BATCH : B106 Data Science

LESSON : **Data Visualization**

DATE : 03.12.2022

SUBJECT : **Intro-Matplotlib**

ZOOM GİRİŞLERİNİZİ LÜTFEN **LMS** SİSTEMİ ÜZERİNDEN YAPINIZ

Data Visualization With Python

Eğitim Programı

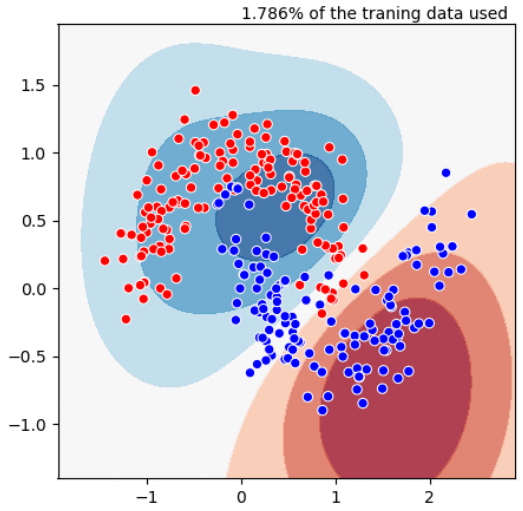
- Data Visualization introsu
- Matplotlib
- Seaborn
- Plotly
- Visualization project

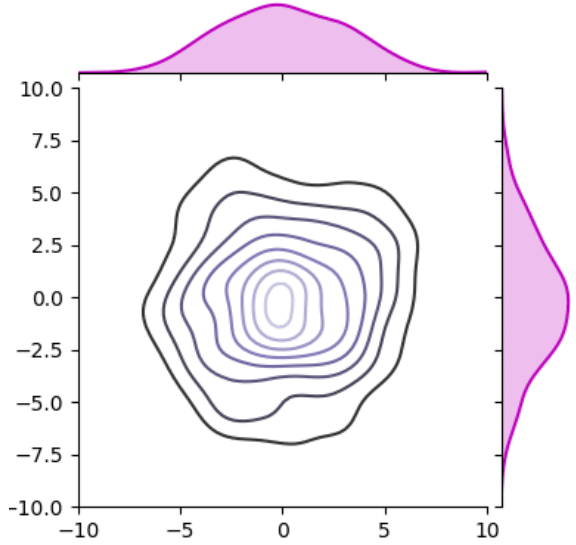
Kursun Kapsamı

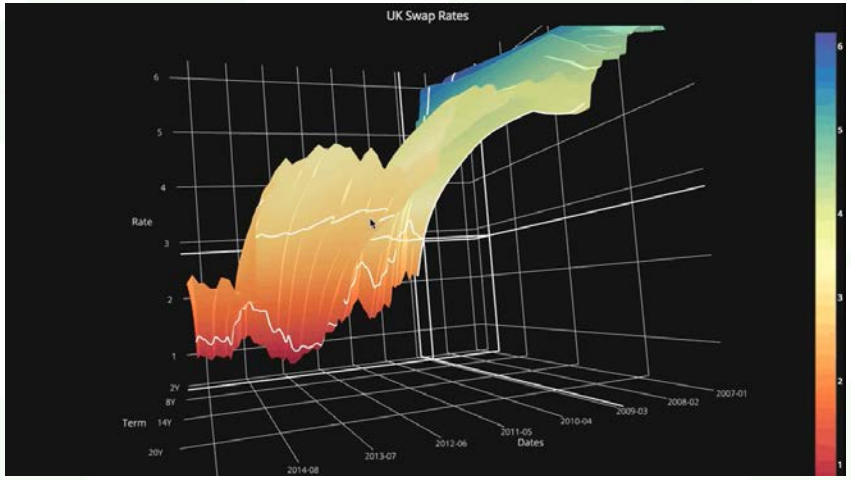
matplotlib

seaborn

plotly







Kursun Kapsamı

matplotlib

seaborn

plotly

```
import matplotlib.pyplot as plt
```

```
import seaborn as sns
```

```
import pandas as pd
```

