GRIP - THE SPARK FOUNDATION

DATA SCIENCE AND BUISNESS ANALYTICS INTERNSHIP

Linear Regression with Python Scikit Learn - Prediction using Supervised ML

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Task-1: Predict the percentage of an student based on the no. of study hours

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

Import the required Libraries

In [115]:

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

from sklearn.linear_model import LinearRegression
from sklearn.model_selection import train_test_split
%matplotlib inline
```

Reading The Data from data source

In [116]:

```
student = pd.read_csv("study_spark.csv")
```

data Imported sucessfully

In [117]:

```
student.head()
```

Out[117]:

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

In [118]:

In [118]:

```
student.tail()
```

Out[118]:

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

In [119]:

```
student.describe()
```

Out[119]:

	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 [120]:

```
student.shape
```

Out[120]:

```
(25, 2)
```

In [121]:

```
student.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
```

checking the missing values

In [122]:

```
student.isnull().sum()
```

Out[122]:

```
Hours     0
Scores    0
dtype: int64
```

Checking the correlation between hours and study

In [123]:

```
student.corr()
```

Out[123]:

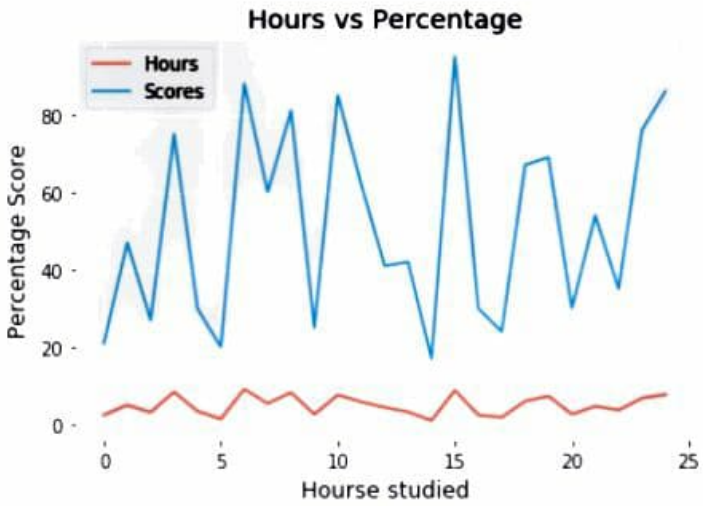
	Hours	Scores
Hours	1.000000	0.976191
Scores	0.976191	1.000000

Data Visualization

Visualization with line plot

In [124]:

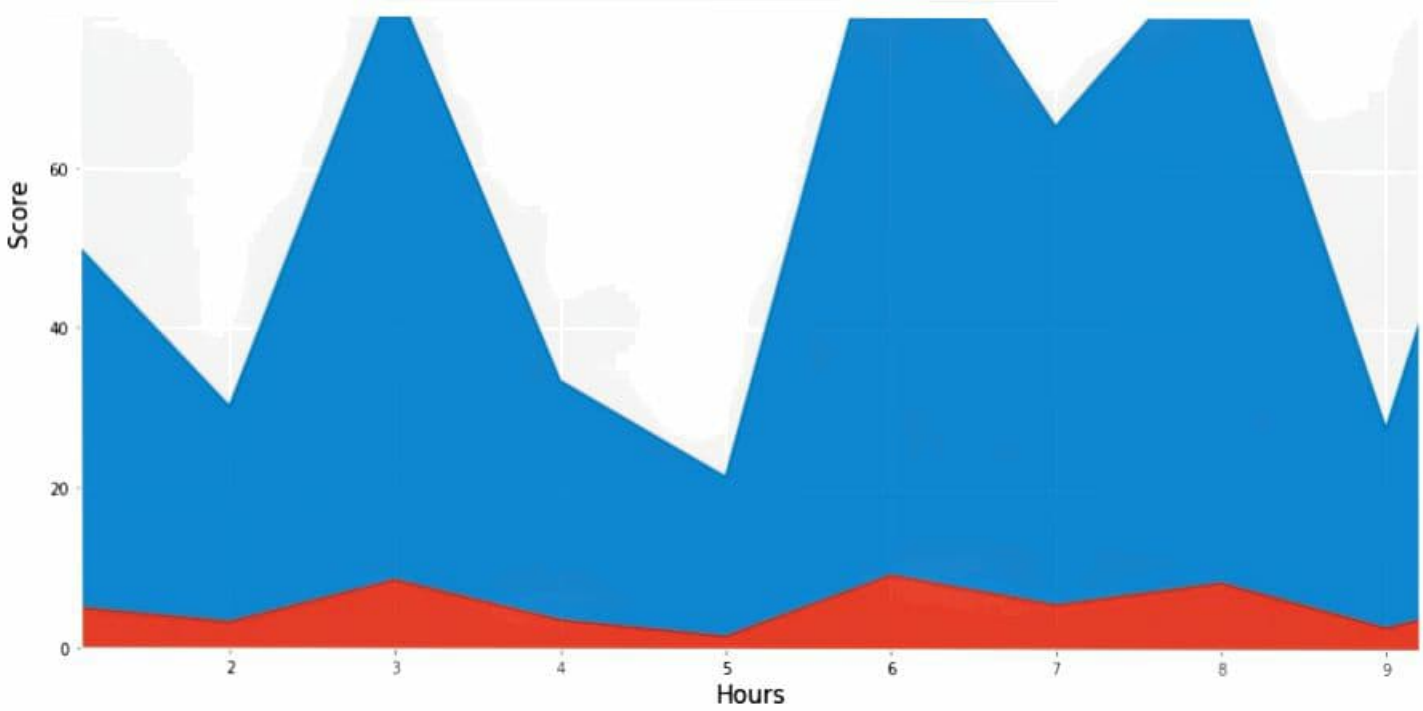
```
plt.style.use('ggplot')
student.plot(kind='line')
plt.title('Hours vs Percentage')
plt.xlabel('Hourse studied')
plt.ylabel('Percentage Score')
plt.show()
```



Data Visualisation with area plot

In [125]:

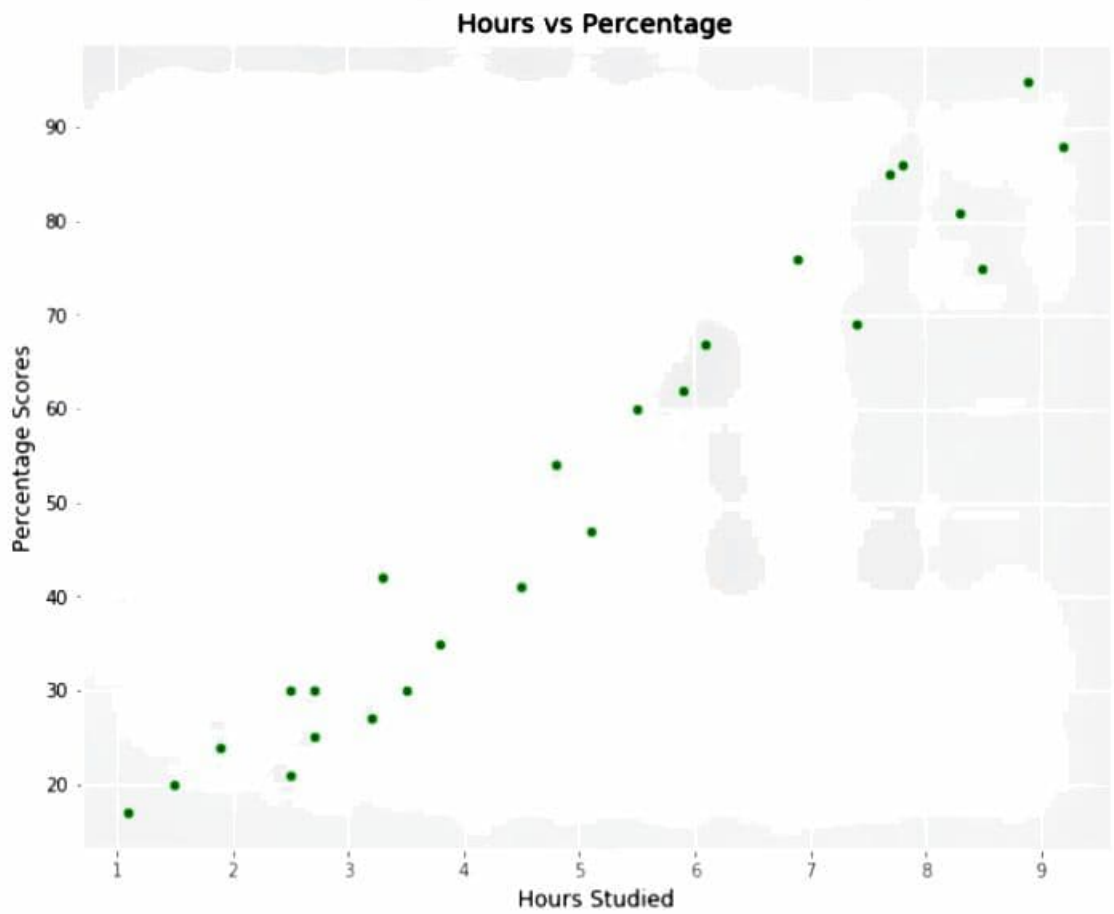
```
xmin = min(student.Hours)
xmax = max(student.Hours)
student.plot(kind='area',alpha=0.8,stacked=True,figsize=(15,10),xlim=(xmin,xmax))
plt.title('Hours vs Score',size=15)
plt.xlabel('Hours',size=15)
plt.ylabel('Score',size=15)
plt.show()
```



Data visualizing with scatter plot

In [126]:

