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**Problem Statement : Predict the percentage of students based on no. of study hours.**

## We are going to use linear regression to predict the percentage of students based on no. of study hours

In [10]:

```
#importing libraries
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
%matplotlib inline
import seaborn as sns
from sklearn.model_selection import train_test_split
from sklearn.linear_model import LinearRegression
from sklearn.metrics import mean_absolute_error
```

In [2]:

```
url = "https://raw.githubusercontent.com/AdiPersonalWorks/Random/master/student_scores%2
data = pd.read_csv(url)
print("Data imported successfully")
```

```
Data imported successfully
```

In [5]:

```
data.head()
```

Out[5]:

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

In [6]:

```
data.shape
```

Out[6]:

```
(25, 2)
```

In [7]:

```
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 [8]:

```
#check if there are null values in dataset
data.isnull()
```

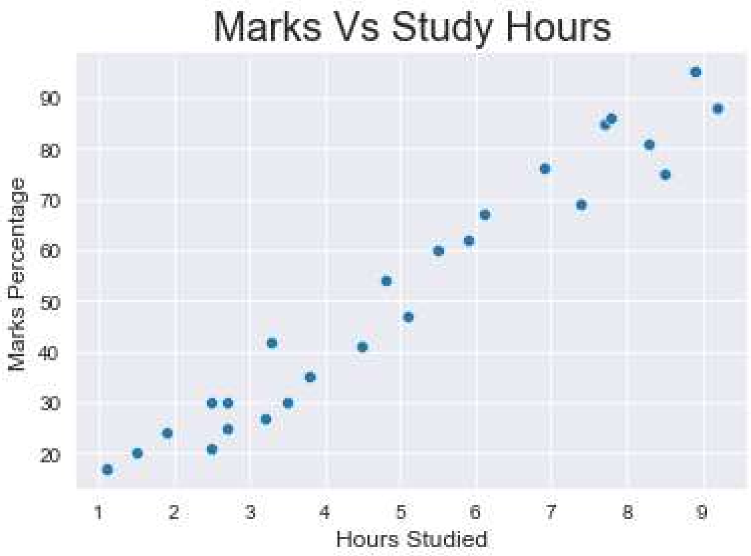
Out[8]:

| | 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 |

### No Null Values in our data so now we can visualize our data

In [13]:

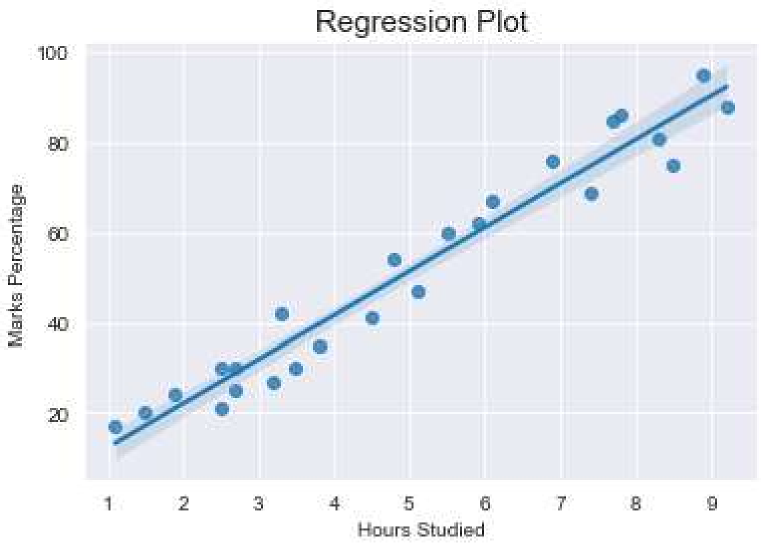
```
sns.set_style('darkgrid')
sns.scatterplot(y= data['Scores'], x= data['Hours'])
plt.title('Marks Vs Study Hours',size=20)
plt.ylabel('Marks Percentage', size=12)
plt.xlabel('Hours Studied', size=12)
plt.show()
```



***From the above scatter plot there looks to be correlation between the 'Marks Percentage' and 'Hours Studied', Lets plot a regression line to confirm the correlation.***

In [15]:

```
sns.regplot(x= data['Hours'], y= data['Scores'])
plt.title('Regression Plot',size=15)
plt.ylabel('Marks Percentage', size=10)
plt.xlabel('Hours Studied', size=10)
plt.show()
print(data.corr())
```



