Data Science and Business Analytics (GRIP JUNE22)

Task 1 : Prediction using supervised ML

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Problem statement

What will be predicted score if a student studies for 9.25 hrs/ day?

Importing necessary libraries

In [1]:
```
import pandas as pd
import matplotlib.pyplot as plt
import numpy as np

%matplotlib inline
```

In [2]:
```
url="http://bit.ly/w-data"
data=pd.read_csv(url)
print('Data successfully loaded')
```

```
Data successfully loaded
```

In [3]:
```
data.head(10)
```

Out[3]:

	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 [4]:
```
data.describe()
```

Out[4]:

	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

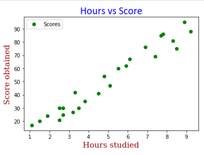
In [5]:
```
data.shape
```

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

In [6]:
```
data.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 [7]:
```
font1 = {'family':'Calibri','color':'blue','size':20}
font2 = {'family':'serif','color':'darkred','size':15}
data.plot(x='Hours',y='Scores',style='o',c='green')
plt.title('Hours vs Score',fontdict=font1)
plt.xlabel('Hours studied',fontdict=font2)
plt.ylabel('Score obtained',fontdict=font2)
plt.show()
```



In [8]:
```
data.corr()
```

Out[8]:

	Hours	Scores
Hours	1.000000	0.976191
Scores	0.976191	1.000000

In [9]:
```
data.isnull().sum()
```

Out[9]:
```
Hours     0
Scores    0
dtype: int64
```

In [10]:
```
x=(data['Hours'].values).reshape(-1,1)
y=data['Scores'].values
```

In [11]:
```
x
```

Out[11]:
```
array([[2.5],
       [5.1],
       [3.2],
       [8.5],
       [3.5],
       [1.5],
       [9.2],
       [5.5],
       [8.3],
       [2.7],
       [7.7],
       [5.9],
       [4.5],
       [3.3],
       [1.1],
       [8.9],
       [2.5],
       [1.9],
       [6.1],
       [7.4],
       [2.7],
       [4.8],
       [3.8],
       [6.9],
       [7.8]])
```

In [12]:
```
y
```

Out[12]:
```
array([21, 47, 27, 75, 30, 20, 88, 60, 81, 25, 85, 62, 41, 42, 17, 95, 30,
       24, 67, 69, 30, 54, 35, 76, 86], dtype=int64)
```

In [13]:
```
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=0)
print('splitting is done')
```

```
splitting is done
```

In [14]:
```
from sklearn.linear_model import LinearRegression
regn = LinearRegression()
regn.fit(x_train,y_train)
print('Training is done')
```

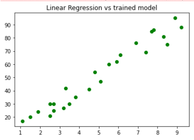
```
Training is done
```

In [15]:
```
print('Intercept value is:',regn.intercept_)
print('Linear coefficient is:',regn.coef_)
```

```
Intercept value is: 2.018160041434683
Linear coefficient is: [9.91065648]
```

In [17]:
```
#Plotting the regression line
line = regn.coef_*x+regn.intercept_

#Plotting for the test data
plt.scatter(x, y,c='green')
plt.title('Linear Regression vs trained model',fontdict=font1)
plt.xlabel('Hours studied',fontdict=font2)
plt.ylabel('Score obtained',fontdict=font2)
plt.plot(x, line);
plt.show()
```

```
---------------------------------------------------------------------------
AttributeError                            Traceback (most recent call last)
Input In [17], in <cell line: 6>()
      4 #Plotting for the test data
      5 plt.scatter(x, y,c='green')
----> 6 plt.title('Linear Regression vs trained model',fontdict=font1)
      7 plt.xlabel('Hours studied',fontdict=font2)
      8 plt.ylabel('Score obtained',fontdict=font2)

File D:\anaconda\lib\site-packages\matplotlib\pyplot.py:3026, in title(label, fontdict, loc, pad, y, **kwargs)
   3024 @_copy_docstring_and_deprecators(Axes.set_title)
   3025 def title(label, fontdict=None, loc=None, pad=None, *, y=None, **kwargs):
-> 3026     return gca().set_title(
   3027         label, fontdict=fontdict, loc=loc, pad=pad, y=y, **kwargs)

File D:\anaconda\lib\site-packages\matplotlib\axes\_axes.py:169, in Axes.set_title(self, label, fontdict, loc, pad, y, **kwargs)
    167 if fontdict is not None:
    168     title.update(fontdict)
--> 169 title.update(kwargs)
    170 return title

File D:\anaconda\lib\site-packages\matplotlib\text.py:172, in Text.update(self, kwargs)
    170 # Update bbox last, as it depends on font properties.
    171 bbox = kwargs.pop("bbox", sentinel)
--> 172 super().update(kwargs)
    173 if bbox is not sentinel:
    174     self.set_bbox(bbox)

File D:\anaconda\lib\site-packages\matplotlib\artist.py:1064, in Artist.update(self, props)
   1062             func = getattr(self, f"set_{k}", None)
   1063             if not callable(func):
-> 1064                 raise AttributeError(f"{type(self).__name__!r} object "
   1065                                      f"has no property {k!r}")
   1066             ret.append(func(v))
   1067 if ret:

AttributeError: 'Text' object has no property 'fontdict'
```



In [18]:
```
#to predict scores of testing data
y_pred = regn.predict(x_test)
```

In [19]:
```
y_pred
```

Out[19]:
```
array([16.884144476, 33.73226078, 75.357018  , 26.79480124, 60.49103328])
```

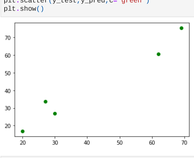
In [20]:
```
df= pd.DataFrame({'Actual': y_test, 'Predicted': y_pred})
```

In [21]:
```
df
```

Out[21]:

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

In [22]:
```
plt.scatter(y_test,y_pred,c='green')
plt.show()
```



In [23]:
```
hours=9.25
pred_score=regn.predict([[hours]])
print("Number of hours = {}".format(hours))
print("Predicted Score = {}".format(pred_score[0]))
```

```
Number of hours = 9.25
Predicted Score = 93.69173248737538
```

In [24]:
```
from sklearn import metrics
print ('Mean Absolute Error:',
      metrics.mean_absolute_error(y_test, y_pred))
```

```
Mean Absolute Error: 4.183859899002975
```

In [ ]:
```

```