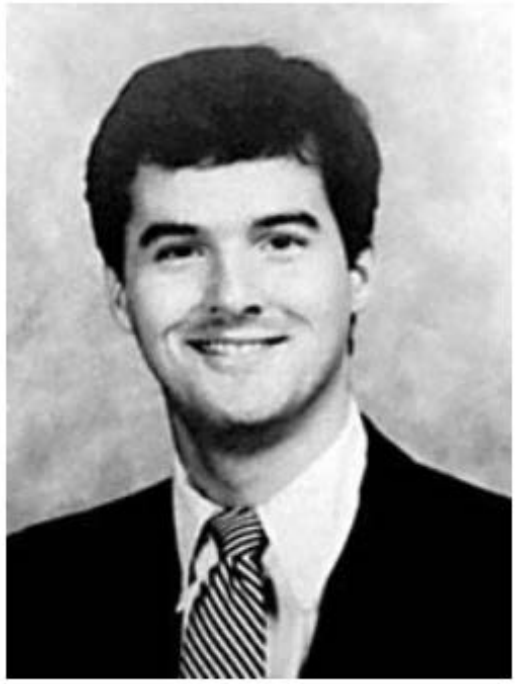
Create figure, axes, subplots

Built on matplotlib and can be used together with it

No need to import matplotlib or seaborn

Matplotlib & Seaborn

- Python'da veriyi görselleştirmek için kullanılır.
- 2002 yılında John Hunter tarafından matlap tarzında bir arayüz oluşturmak amacıyla bir proje olarak başlatıldı.
- İlk sürümü 2003 yılında yayınlandı.
- Geliştirilerek seaborn kütüphanesi ortaya çıkmıştır.



Matplotlib & Seaborn

FEATURES	MATPLOTLIB	SEABORN
Functionality	It is utilized for making basic graphs. Datasets are visualised with graphs styles. • Bar graphs, • Histograms, • Pie charts, • Scatter plots, • Lines and so on.	Seaborn contains a number of patterns and plots for data visualization. It uses fascinating themes. It helps in compiling whole data into a single plot.
Syntax	It uses comparatively complex and lengthy syntax.	It uses comparatively simple syntax which is easier to learn and understand.

Two Methods

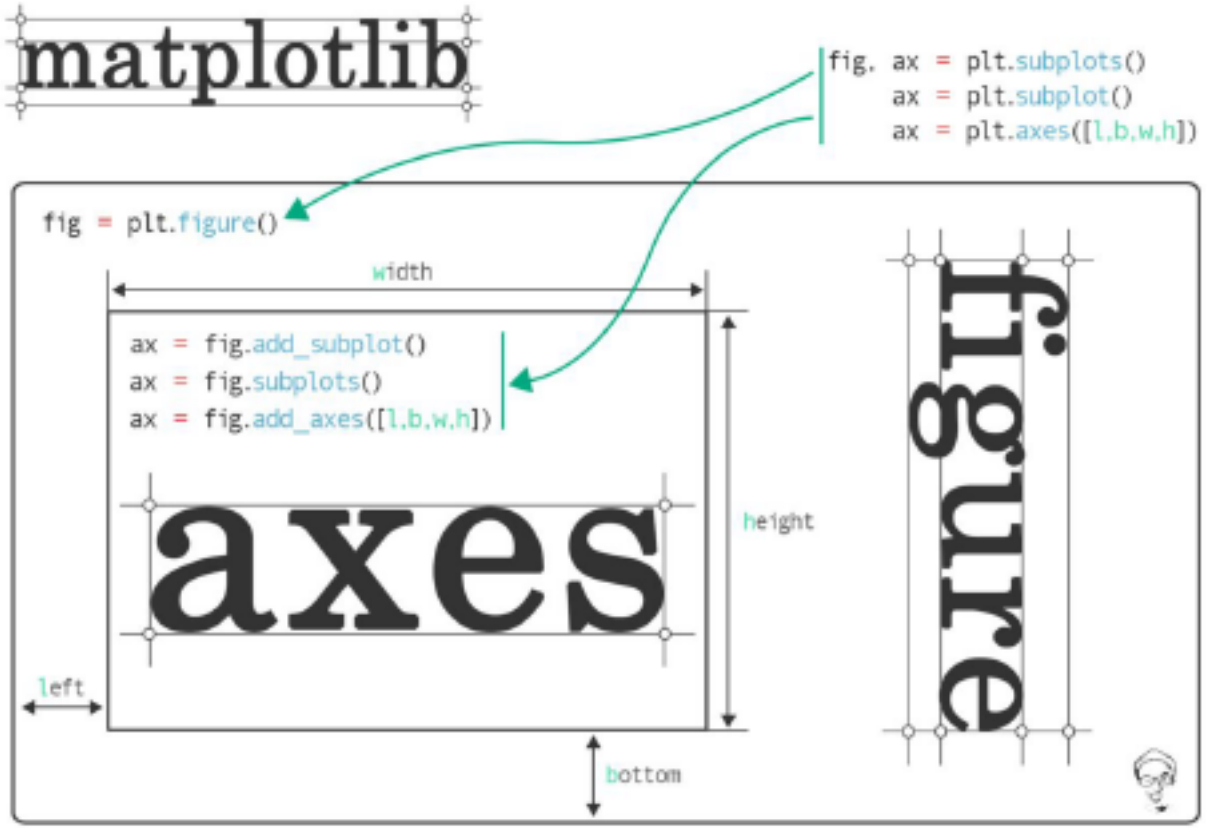
Functional Method

```
plt.plot(age, salary)
plt.xlabel("age")
plt.ylabel("salary")
plt.title("Salary by Age")

plt.show()
```

