ScorePredictionUsingRegression

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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.

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4 Setting Up

4.1 1.2 Loading Libraries

[1]:

```
# Data Analysis
import pandas as pd

# Visualization
import seaborn as sns
import matplotlib.pyplot as plt
import plotly.express as px
%matplotlib inline

# Machine Learning
from sklearn.linear_model import LinearRegression
from sklearn.model_selection import train_test_split
from sklearn.metrics import r2_score
from sklearn.metrics import mean_absolute_error
from sklearn.metrics import mean_squared_error
```

4.2 1.3 Loading Data

[2]:

```
raw_url = "https://raw.githubusercontent.com/AdiPersonalWorks/Random/master/
  ↪student_scores%20-%20student_scores.csv"
df = pd.read_csv(raw_url)
df
```

[2]:

```
    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
10    7.7      85
11    5.9      62
12    4.5      41
13    3.3      42
14    1.1      17
15    8.9      95
16    2.5      30
17    1.9      24
18    6.1      67
19    7.4      69
20    2.7      30
21    4.8      54
22    3.8      35
23    6.9      76
24    7.8      86
```

5 2. Exploratory Data Analysis(EDA)

5.1 2.1 Univariate Analysis

As we only have Continous varibles in our Data.

In Univariate Analysis we need to understand **Central Tendency** and **Spread of Data/Measure of Dispersion**, for visualization we can use **Histogram Plot** and **Box Plot**.

To measure Central Tendency and Dispersion we have serval method some are Mean, Median, Mode and Range, IQR(Inter Quartile Range), Standard Deviation, Varience etc.

[3]:
```
print(f'Size of the data is: {df.shape}')
```

```
Size of the data is: (25, 2)
```

[4]:
```
print(f'Type and distribution of Data is: ')
df.info()
```

```
Type and distribution of Data is:
<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
```

[5]:
```
# Null values
print(f' Sum of Null values in Data:')
df.isnull().sum()
```

```
 Sum of Null values in Data:
```

[5]:
```
Hours     0
Scores    0
dtype: int64
```

[6]:
```
# mean, median and mode of Scores
print('Mean',' '*5,df['Scores'].mean())
print('Meidan',' '*5,df['Scores'].median())
print('Mode',' '*5,df['Scores'].mode())
```

```
Mean       51.48
Meidan       47.0
Mode       0    30
dtype: int64
```

[7]:
```
# Standard deviation of marks
print('Standard deviation ',df['Scores'].std())
```

```
Standard deviation  25.28688724747802
```

[8]:
```
print(f'Descriptive analysis for measuring Central Tendency data is: ')
df.describe()
```

```
Descriptive analysis for measuring Central Tendency data is:
```

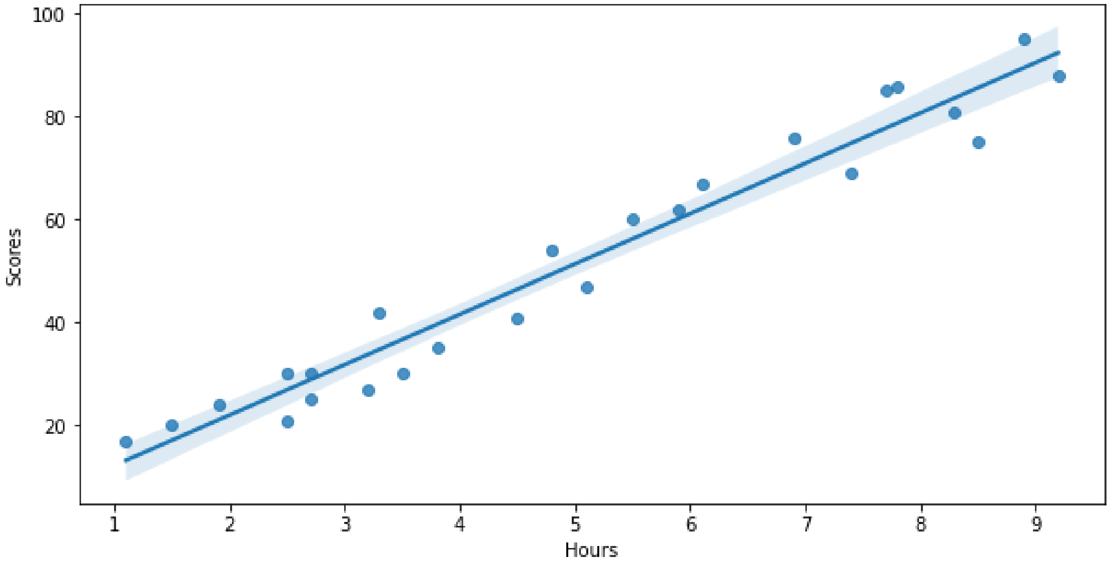
[8]:

```
           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
```

