The Sparks Foundation

DATA SCIENCE AND BUSINESS ANALYTICS

TASK 1: PREDICTION USING SUPERVISED ML

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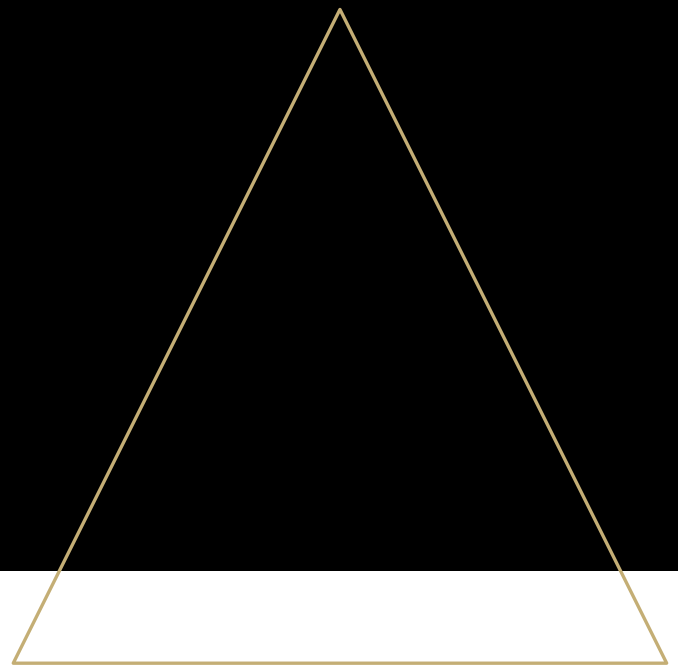
Data Science & Business Analytics Tasks

Prediction using Supervised ML

(Level – Beginner)

- Predict the percentage of an student based on the no. of study hours.
- This is a simple linear regression task as it involves just 2 variables.
- You can use R, Python, SAS Enterprise Miner or any other tool
- Data can be found at http://bit.ly/w-data
- What will be predicted score if a student studies for 9.25 hrs/ day?
- Sample Solution : https://bit.ly/2HxiGGJ
- Task submission:
  1. Host the code on GitHub Repository (public). Record the code and output in a video. Post the video on YouTube
  2. Share links of code (GitHub) and video (YouTube) as a post on **YOUR LinkedIn profile**, not TSF Network.
  3. Submit the LinkedIn link in Task Submission Form when shared.

Overview



- Define the problem
- Importing all libraries required
- Reading data
- Plotting the distribution
- Preparing the data
- Training the Algorithm
- Making Predictions
- Evaluating the model

Define the problem

- Predict the student percentage based on the number of hours of study.
- The feature is the number of hours studied and the target value is the percentage.
- Task can be solved using simple linear regression (we only have two variables).

Importing all libraries required

In [15]:
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
%matplotlib inline
```

Reading data from file

In [16]:
```
data_path = "student_scores.csv"
df = pd.read_csv(data_path)
df.head()
```

Out[16]:

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

In [17]:
```
# Shape of data
df.shape
```

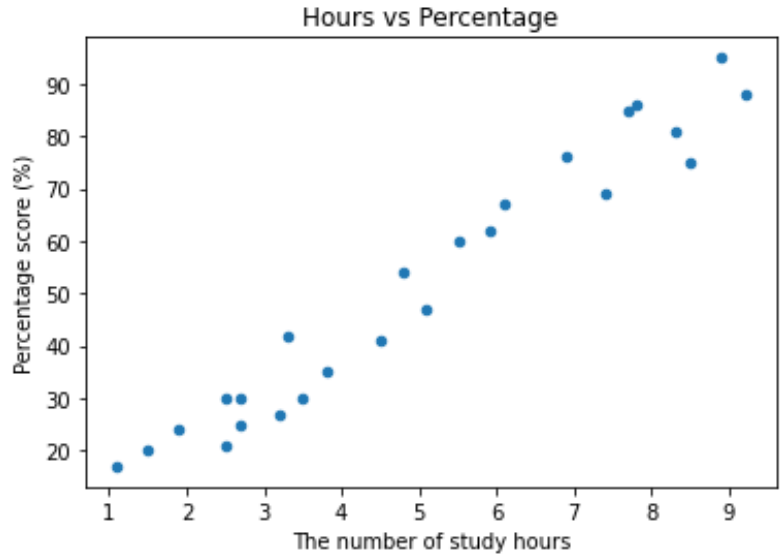
Out[17]:
```
(25, 2)
```

In [18]:
```
# Check that the data set does not contain null values
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
```

Plotting the distribution

In [19]:
```
df.plot(kind='scatter', x='Hours', y='Scores')
plt.title('Hours vs Percentage')
plt.xlabel('The number of study hours')
plt.ylabel('Percentage score (%)')
plt.show()
```



From the above graph, we can clearly see that there is a positive direct relationship between the number of hours studied and the Percentage score.

Preparing the data

In [20]:
```
# divide the data into "attributes" (inputs) and "labels" (outputs).