```
           Hours    Scores
Hours   1.000000  0.976191
Scores  0.976191  1.000000
```

It is confirmed that the variables are positively correlated.

## Training Model

### Spliting data

In [17]:

```
# Defining X and y from the Data
X = data.iloc[:, :-1].values
y = data.iloc[:, 1].values

# Spliting the Data in two
train_X, val_X, train_y, val_y = train_test_split(X, y, random_state = 0)
```

## Fitting the data into model

In [19]:

```
regression = LinearRegression()
regression.fit(train_X, train_y)
print("---------Model Trained---------")
```

```
---------Model Trained---------
```

## Predicting the percentage of marks

In [20]:

```
pred_y = regression.predict(val_X)
prediction = pd.DataFrame({'Hours': [i[0] for i in val_X], 'Predicted Marks': [k for k i
prediction
```

Out[20]:

| | Hours | Predicted Marks |
|---|---|---|
| **0** | 1.5 | 16.844722 |
| **1** | 3.2 | 33.745575 |
| **2** | 7.4 | 75.500624 |
| **3** | 2.5 | 26.786400 |
| **4** | 5.9 | 60.588106 |
| **5** | 3.8 | 39.710582 |
| **6** | 1.9 | 20.821393 |

## Comparing the Predicted Marks with the Actual Marks

```
In [21]:
```

```
compare_scores = pd.DataFrame({'Actual Marks': val_y, 'Predicted Marks': pred_y})
compare_scores
```

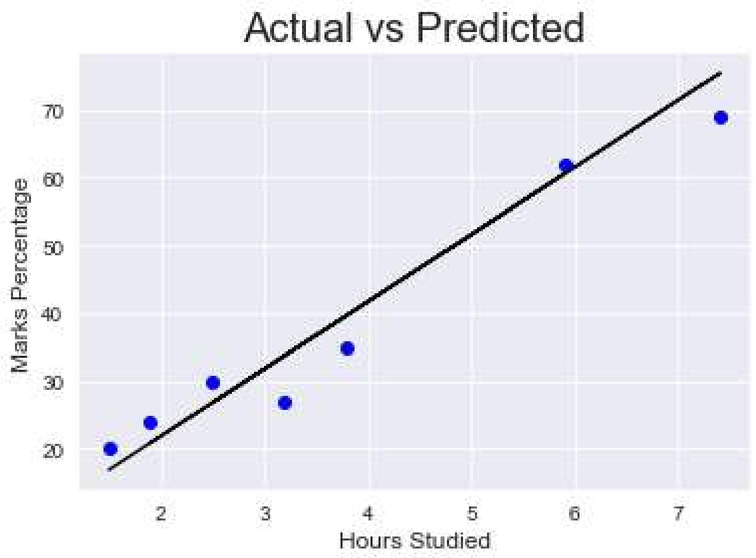
```
Out[21]:
```

| | Actual Marks | Predicted Marks |
|---|---|---|
| **0** | 20 | 16.844722 |
| **1** | 27 | 33.745575 |
| **2** | 69 | 75.500624 |
| **3** | 30 | 26.786400 |
| **4** | 62 | 60.588106 |
| **5** | 35 | 39.710582 |
| **6** | 24 | 20.821393 |

## Visually Comparing the Predicted Marks with the Actual Marks

```
In [23]:
```

```
plt.scatter(x=val_X, y=val_y, color='blue')
plt.plot(val_X, pred_y, color='Black')
plt.title('Actual vs Predicted', size=20)
plt.ylabel('Marks Percentage', size=12)
plt.xlabel('Hours Studied', size=12)
plt.show()
```



## Evaluating the Model

In [24]:

```
# Calculating the accuracy of the model
print('Mean absolute error: ',mean_absolute_error(val_y,pred_y))
```

```
Mean absolute error:  4.130879918502486
```

***Small value of Mean absolute error states that the chances of error or wrong forecasting through the model are very less.***

## What will be the predicted score of a student if he/she studies for 9.25 hrs/ day?

In [25]:

```
hours = [9.25]
answer = regression.predict([hours])
print("Score = {}".format(round(answer[0],3)))
```

```
Score = 93.893
```

## According to the regression model if a student studies for 9.25 hours a day he/she is likely to score 93.89 marks.