```
student.plot(kind='scatter',x='Hours',y='Scores',color='g',figsize=(10,8))
plt.title('Hours vs Percentage')
plt.xlabel('Hours Studied')
plt.ylabel('Percentage Scores')
plt.show()
```



By Visulization we come to know that this problem can be easily solved by linear regression

Modeling the data

In [127]:

```
x = np.asanyarray(student[['Hours']])
y = np.asanyarray(student[['Scores']])

# Using train test split to split the data in train and test Data
train_x,test_x,train_y,test_y=train_test_split(x,y,test_size=0.2,random_state=2)
regressor = LinearRegression()
regressor.fit(train_x,train_y)

print("Training Complete\n")
print('coehhicient: ', regressor.coef_)
print('Intercept: ',regressor.intercept_)
```

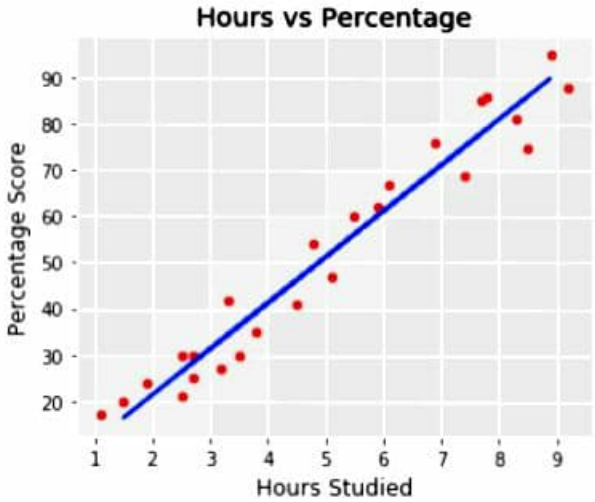
```
Training Complete

coehhicient:  [[9.94061514]]
Intercept:  [1.50791048]
```

we can also plot the fit line over the data in single linear regression

In [128]:

```
student.plot(kind='scatter',x='Hours',y='Scores',figsize=(5,4),color='r')
plt.plot(train_x, regressor.coef_[0]*train_x + regressor.intercept_,color='b')
plt.title('Hours vs Percentage')
plt.xlabel('Hours Studied')
plt.ylabel('Percentage Score')
plt.show()
```



The blue line is the best fit line for this data

Evaluation of model

In [129]:

```
# Using metrics to find mean obsolute error and r2 to see the accuracy

from sklearn import metrics
from sklearn.metrics import r2_score

y_pred=regressor.predict(test_x)
print('Mean Absolute Error : {}'.format(metrics.mean_absolute_error(y_pred,test_y)))
print("R2-score: %.2f" % r2_score(y_pred, test_y))
```

```
Mean Absolute Error : 4.877039354964476
R2-score: 0.98
```

Mean absolute Error: it is mean of absolute value of error r2-score: it is not the error but its the metric for accuracy for the model. Higher the r2 value higher is the accuracy of model. Best score is 1

In [130]:

```
# Comparing Actual vs predicted
#student2 = pd.DataFrame({'Actual': test_y, 'Predicted': y_pred})
#student2
```

Predicting the score with the single input value

In [131]:

```
hours = 9.25
predicted_score = regressor.predict([[hours]])
print(f'No. of hours = {hours}')
print(f'predicted Score  = {predicted_score[0]}')
```

```
No. of hours = 9.25
predicted Score  = [93.45860056]
```

In [ ]: