# Data Science Project 1 : Prediction of students' score based on number of hours of study

## Topic : Supervised Machine Learning : Simple Linear Regression

## Algorithm used : Linear Regression Algorithm

### Library imports

In [33]:

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

### Reading the csv file and creating a dataframe

In [34]:

```
df = pd.read_csv("http://bit.ly/w-data")
```

In [35]:

```
df.head()
```

Out[35]:

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

### x represents Feature (Hours) and y represents Label / Target (Score)

In [36]:

```
x = df.iloc[ : , : -1].values    # 2D
y = df.iloc[ : , -1].values      # 1D
```

In [37]:

```
print("Feature = ",x)
print("Label = ",y)
```

```
Feature =  [[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]]
Label =  [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]
```

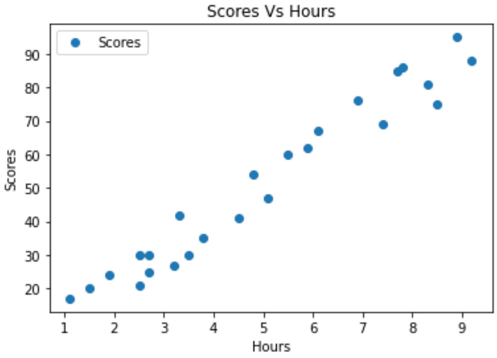
## Visualization of the given data :

## Scores Vs Hours

In [38]:

```
df.plot(x="Hours",y="Scores",style="o")
# OR plt.scatter(x,y)

plt.xlabel("Hours")
plt.ylabel("Scores")
plt.title("Scores Vs Hours")
plt.show()
```



## train_test_split : to decide the data to be considered for training and testing

In [39]:

```
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)
```

In [40]:

```
print("x_train = ",x_train)
```

```
x_train =  [[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]]
```

In [41]:

```
print("x_test = ",x_test)
```

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

In [42]:

```
print("y_train = ",y_train)
```

```
y_train =  [35 24 86 76 17 47 85 42 81 88 67 30 25 60 30 75 21 54 95 41]
```

In [43]:

```
print("y_test = ",y_test)
```

```
y_test =  [20 27 69 30 62]
```

### Model Training / Fitting : to train the model using Linear Regression algorithm

In [44]:

```
from sklearn.linear_model import LinearRegression
regressor = LinearRegression()

regressor.fit(x_train,y_train)
```

Out[44]:

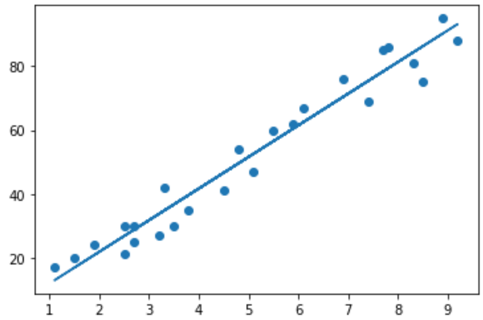
```
LinearRegression()
```

### Visualization of the best fit line given by the Linear Regression model for the given data

In [45]:

```
line = regressor.coef_ * x + regressor.intercept_

plt.scatter(x,y)
plt.plot(x,line)
plt.show()
```



### Model Testing : prediction of possible score for the given number of hours of study

In [46]:

```
y_pred = regressor.predict(x_test)
```

### Comparison between y_test and y_pred :

### to compare between the actual true score and the predicted score

In [47]:

```
comparison = pd.DataFrame({"True" : y_test , "Predicted" : y_pred})
comparison
```

### prediction of the possible score for the number of hours of study entered as an input by the user

In [48]:

```
while(True):

    try:
        hours_input = float(input("Enter the number of hours of study : "))

        if(hours_input >=0):
            no_of_hours = np.array( [ hours_input ] )
            no_of_hours = no_of_hours.reshape(-1,1)
            predicted_score = regressor.predict(no_of_hours)
            print("\nA student may obtain a score of about ", predicted_score," if he / she studies for ",hours_input, " hours")
            break

        else:
            print("Kindly enter a positive value\n")

    except:
        print("Kindly enter a positive intger\n")
```

```
Enter the number of hours of study : 3.4

A student may obtain a score of about  [35.71439208]  if he / she studies for  3.4  hours
```

## To verify the accuracy of the model by the following metrics:

### 1. R2 Score

### 2. Mean Absolute Error

### 3. Mean Squared Error

In [49]:

```
from sklearn import metrics

# 1.   R2 Score
print(metrics.r2_score(y_test,y_pred))

# 2.   Mean Absolute Error
print(metrics.mean_absolute_error(y_test,y_pred))

# 3.   Mean Squared Error
print(metrics.mean_squared_error(y_test,y_pred))
```

```
0.9454906892105354
4.183859899002982
21.598769307217456
```

# Hence, the model has an accuracy of 94.55 %