```
#reading the data from csv file

data=pd.read_csv("http://bit.ly/w-data")
print("Data Imported Successfully")
print(data)
```

```
Data Imported Successfully
    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
```

Understanding charateristics of dataset

In [11]:
```
#getting  dimension

data.ndim
```

Out[11]:
```
2
```

In [12]:
```
#getting no of rows and coloumn

data.shape
```

Out[12]:
```
(25, 2)
```

In [13]:
```
#statistical report

data.describe().T
```

Out[13]:

	count	mean	std	min	25%	50%	75%	max
Hours	25.0	5.012	2.525094	1.1	2.7	4.8	7.4	9.2
Scores	25.0	51.480	25.286887	17.0	30.0	47.0	75.0	95.0

In [14]:
```
#get data of first five rows

data.head()
```

Out[14]:

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

In [15]:
```
#get data of last five rows

data.tail()
```

Out[15]:

	Hours	Scores
20	2.7	30
21	4.8	54
22	3.8	35
23	6.9	76
24	7.8	86

In [16]:
```
#to get the column in the given data

data.columns
```

Out[16]:
```
Index(['Hours', 'Scores'], dtype='object')
```

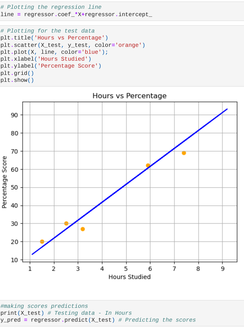
In [17]:
```
# to check if data contain null or missing value

data.isnull().sum()
```

Out[17]:
```
Hours     0
Scores    0
dtype: int64
```

In [18]:
```
# Plotting the distribution of scores

data.plot(x='Hours', y='Scores', style='*')
plt.title('Hours vs Percentage')
plt.xlabel('Hours Studied')
plt.ylabel('Percentage Score')
plt.grid()
plt.show()
```



From the graph above, we can clearly see that there is a positive linear relation between the number of hours studied and percentage of score.

Data Preparation

In this step the data is divided into "attributes" (inputs) and "labels" (outputs).

In [19]:
```
#dividing the data into "attributes" (inputs) and "labels" (outputs).
X = data.iloc[:, :-1].values
y = data.iloc[:, 1].values
```

In [20]:
```
X
```

Out[20]:
```
array([[2.5],
       [5.1],
       [3.2],
       [8.5],
       [3.5],
       [1.5],
       [9.2],
       [5.5],
       [8.3],
       [2.7],
       [7.7],
       [5.9],
       [4.5],
       [3.3],
       [1.1],
       [8.9],
       [2.5],
       [1.9],
       [6.1],
       [7.4],
       [2.7],
       [4.8],
       [3.8],
       [6.9],
       [7.8]])
```

In [21]:
```
y
```

Out[21]:
```
array([21, 47, 27, 75, 30, 20, 88, 60, 81, 25, 85, 62, 41, 42, 17, 95, 30,
       24, 67, 69, 30, 54, 35, 76, 86], dtype=int64)
```

In [22]:
```
# to split this data into training and test sets

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)
```

Training the Algorithm

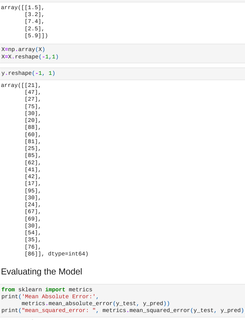
In [23]:
```
from sklearn.linear_model import LinearRegression as lr
regressor = lr()
regressor.fit(X_train, y_train)

print("Training complete.")
```

```
Training complete.
```

In [24]:
```
# Plotting the regression line
line = regressor.coef_*X+regressor.intercept_
```

In [25]:
```
# Plotting for the test data
plt.title('Hours vs Percentage')
plt.scatter(X_test, y_test, color='orange')
plt.plot(X, line, color='blue');
plt.xlabel('Hours Studied')
plt.ylabel('Percentage Score')
plt.grid()
plt.show()
```



In [26]:
```
#making scores predictions
print(X_test) # Testing data - In Hours
y_pred = regressor.predict(X_test) # Predicting the scores
```

```
[[1.5]
 [3.2]
 [7.4]
 [2.5]
 [5.9]]
```

In [27]:
```
# Comparing Actual vs Predicted
data = pd.DataFrame({'Actual': y_test, 'Predicted': y_pred})
data
```

Out[27]:

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

In [28]:
```
y_test
```

Out[28]:
```
array([20, 27, 69, 30, 62], dtype=int64)
```

In [29]:
```
X_test
```

Out[29]:
```
array([[1.5],
       [3.2],
       [7.4],
       [2.5],
       [5.9]])
```

In [30]:
```
X=np.array(X)
X=X.reshape(-1,1)
```

In [31]:
```
y.reshape(-1, 1)
```

Out[31]:
```
array([[21],
       [47],
       [27],
       [75],
       [30],
       [20],
       [88],
       [60],
       [81],
       [25],
       [85],
       [62],
       [41],
       [42],
       [17],
       [95],
       [30],
       [24],
       [67],
       [69],
       [30],
       [54],
       [35],
       [76],
       [86]], dtype=int64)
```

Evaluating the Model

In [32]:
```
from sklearn import metrics
print('Mean Absolute Error:',
      metrics.mean_absolute_error(y_test, y_pred))
print("mean_squared_error: ", metrics.mean_squared_error(y_test, y_pred))
```

```
Mean Absolute Error: 4.183859899002975
mean_squared_error:  21.598769307217474
```

Making Predictions

In [33]:
```
#making the prediction
hours = 9.25
hours = np.array(hours).reshape(1, -1)
pred_percentage = regressor.predict(hours)
print("No of Hours = {}".format(hours))
print("The predicted percentage of the student is", pred_percentage[0])
```

```
No of Hours = [[9.25]]
The predicted percentage of the student is 93.69173248737538
```