Prediction Using Supervise Machine LearningTechnique

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PROBLEM STATEMENT

In this regression task we will predict the percentage of marks that a student is expected to score based upon the number of hours they studied. This is a simple linear regression task as it involves just two variables.

In [1]:
```
# filtering out the warnings
import warnings
warnings.filterwarnings('ignore')
```

In [2]:
```
# Importing the required libraries
from sklearn.model_selection import train_test_split
from sklearn.linear_model import LinearRegression
import matplotlib.pyplot as plt
import pandas as pd
import numpy as np
```

Reading The Data For Further Analysis

In [3]:
```
# Reading data from remote link
url = r"https://raw.githubusercontent.com/AdiPersonalWorks/Random/master/student_scores%20-%20student_scores.csv"
df = pd.read_csv(url)
print("Data import successful")
```

```
Data import successful
```

Exploratory Data Analysis

In [4]:
```
# head of the data
df.head(10)
```

Out[4]:

	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

In [5]:
```
#Checking the data dimensions
df.shape
```

Out[5]:
```
(25, 2)
```

In [6]:
```
# Viewing the columns of the data
df.columns
```

Out[6]:
```
Index(['Hours', 'Scores'], dtype='object')
```

In [7]:
```
# Checking the column information
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 [8]:
```
# Checking for missing values if any
df.isnull().sum().sort_values(ascending=False)
```

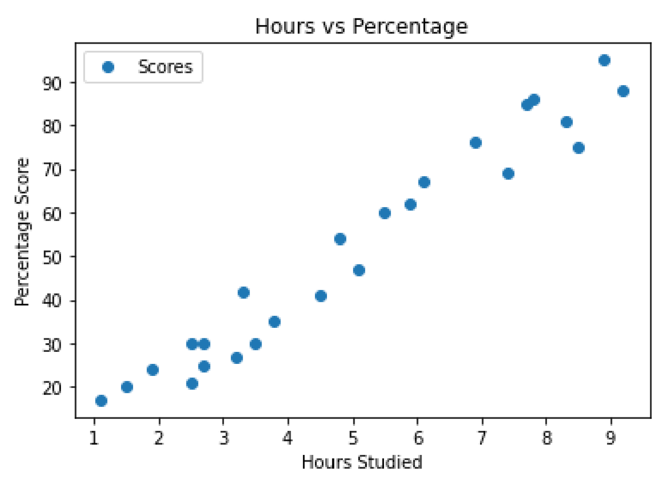
Out[8]:
```
Hours     0
Scores    0
dtype: int64
```

In [9]:
```
# Summary of all numerical data
df.describe()
```

Out[9]:

	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

In [10]:
```
# Plotting the distribution of scores
df.plot(x='Hours', y='Scores', style='o')
plt.title('Hours vs Percentage')
plt.xlabel('Hours Studied')
plt.ylabel('Percentage Score')
plt.show()
```



In [11]:
```
X = df.iloc[:, :-1].values
y = df.iloc[:, 1].values
```

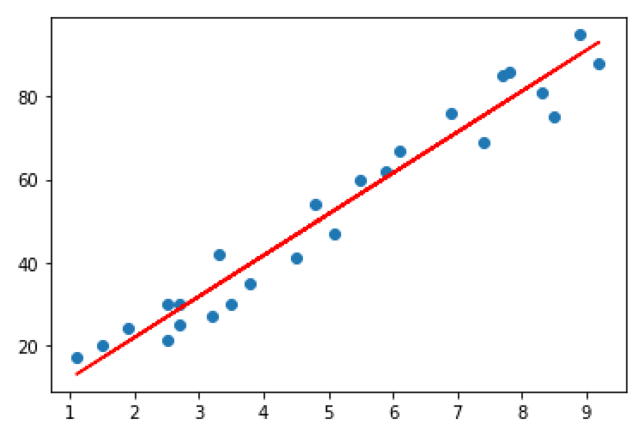
In [12]:
```
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2, random_state=0)
regressor = LinearRegression()
regressor.fit(X_train.reshape(-1,1), y_train)

print("Training complete.")
```

```
Training complete.
```

In [13]:
```
# Plotting the regression line
line = regressor.coef_*X+regressor.intercept_

