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Task1 - Prediction using Supervised ML(Level Beginner)

Objective:

In this simple linear regression task we will predict the percentage of scores a student expected to get based on the number of hours they studied . In this simple linear regression task we just use 2 variables.

In [1]:

```
# Importing all useful library for this task.
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
%matplotlib inline
```

In [2]:

```
# Reading the required data from the link.
link = "http://bit.ly/w-data"
p_data = pd.read_csv(link)
print("Data has been imported")
p_data.head(15)
```

```
Data has been imported
```

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

In [3]:

```
# Taking information about the data imported.
p_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 [4]:

```
# Counting the type of values in Hours column.
p_data['Hours'].value_counts()
```

Out[4]:

```
2.5    2
2.7    2
3.8    1
8.5    1
3.5    1
1.5    1
5.5    1
4.5    1
5.9    1
6.1    1
7.7    1
1.9    1
1.1    1
4.8    1
8.3    1
8.9    1
7.4    1
7.8    1
5.1    1
3.2    1
9.2    1
3.3    1
6.9    1
Name: Hours, dtype: int64
```

In [5]:

```
# Counting the type of values in Scores column.
p_data['Scores'].value_counts()
```

Out[5]:

```
30    3
95    1
62    1
85    1
86    1
67    1
24    1
69    1
17    1
41    1
42    1
75    1
47    1
76    1
81    1
20    1
21    1
54    1
88    1
25    1
27    1
60    1
35    1
Name: Scores, dtype: int64
```

In [6]:

```
# Full description of the dataset.
p_data.describe()
```

Out[6]:

	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

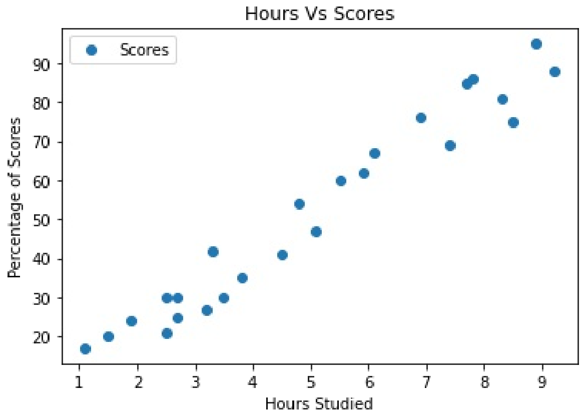
Plotting the 2D graph of the dataset for manipulating the relationship between the attributes.

In [7]:

```
p_data.plot(x='Hours', y='Scores', style = 'o')
plt.title('Hours Vs Scores')
plt.xlabel('Hours Studied')
plt.ylabel('Percentage of Scores')
```

Out[7]:

```
Text(0, 0.5, 'Percentage of Scores')
```



In [8]:

```
# To check whether any data is missing in dataset or not.
p_data.isnull()
```

Out[8]:

	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

Train Test Split

In [9]:

```
Tr = p_data.iloc[:, :-1].values
Te = p_data.iloc[:, 1].values
```

In [10]:

```
# Splitting the train and test set into features and labels
from sklearn.model_selection import train_test_split
X_train, X_test, Y_train, Y_test  = train_test_split(Tr, Te, test_size=0.2, random_state=0)
```

In [11]:

```
print(" X Train Set:")
print(X_train)
print("Y Train Set:")
print(Y_train)
print("X Test Set:")
print(X_test)
print("Y Test Set:")
print(Y_test)
```

```
 X Train Set:
[[3.8]
 [1.9]
 [7.8]
 [6.9]
 [1.1]
 [5.1]
 [7.7]
 [3.3]
 [8.3]
 [9.2]
 [6.1]
 [3.5]
 [2.7]
 [5.5]
 [2.7]
 [8.5]
 [2.5]
 [4.8]
 [8.9]
 [4.5]]
Y Train Set:
[35 24 86 76 17 47 85 42 81 88 67 30 25 60 30 75 21 54 95 41]
X Test Set:
[[1.5]
 [3.2]
 [7.4]
 [2.5]
 [5.9]]
Y Test Set:
[20 27 69 30 62]
```

Training of Algorithm for Prediction(Testing the model on test data)

In [12]:

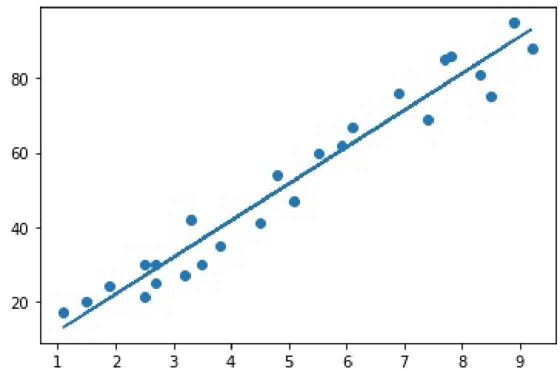
```
from sklearn.linear_model import LinearRegression
model = LinearRegression()
model.fit(X_train, Y_train)
```

Out[12]:

```
LinearRegression(copy_X=True, fit_intercept=True, n_jobs=None, normalize=False)
```

In [13]:

```
# To observe the regression line for better evaluation
ray = model.coef_*Tr+model.intercept_
plt.scatter(Tr, Te)
plt.plot(Tr, ray);
plt.show()
```



In [14]:

```
print(X_test)
pred = model.predict(X_test) # Predicted data
```

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

In [15]:

```
# Comparing predicted and actual value
df = pd.DataFrame({'Real': Y_test, 'Predicted': pred})
df
```

Out[15]:

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

In [16]:

```
# Checking the condition at 9.25 hours
hour = 9.25
hours =[[9.25]]
q_pred = model.predict(hours)
print(f"Student will gain score {q_pred[0]} if study for {hour} hours a day")
```

```
Student will gain score 93.69173248737535 if study for 9.25 hours a day
```

Evaluating The Model to know the performance

In [17]:

```
from sklearn.metrics import mean_squared_error
Tr_predictions = model.predict(X_train)
Te_predictions = model.predict(X_test)
mse = mean_squared_error(Y_train, Tr_predictions)
rmse1 = np.sqrt(mse)
mse = mean_squared_error(Y_test, Te_predictions)
rmse2 = np.sqrt(mse)

print('RMSE(Root Mean Squared Error) for train_set:',rmse1)
print('RMSE(Root Mean Squared Error) for test_set:',rmse2)
```

```
RMSE(Root Mean Squared Error) for train_set: 5.558613350226342
RMSE(Root Mean Squared Error) for test_set: 4.647447612100367
```

In [18]:

```
from sklearn import metrics
Tr_predictions = model.predict(X_train)
Te_predictions = model.predict(X_test)
print('MAE(Mean Absolute Error) for train set:',
      metrics.mean_absolute_error(Y_train, Tr_predictions))
print('MAE(Mean Absolute Error) for test set:',
      metrics.mean_absolute_error(Y_test, Te_predictions))
```

```
MAE(Mean Absolute Error) for train set: 5.186601709180371
MAE(Mean Absolute Error) for test set: 4.183859899002975
```

In [ ]:

```

```