Name - Ranjana kumari

Task 1 - Linear Regression using python scikit learn

In this section we will see how to implement linear regression using python scikit learn to 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

```
In [ ]:  # Importing all libraries required in this notebook
         import pandas as pd
         import numpy as np
         import matplotlib.pyplot as plt
         %matplotlib inline
```

```
In [2]:  # Reading data from remote link
         url = "http://bit.ly/w-data"
         study_data = pd.read_csv(url)
         print("Data imported successfully")
         #displaying the first 10 data
         study_data.head(10)

         Data imported successfully
```

Out[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

```
In [3]:  # shape of the dataset
         study_data.shape

Out[3]:  (25, 2)
```

```
In [4]:  # datatypes of each attribute
         study_data.dtypes

Out[4]:  Hours      float64
         Scores       int64
         dtype: object
```

```
In [5]:  # check for null values
         study_data.isnull().any()

Out[5]:  Hours     False
         Scores    False
         dtype: bool
```

```
In [6]:  #summary statistics of the data
         study_data.describe()
```

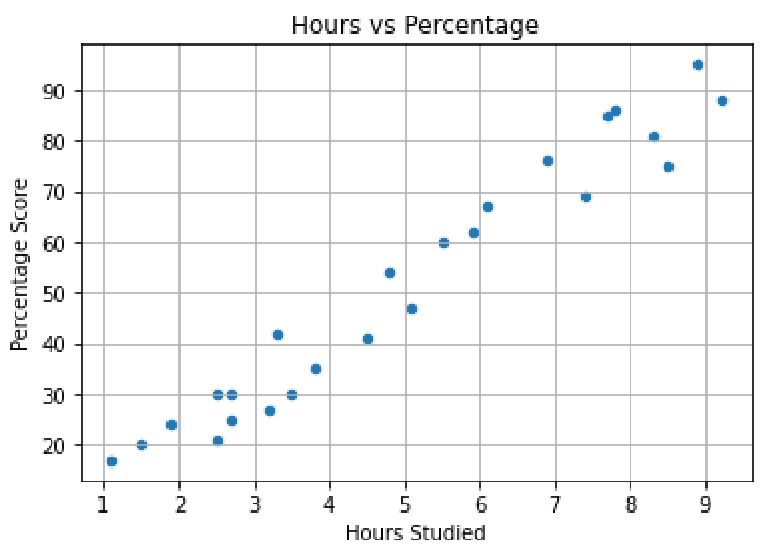
Out[6]:

	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

Data Visualization

Plotting a 2D graph on the data points from our dataset using scatter plot to see the distribution of scores and look for any

```
In [7]:  # Plots the distribution of scores
         study_data.plot(x='Hours', y='Scores', kind='scatter', grid=True)
         plt.title('Hours vs Percentage')
         plt.xlabel('Hours Studied')
         plt.ylabel('Percentage Score')
         plt.show()
```



From the graph above, we can clearly see that there is a positive linear relation between the number of hours studied and percentage of score.

Preparing the data

Dividing the data into inputs (all the attributes except the attribute which needs to be predicted) and output (the attribute which

```
In [8]:  # Inputs
         X = study_data.iloc[:,:-1].values
         # Output
         Y = study_data.iloc[:,-1].values
```

Splitting the data

Data is split using train test split from Scikit Learn model_selection module.

```
In [9]:  from sklearn.model_selection import train_test_split
```

```
In [10]: # Splits data by 80-20 i.e, 80 % of data for training and 20 % of data for testing
         X_train, X_test, Y_train, Y_test = train_test_split(X, Y, test_size=0.20, random_state=0)
```

Training the Algorithm

We are using Linear Regression model algorithm for our problem from Scikit Learn's linear_model module library.

```
In [11]: from sklearn.linear_model import LinearRegression
```

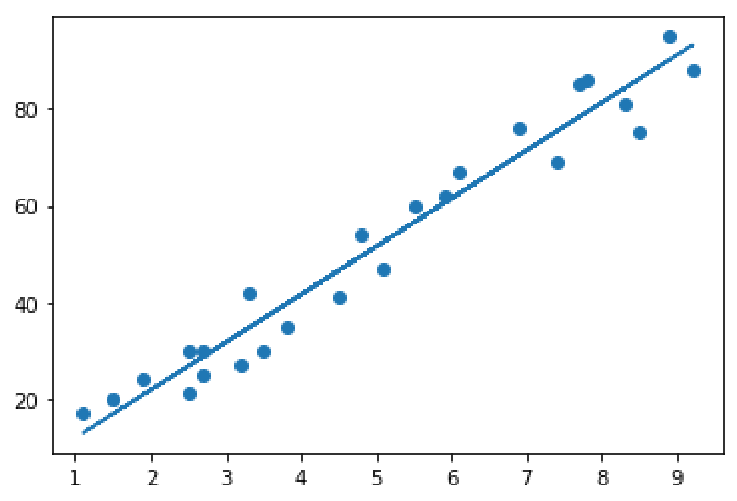
```
In [12]: # Instantiating the model
         regressor = LinearRegression()
         # Fitting the data for training
         regressor.fit(X_train, Y_train)

         print('Training done.')

         Training done.
```

```
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);
         plt.show()
```



Making Predictions

After training the model, its time to predict the output values using the input test data.

```
In [14]: # Predicting the scores
         Y_pred = regressor.predict(X_test)
```

```
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]: # You can also test with your own data
         hours = 9.25
         own_pred = regressor.predict([[hours]])
         print(f"No of Hours = {hours}")
         print(f"Predicted Score = {own_pred[0]}")

         No of Hours = 9.25
         Predicted Score = 93.69173248737538
```

Evaluating the model

The last step is to evaluate the performance and efficiency of the algorithm. This step becomes useful to compare it with different algorithms working on the same dataset to see which algorithm performs the best. Here, we have chosen the mean

```
In [17]: from sklearn.metrics import mean_absolute_error
```

```
In [18]: print('Mean Absolute Error: ',mean_absolute_error(Y_test, Y_pred))

         Mean Absolute Error:  4.183859899002975
```

```
In [ ]:
```