# Plotting for the test data
plt.scatter(X, y)
plt.plot(X, line,color='red');
plt.show()
```



In [14]:
```
# Testing data
print(X_test)
# Model Prediction
y_pred = regressor.predict(X_test)
```

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

In [15]:
```
# Comparing Actual vs Predicted
df = pd.DataFrame({'Actual': y_test, 'Predicted': y_pred})
df
```

Out[15]:

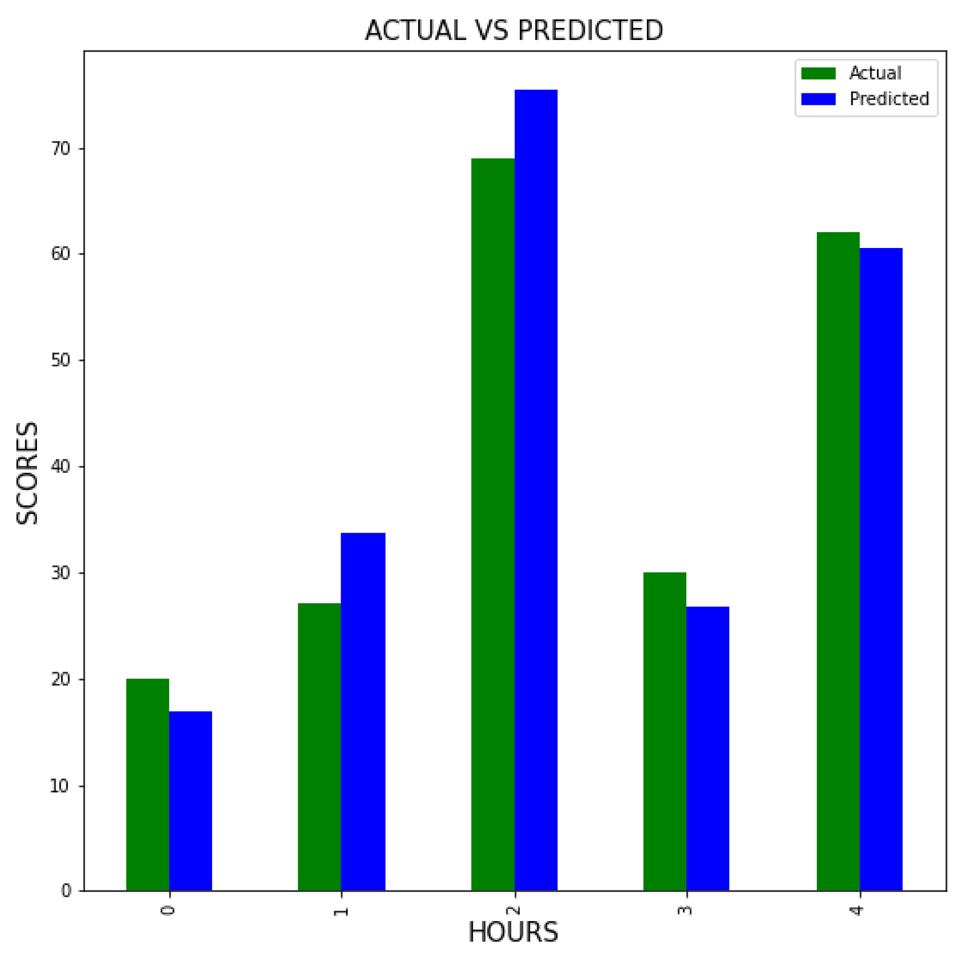
	Actual	Predicted
0	20	16.884145
1	27	33.732261
2	69	75.357018
3	30	26.794801
4	62	60.491033

In [16]:
```
#Estimating training and test score
print("Training Score:",regressor.score(X_train,y_train))
print("Test Score:",regressor.score(X_test,y_test))
```

```
Training Score: 0.9515510725211552
Test Score: 0.9454906892105355
```

In [17]:
```
# Plotting the Bar graph to depict the difference between the actual and predicted value

df.plot.bar(color=['green','blue'],figsize=(9,9))
plt.xlabel("HOURS",fontdict={'color':'black','fontsize':15})
plt.ylabel("SCORES",fontdict={'color':'black','fontsize':15})
plt.title("ACTUAL VS PREDICTED",fontdict={'color':'black','fontsize':15})
plt.show()
```



In [18]:
```
# Testing the model with our own data
hours = 9.25
test = np.array([hours])
test = test.reshape(-1, 1)
own_pred = regressor.predict(test)
print("No of Hours = {}".format(hours))
print("Predicted Score = {}".format(own_pred[0]))
```

```
No of Hours = 9.25
Predicted Score = 93.69173248737535
```

MODEL EVALUATION

Mean Absolute Error(MAE): MAE measures the differences between prediction and actual observation.

In [19]:
```
from sklearn import metrics
print('Mean Absolute Error:',metrics.mean_absolute_error(y_test, y_pred))
```

```
Mean Absolute Error: 4.183859899002975
```

MSE simply refers to the mean of the squared difference between the predicted value and the observed value.

In [20]:
```
print('Mean Squared Error:', metrics.mean_squared_error(y_test, y_pred))
```

```
Mean Squared Error: 21.598769307217406
```

R-squared is measure of how close the data are to the fitted regression line.

In [22]:
```
print('Root Mean Squared Error:', np.sqrt(metrics.mean_squared_error(y_test, y_pred)))
```

```
Root Mean Squared Error: 4.647447612100367
```

In [23]:
```
print('R-2:', metrics.r2_score(y_test, y_pred))
```

```
R-2: 0.9454906892105355
```

CONCLUSION

1.We have successfully created a Simple linear Regression model to predict score of the student given number of hours one studies.

2.By the MAE and MSE , we are not getting much difference in actual or predicted value , means error is less.

3.The Score of R-Square 0.94 quite close to 1.