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

The next step is to divide this data into training and test sets once we have our attributes and labels. Scikit-built-in Learn's train test split() method will be used to accomplish this:

In [21]:
```
# Spliting the data to train & test

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=42)
```

Training the Algorithm

In [22]:
```
# Create a model and fit it

from sklearn.linear_model import LinearRegression
model_Regression = LinearRegression()
model_Regression.fit(X_train,y_train)
```

Out[22]:
```
LinearRegression()
```

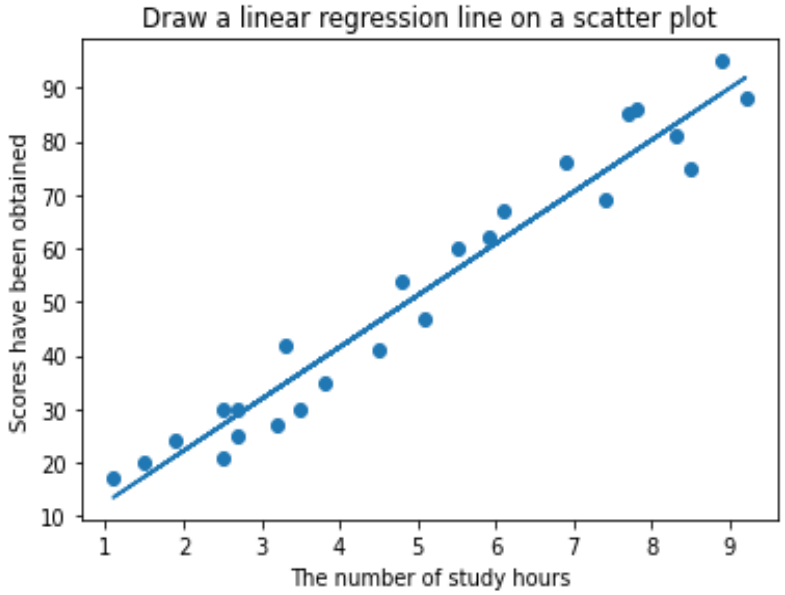
In [23]:
```
# intercept_ represents the coefficient b₀
b0 = model_Regression.intercept_
# coef_ represents b₁
b1 = model_Regression.coef_
print('slope:', b1)
```

```
slope: [9.68207815]
```

If a student studies one hour more than he studied on the test previously, he can expect to achieve a 9.68% increase in the grade previously achieved by the student.

In [24]:
```
# Plotting the regression line
regression_line = b0 + b1*X

# Plotting for the test data
plt.scatter(X, y)
plt.plot(X, regression_line);
plt.title('Draw a linear regression line on a scatter plot')
plt.xlabel("The number of study hours")
plt.ylabel("Scores have been obtained")
plt.show()
```



Making Predictions

In [25]:
```
# Testing data - In Hours
print(X_test)

# Predicting the scores
y_pred = model_Regression.predict(X_test)
```

```
[[8.3]
 [2.5]
 [2.5]
 [6.9]
 [5.9]]
```

In [26]:
```
# Comparing Actual vs Predicted
df = pd.DataFrame({'Actual_value':y_test,'Predicted_value':y_pred})
df
```

Out[26]:

	Actual_value	Predicted_value
0	81	83.188141
1	30	27.032088
2	21	27.032088
3	76	69.633232
4	62	59.951153

In [27]:
```
# est with your own data
hours = [[9.25]]
own_pred = model_Regression.predict(hours)
print("No of Hours = {}".format(hours))
print("Predicted Score = {}".format(own_pred[0]))
```

```
No of Hours = [[9.25]]
Predicted Score = 92.38611528261494
```

Evaluating the model

Evaluation of the algorithm's performance is the final phase. This stage is crucial for evaluating how well various algorithms perform on a certain collection of data. Here, we picked the mean squared error for simplicity. Such measures are numerous.

In [28]:
```
from sklearn import metrics

# The mean of the absolute value of the errors.
print('Mean Absolute Error:', metrics.mean_absolute_error(y_test, y_pred))
```

```
Mean Absolute Error: 3.9207511902099244
```

Thank You

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