5.2 2.2 Visualizing the Data

[9]:

```
# Relationship between scores and time for outliers
plt.figure(figsize=[10,5])
sns.regplot(x=df['Hours'],y=df['Scores'])
plt.show()
```

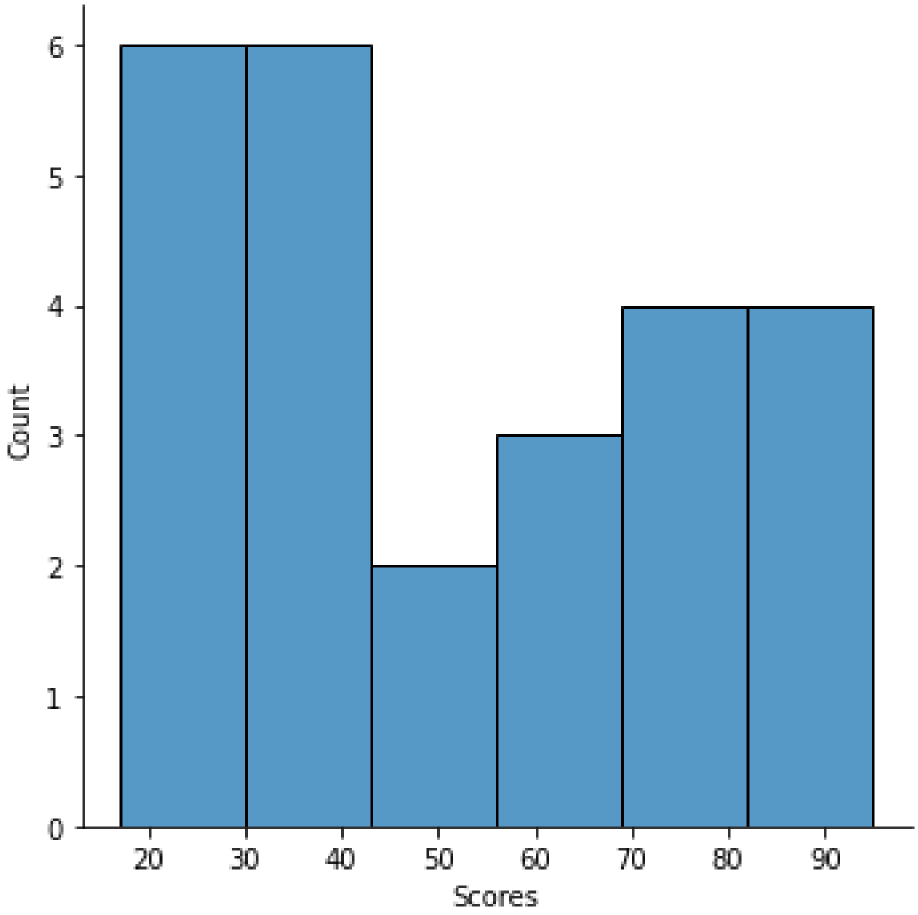


[10]:

```
# Distribution of Scores
sns.displot(df['Scores'])
```

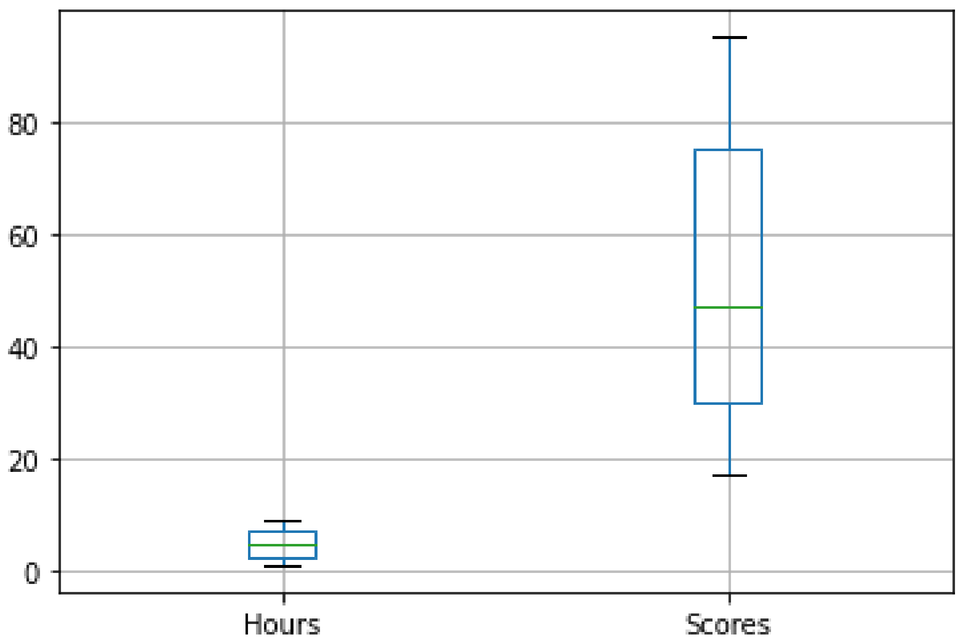
[10]:

```
<seaborn.axisgrid.FacetGrid at 0x7f4410e10df0>
```



[11]:
```
# boxplot fo routliers
df.boxplot()
```

[11]:
