EXPERIMENT 2

Name-SANSKAR AGRAWAL **UID- 20BCS5914**
Branch- CSE **Section/Group- 806 B**
Semester- 5th **Date of Performance-28/08/2022**
Subject Name_ Machine Learning Lab
Subject Code- 20CSP-317

AIM - Data Visualization

OBJECTIVE – To analyze the data for certain trends, patterns may become difficult if the data is in its raw format. To overcome this data visualization comes into play. Data visualization provides a good, organized pictorial representation of the data which makes it easier to understand, observe, analyze.

Steps Involved-

Python provides various libraries that come with different features for visualizing data.

All these libraries come with different features and can support various types of graphs. The four main libraries are: Matplotlib, Seaborn, Bokeh, Plotly

S/W Requirement: - VS Code or Jupyter Notebook

INPUT AND OUTPUT –

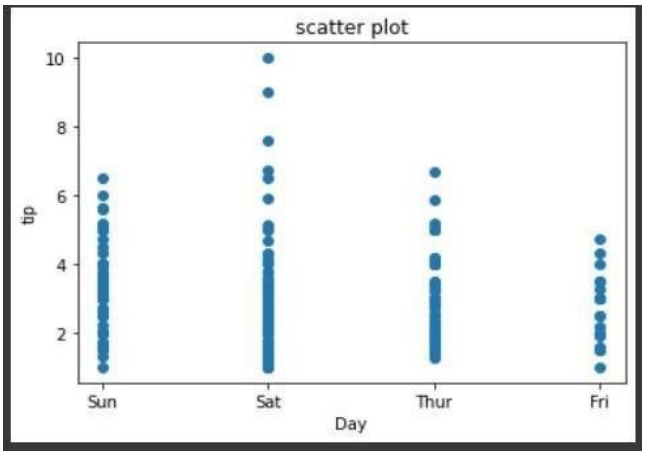
```
import pandas as pd
data=pd.read_csv("/content/tips.csv")
data.head(10)
```

	total_bill	tip	sex	smoker	day	time	size	price_per_person	Payer Name	CC Number	Payment ID
0	16.99	1.01	Female	No	Sun	Dinner	2	8.49	Christy Cunningham	3560325168603410	Sun2959
1	10.34	1.66	Male	No	Sun	Dinner	3	3.45	Douglas Tucker	4478071379779230	Sun4608
2	21.01	3.50	Male	No	Sun	Dinner	3	7.00	Travis Walters	6011812112971322	Sun4458
3	23.68	3.31	Male	No	Sun	Dinner	2	11.84	Nathaniel Harris	4676137647685994	Sun5260
4	24.59	3.61	Female	No	Sun	Dinner	4	6.15	Tonya Carter	4832732618637221	Sun2251
5	25.29	4.71	Male	No	Sun	Dinner	4	6.32	Erik Smith	213140353657882	Sun9679
6	8.77	2.00	Male	No	Sun	Dinner	2	4.38	Kristopher Johnson	2223727524230344	Sun5985
7	26.88	3.12	Male	No	Sun	Dinner	4	6.72	Robert Buck	3514785077705092	Sun8157
8	15.04	1.96	Male	No	Sun	Dinner	2	7.52	Joseph Mcdonald	3522866365840377	Sun6820
9	14.78	3.23	Male	No	Sun	Dinner	2	7.39	Jerome Abbott	3532124519049786	Sun3775