Object Oriented

```
fig, ax = plt.subplots()

ax.plot(age, salary, "r")
ax.set_xlabel("Age")
ax.set_ylabel("Salary")
ax.set_title("Salary by Age")
```

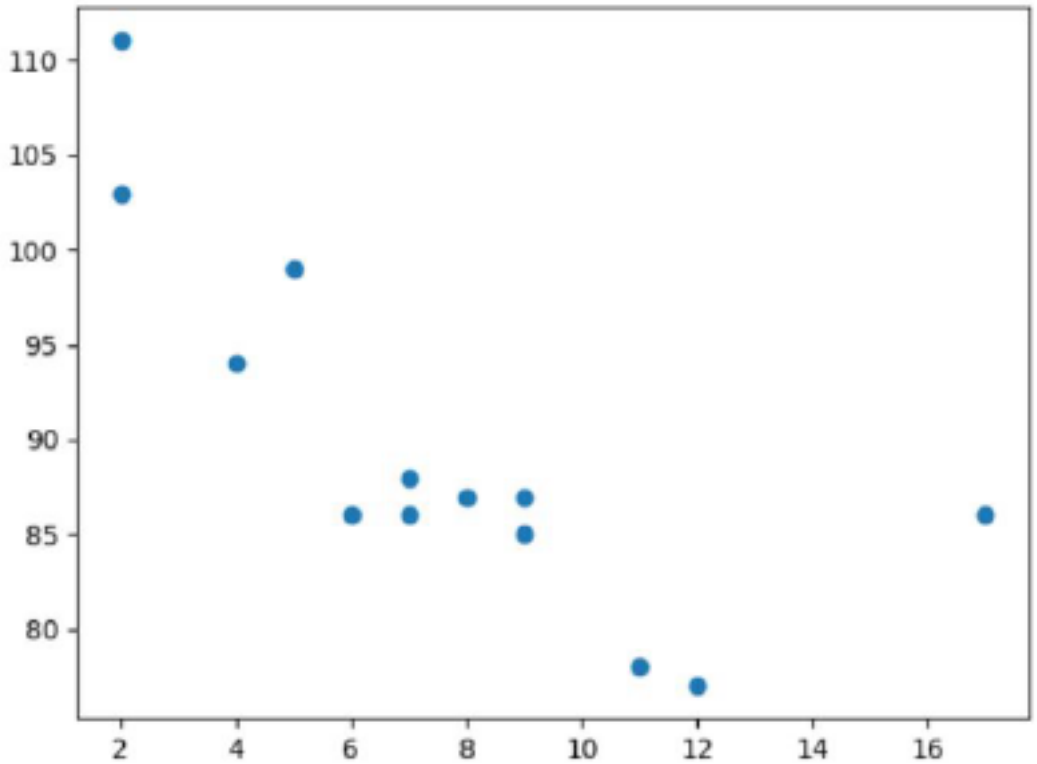
Axis – Axes – Figure ?



How do you describe figure & axes?

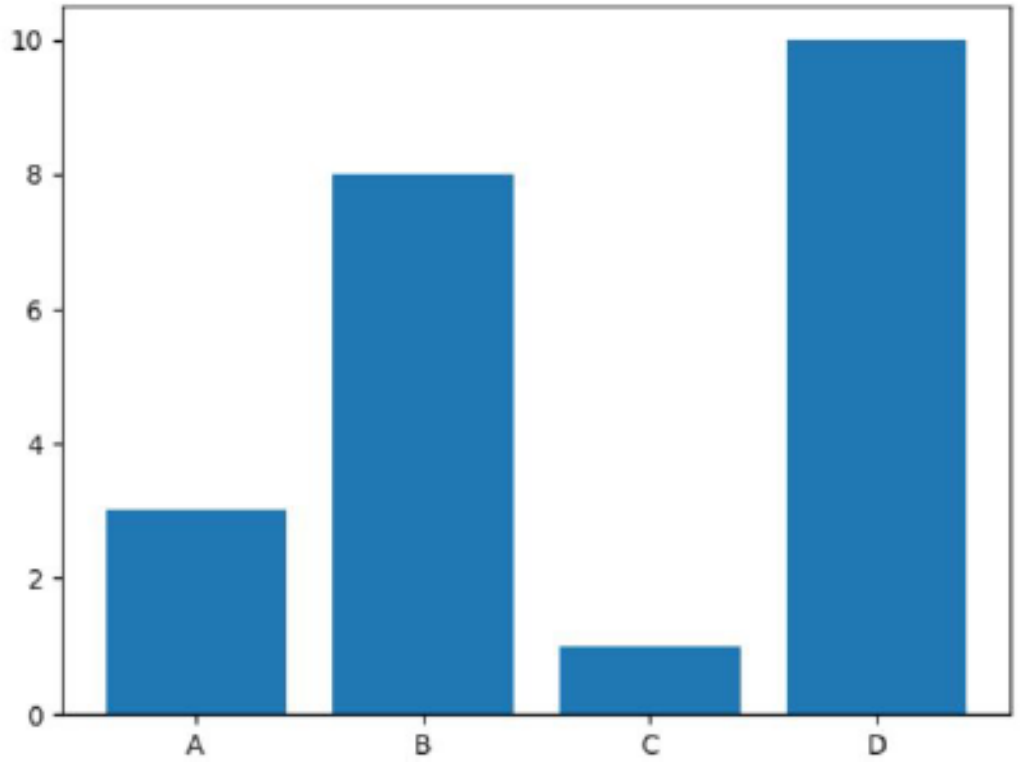
Scatter Plot

```
import matplotlib.pyplot as plt
import numpy as np

x= np.array([5,7,8,7,2,17,2,9,4,11,12,9,6])
y= np.array([99,86,87,88,111,86,
        103,87,94,78,77,85,86])

plt.scatter(x, y)
plt.show()
```