```
<AxesSubplot:>
```



6 Model development and Evaluation

6.1 3.1 Train-Test Split

[12]:
```
X = df.iloc[:,:-1]
y = df.iloc[:,-1]
```

[13]:
```
# Spliting the data for training and testing
X_train,X_test,y_train,y_test = train_test_split(X,y,test_size=0.
 ↪25,random_state=0)
```

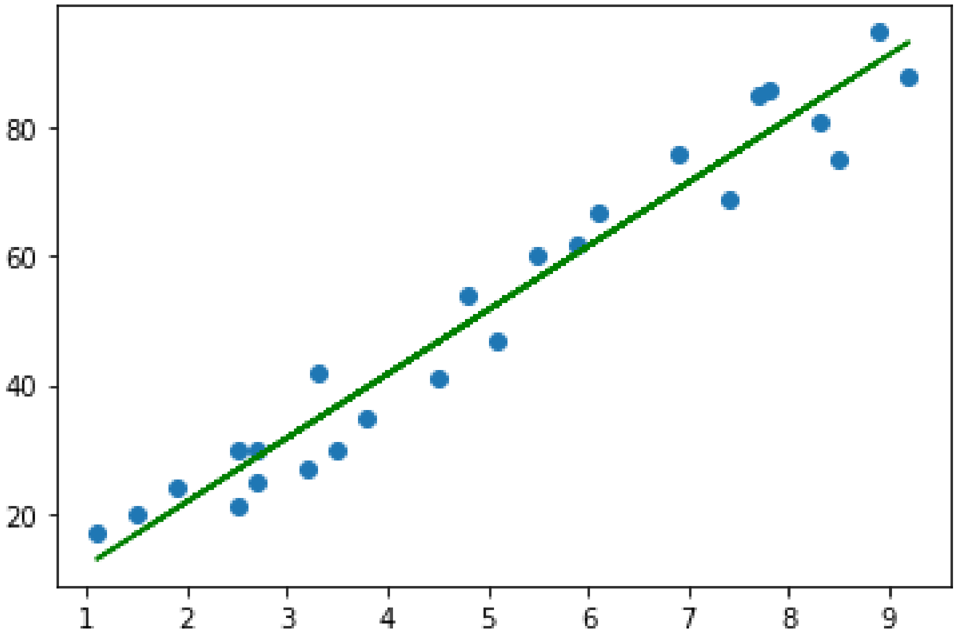
6.2 3.2 Linear Regression

[14]:
```
# Training the model
reg = LinearRegression()
model = reg.fit(X_train,y_train)
```