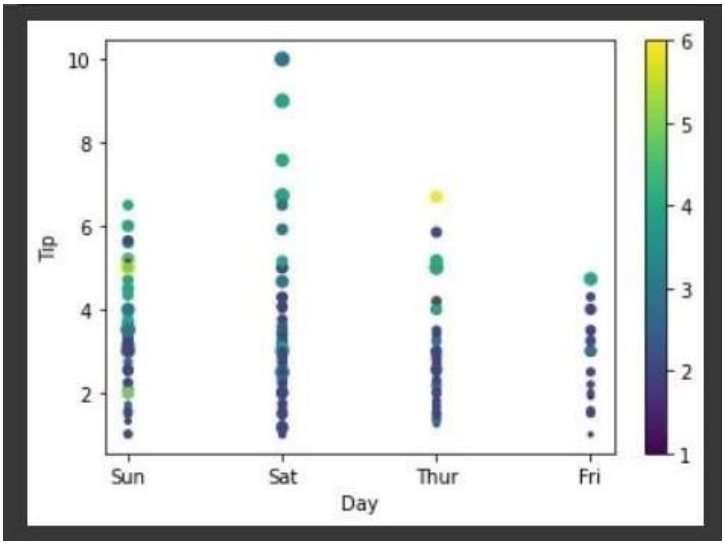
Scatter Plot :-

Scatter plots are used to observe relationships between variables and uses dots to represent the relationship between them. The scatter() method in the matplotlib library is used to draw a scatter plot.

```
pip install matplotlib
import matplotlib.pyplot as plt
plt.scatter(data['day'], data['tip'])
plt.title('scatterplot')
plt.xlabel('Day')
plt.ylabel('tip') plt.show()
```



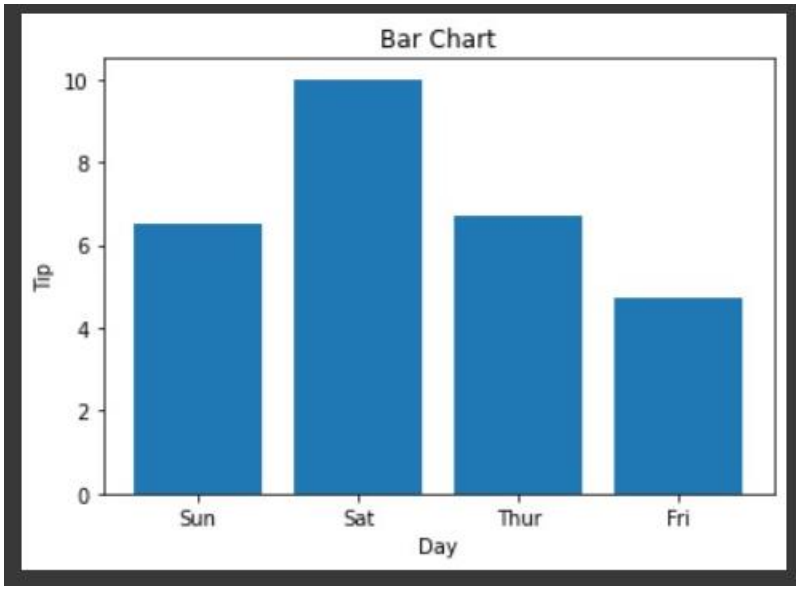
```
plt.scatter(data['day'], data['tip'], c=data['size'], s=data['total_bill'])
plt.xlabel('Day') plt.ylabel('Tip')
plt.colorbar()
plt.show()
```



Bar Chart:-

A bar plot or bar chart is a graph that represents the category of data with rectangular bars with lengths and heights that is proportional to the values which they represent. It can be created using the bar() method.

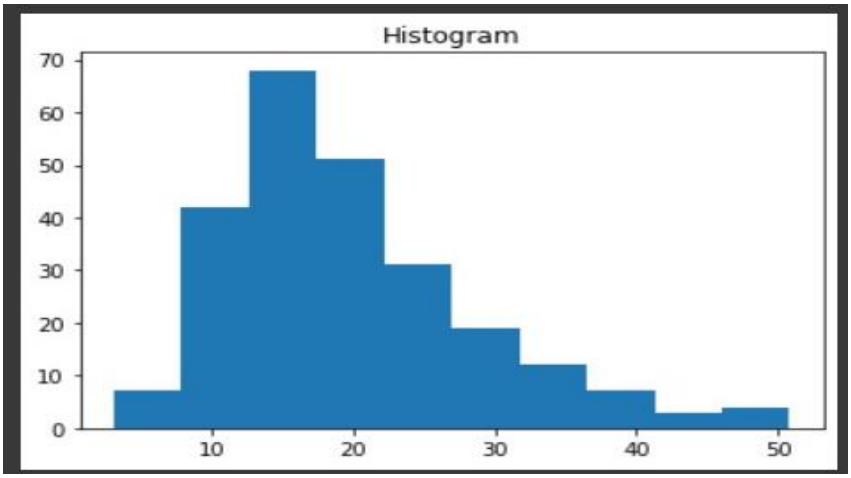
```
plt.bar(data['day'], data['tip'])
plt.title("Bar Chart")
plt.xlabel('Day')
plt.ylabel('Tip')
plt.show()
```



