PREDICTION USING SUPERVISED ML

TASK 1

Predict the percentage of an student based on the no. of Study hours.

WHAT WILL BE THE PREDICTED SCORE IF STUDENT STUDIES FOR 9.25 HRS/DAY

In [2]:
```
#importing required libraries
```

In [69]:
```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
%matplotlib inline
from sklearn.model_selection import train_test_split
from sklearn.linear_model import LinearRegression
from sklearn.metrics import mean_absolute_error
from sklearn.metrics import mean_squared_error,r2_score
import seaborn as sns
from sklearn import metrics
```

In [6]:
```
#loadig file
```

In [15]:
```
url = "http://bit.ly/w-data"
df = pd.read_csv(url)
print("Data imported successfully")
```

```
Data imported successfully
```

Perform appropriate Exploratory Data Analysis to understand the data

In [14]:
```
df.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 [16]:
```
df.tail()
```

Out[16]:

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

In [17]:
```
df.isnull().sum()
```

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

In [19]:
```
df.describe(include='all').T
```

Out[19]:

	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 [22]:
```
df.shape
```

Out[22]:
```
(25, 2)
```

In [27]:
```
df.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 [29]:
```
dups = df.duplicated()
print('Number of duplicate rows = %d' % (dups.sum()))
```

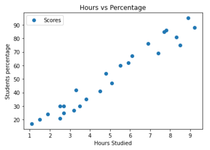
```
Number of duplicate rows = 0
```

Visualisation of data

In [34]:
```
# Plotting the distribution of scores
```

In [38]:
```

df.plot(x='Hours', y='Scores', style='o')
plt.title('Hours vs Percentage')
plt.xlabel('Hours Studied')
plt.ylabel('Students percentage')
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 PROCESSING

In [40]:
```
#Now,  we will divide data into attributes(Input) and Labels(Output) for further observations
```

In [42]:
```
x= df.iloc[:,:-1].values
y= df.iloc[:,1].values
```

Model training

In [47]:
```
#Splitting a Dataset in Train and Test. Then train the algorithm
x_train,x_test,y_train, y_test = train_test_split(x,y,test_size=0.2,
random_state=0)
regressor = LinearRegression()
regressor.fit(x_train.reshape(-1,1),y_train)
print('Traning of data is complete')
```

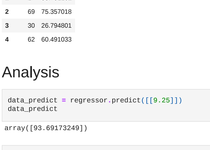
```
Traning of data is complete
```

Plotting the line Of Regression

In [78]:
```
#fitting the data
regression = LinearRegression()
regression.fit(x_train, y_train)
print("---------Model Trained---------")
```

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

In [49]:
```
line = regressor.coef_*x+regressor.intercept_
plt.scatter(x,y, color= 'green')
plt.title('Training data')
plt.plot(x, line, color= 'yellow')
plt.show()
```



Making Prediction

In [52]:
```
print(x_test)
```

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

In [66]:
```
y_predict = regressor.predict(x_test)
```

In [ ]:
```
#Comparing Actual Model with Predicted Model
```

In [73]:
```
df = pd.DataFrame({'Actual': y_test,'Predicted': y_predict})
print('Difference can be seen in Table Below')
df
```

```
Difference can be seen in Table Below
```

Out[73]:

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

Analysis

In [56]:
```
data_predict = regressor.predict([[9.25]])
data_predict
```

Out[56]:
```
array([93.69173249])
```

In [57]:
```
#Evaluating the Model
```

The final step is to evalute the performance of algorithm. This step is particularly important to compare how well different algorithms perform on a particular dataset. Here different errors have been calculated to compare model performance and predict the accuracy.

In [70]:
```
print('Mean Absolute Error', mean_absolute_error(y_test, y_predict))
print('Mean Squared Error', mean_squared_error(y_test,y_predict))
print('Root Mean Squared Error', np.sqrt(mean_squared_error(y_test,y_predict)))
print('R-2', r2_score(y_test, y_predict))
```

```
Mean Absolute Error 4.183859899002975
Mean Squared Error 21.5987693072174
Root Mean Squared Error 4.647447612100366 5
R-2 0.9454906892105356
```

In [68]:
```
from sklearn import metrics
print('Mean Absolute Error:',
      metrics.mean_absolute_error(y_test, y_predict))
```

```
Mean Absolute Error: 4.183859899002975
```

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

In [79]:
```
hours = [9.25]
answer = regression.predict([hours])
print("Score = {}".format(round(answer[0],3)))
```

```
Score = 93.692
```

In [80]:
```
#conclusion
```

We can conclude that if a student studies for 9.25 hours a day he/she is likely to score 93.89 marks.