[15]:
```
# plot of Training
intercept = model.intercept_
coef = model.coef_

reg_line = intercept+coef*X

plt.scatter(X,y,)
plt.plot(X,reg_line,color='g')
plt.show()
```



6.3 Prediction and Submission

[16]:
```
# Predicting output
y_pred = model.predict(X_test)
```

6.4 Evaluating and submition

[17]:
```
# Error in prediction
print(f'Mean Absolute Error: ',mean_absolute_error(y_test,y_pred))
print(f'r^2 Coefficent of Determination (Best 1): ',r2_score(y_test,y_pred))
print(f'Root Mean Square: ',mean_squared_error(y_test,y_pred))
```

```
Mean Absolute Error:  4.130879918502482
r^2 Coefficent of Determination (Best 1):  0.9367661043365056
Root Mean Square:  20.33292367497996
```

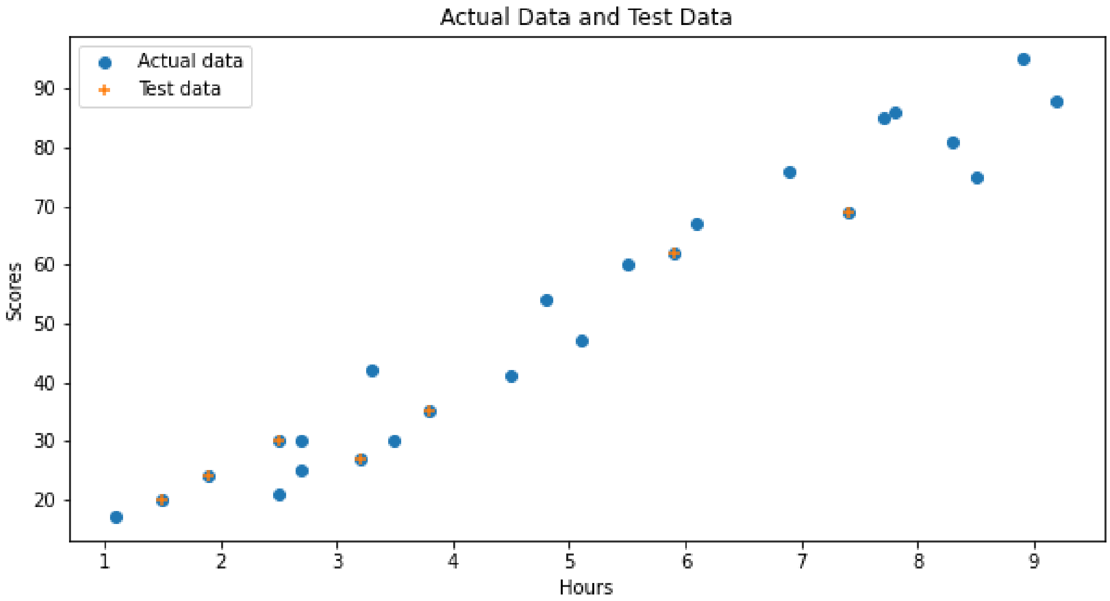
[18]:
```
result_df = pd.DataFrame({'Actual':y_test,'Predicted':y_pred})
result_df
```

[18]:
```
    Actual  Predicted
5       20  16.844722
2       27  33.745575
19      69  75.500624
16      30  26.786400
```

```
11      62  60.588106
22      35  39.710582
17      24  20.821393
```

[19]:

```
plt.figure(figsize=(10,5))
plt.scatter(X,y,label='Actual data')
plt.scatter(X_test,y_test,label='Test data',marker='+')
plt.xlabel("Hours")
plt.ylabel("Scores")
plt.title("Actual Data and Test Data")
plt.legend()
plt.show()
```


Actual Data and Test Data
● Actual data
+ Test data
Scores
Hours