Histogram:-

A histogram is basically used to represent data in the form of some groups. It is a type of bar plot where the X-axis represents the bin ranges while the Y-axis gives information about frequency. The hist() function is used to compute and create a histogram. In histogram, if we pass categorical data then it will automatically compute the frequency of that data i.e. how often each value occurred.

```
plt.hist(data['total_bill'])
plt.title("Histogram")
plt.show()
```



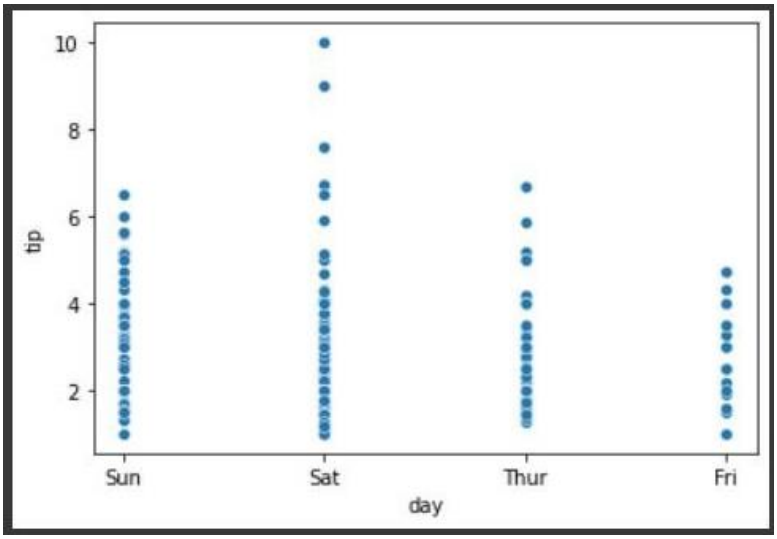
Seaborn:-

Seaborn is a high-level interface built on top of the Matplotlib. It provides beautiful design styles and color palettes to make more attractive graphs.

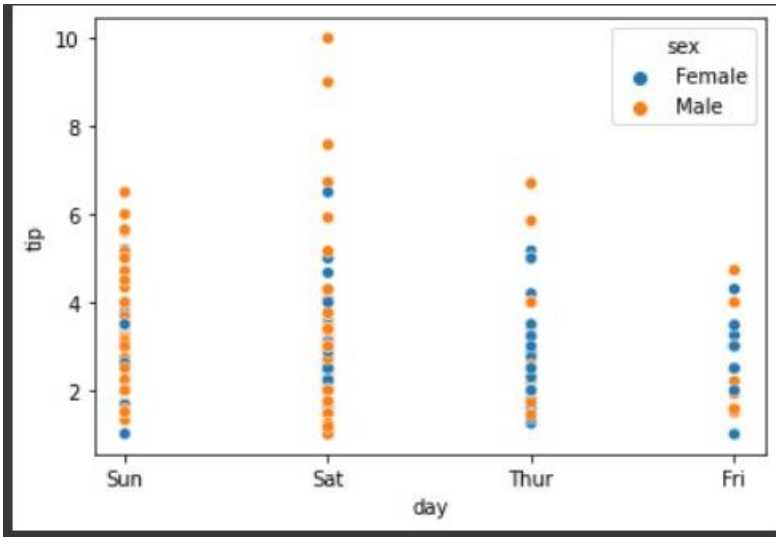
Scatter Plot :-

Scatter plot is plotted using the scatterplot() method. This is similar to Matplotlib, but additional argument data is required.

```
import seaborn as sns import
matplotlib.pyplot as plt import
pandas as pd
sns.scatterplot(x='day', y='tip',
data=data,) plt.show()
```



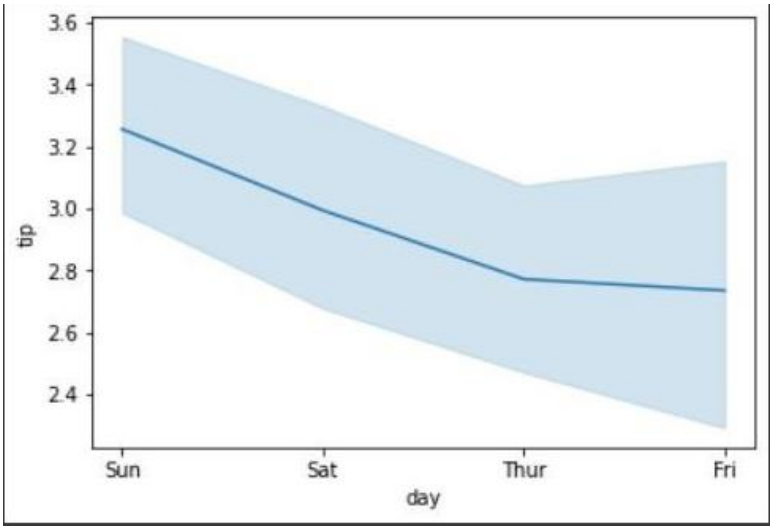

```
sns.scatterplot(x='day', y='tip', data=data,hue='sex')
plt.show()
```



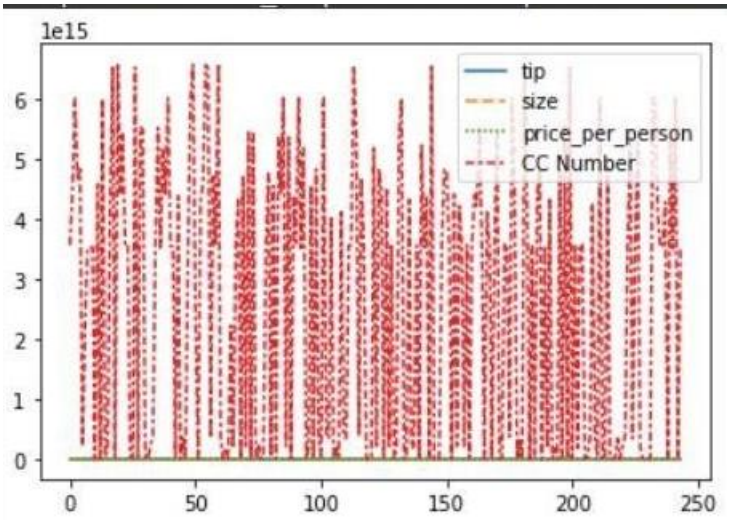
Line Plot:-

Line Plot in Seaborn plotted using the lineplot() method. In this, we can pass only the data argument also.

```
sns.lineplot(x='day', y='tip', data=data)
plt.show()
```



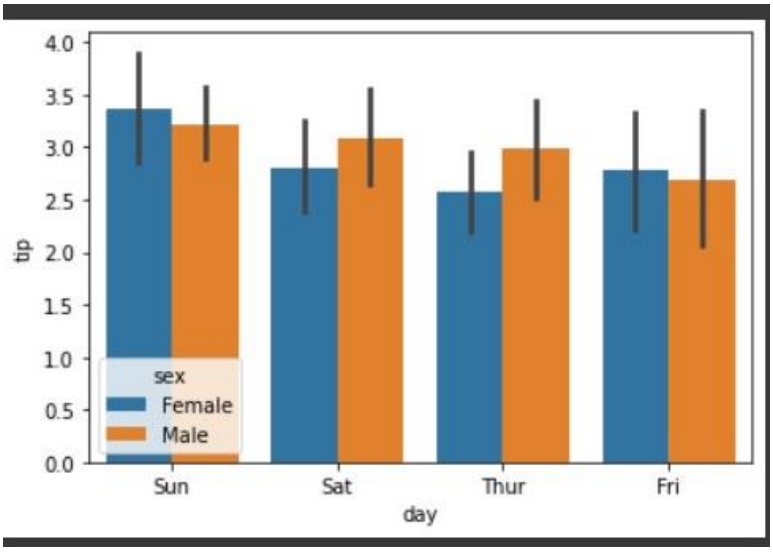

```
sns.lineplot(data=data.drop(['total_bill'], axis=1))
```



Bar Plot:-

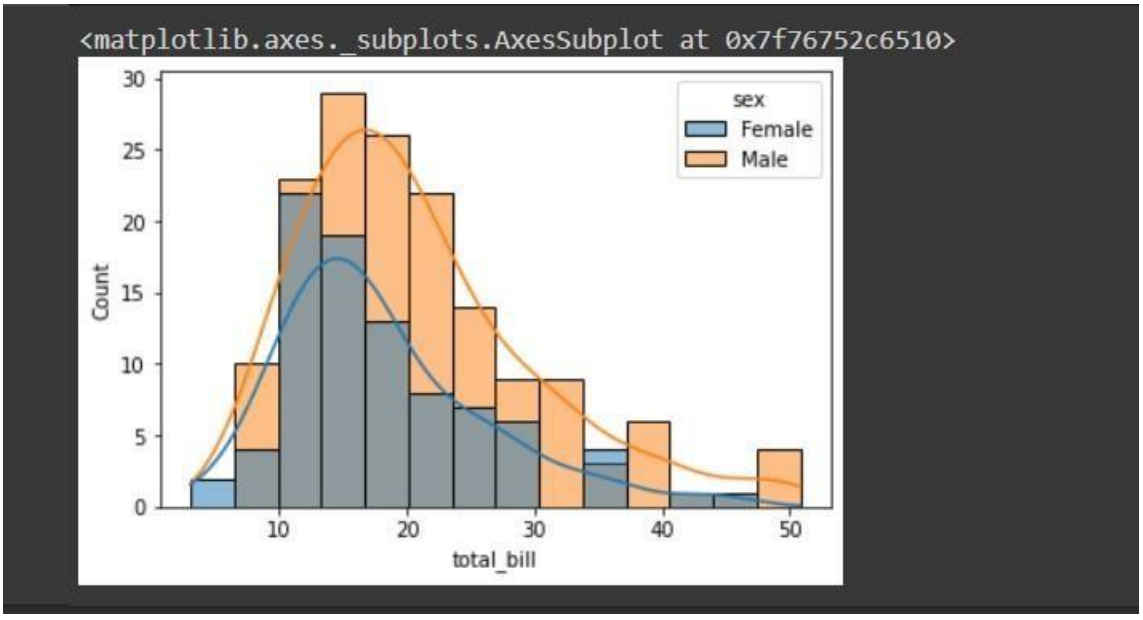
Bar Plot in Seaborn can be created using the barplot() method.

```
sns.barplot(x='day',y='tip', data=data, hue='sex')
plt.show()
```



Histogram:- The histogram in Seaborn can be plotted using the histplot() function.

```
sns.histplot(x='total_bill', data=data, kde=True, hue='sex')
```



Bokeh:-

Bokeh is mainly famous for its interactive charts visualization. Bokeh renders its plots using HTML and JavaScript that uses modern web browsers for presenting elegant, concise construction of novel graphics with high-level interactivity.

Scatter Plot:-

Scatter Plot in Bokeh can be plotted using the scatter() method of the plotting module. Here pass the x and y coordinates respectively.

```
pip install bokeh from bokeh.plotting import figure,
output_file, show from bokeh.palettes import
magma import pandas as pd

graph = figure(title = "Bokeh Scatter Graph") data = pd.read_csv("tips.csv") color = magma(245)
graph.scatter(data['total_bill'], data['tip'], color=color)
show(graph)
```

```
show(graph)

BokehUserWarning: ColumnDataSource's columns must be of the same length. Current lengths: ('line_color', 245), ('x', 244), ('y', 244)
BokehUserWarning: ColumnDataSource's columns must be of the same length. Current lengths: ('fill_color', 245), ('line_color', 245), ('x', 244), ('y', 244)
```

Line Chart:-A line plot can be created using the line() method of the plotting module.

```
# importing the modules from bokeh.plotting import
figure, output_file, show import pandas as pd
# instantiating the figure object graph =
figure(title = "Bokeh Bar Chart")
# reading the database data =
pd.read_csv("tips.csv")
 # Count of each unique value of tip column
df = data['tip'].value_counts() df =
data['total_bill'].value_counts()
# plotting the graph
graph.line(df, data['tip'])
graph.line(df,
data['total_bill']) # displaying
the model show(graph)
```

```
BokehUserWarning: ColumnDataSource's columns must be of the same length. Current lengths: ('x', 229), ('y', 244)
BokehUserWarning: ColumnDataSource's columns must be of the same length. Current lengths: ('x', 229), ('y', 244)
```

Bar Chart:-

Bar Chart can be of two types horizontal bars and vertical bars. Each can be created using the hbar() and vbar() functions of the plotting interface respectively.

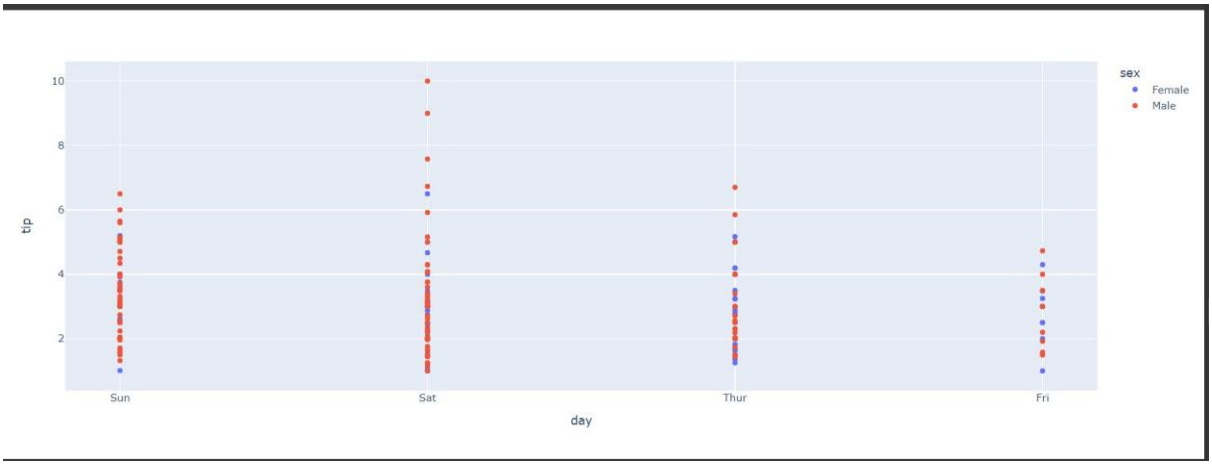
```
from bokeh.plotting import figure, output_file, show
import pandas as pd
graph = figure(title = "Bokeh Bar Chart")
data = pd.read_csv("tips.csv")
graph.vbar(data['total_bill'], top=data['tip'])
show(graph)
```

```
import plotly.express as px
import pandas as pd

# reading the database
data =
pd.read_csv("tips.csv")

# plotting the scatter chart
fig = px.scatter(data, x="day", y="tip", color='sex')

# showing the plot
fig.show()
```



Line Chart:-

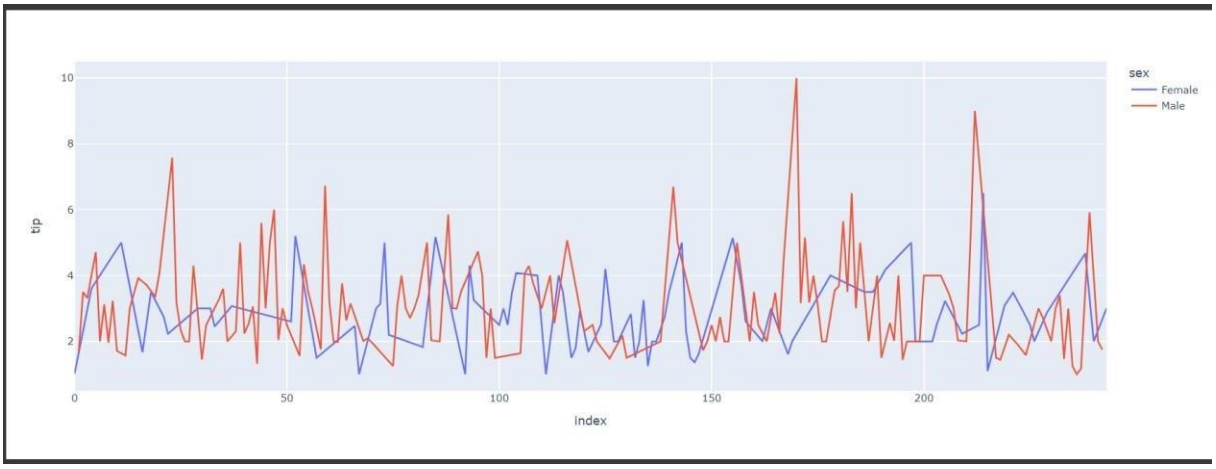
Line plot in Plotly is much accessible and illustrious annexation to plotly which manage a variety of types of data and assemble easy-to-style statistic. With px.line each data position isrepresented as a vertex

```
import plotly.express as px
import pandas as pd

# reading the database data
= pd.read_csv("tips.csv")

# plotting the scatter chart fig =
px.line(data, y='tip', color='sex')

# showing the plot
fig.show()
```

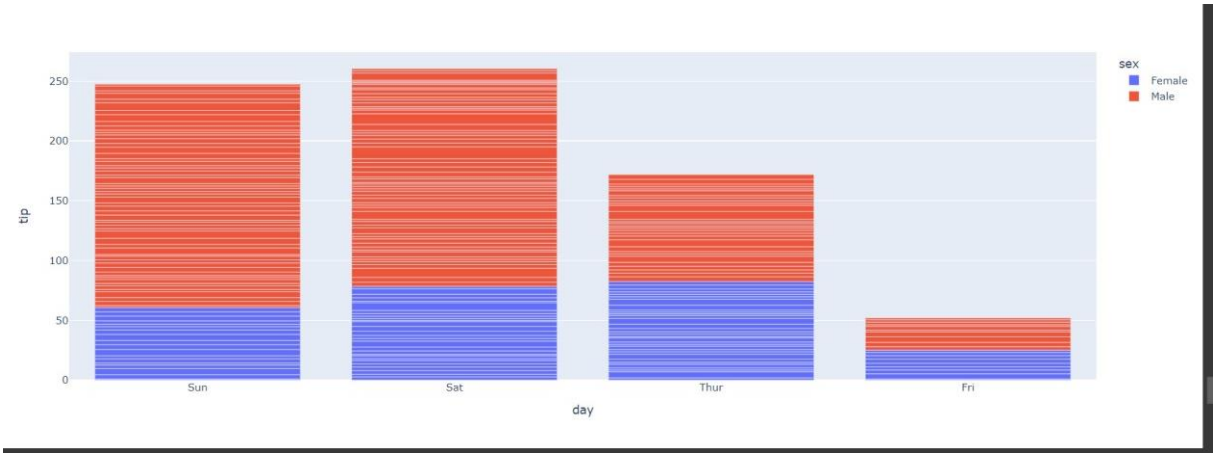



```
import plotly.express as px
import pandas as pd

# reading the database data
= pd.read_csv("tips.csv")

# plotting the scatter chart
fig = px.bar(data, x='day', y='tip', color='sex')

# showing the plot
fig.show()
```

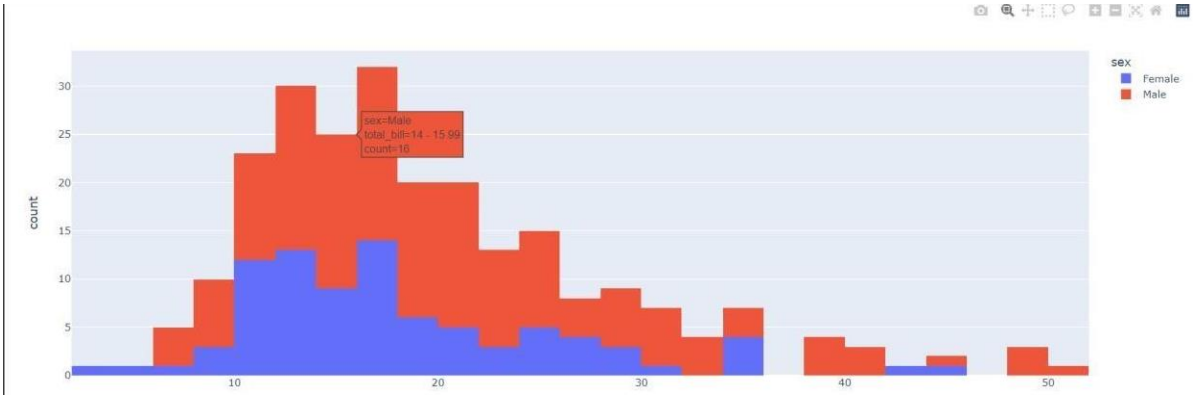



```
import plotly.express as px
import pandas as pd

# reading the database data
= pd.read_csv("tips.csv")

# plotting the scatter chart fig =
px.histogram(data, x='total_bill', color='sex')

# showing the plot
fig.show()
```



Learning outcomes (What I have learnt) -

1. How to establish relationship between different columns (variables) in a dataset using Graphs.
2. To draw different kind of graphs and charts by using different kind of libraries.
3. To find Relationship between different variables and map different type of Graphs.
4. Detailed introduction to visualization using matplot , seaborn , plotyl and bokeh libraries.

Evaluation Grid (To be created as per the SOP and Assessment guidelines by the faculty):

Sr. No.	Parameters	Marks Obtained	Maximum Marks
1.			
2.			
3.			