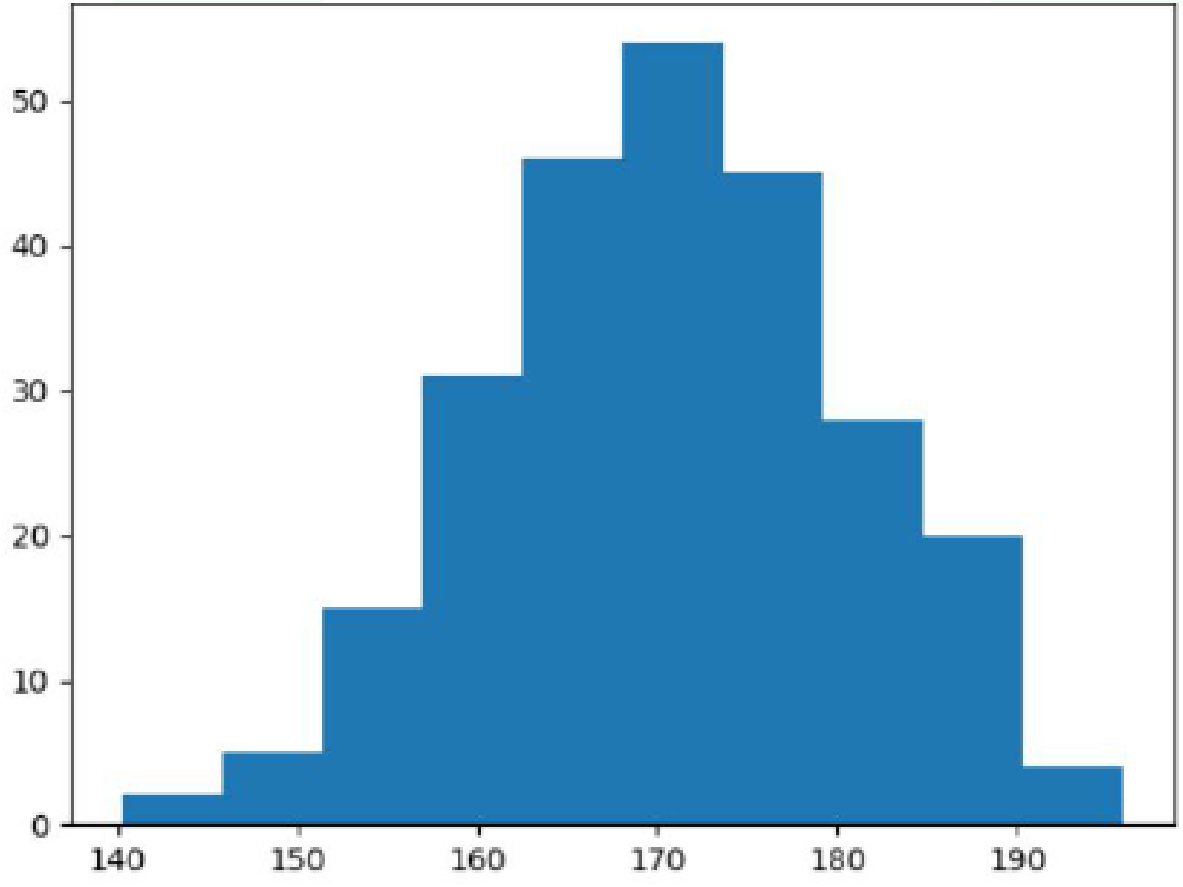
Bar Chart

```
import matplotlib.pyplot as plt
import numpy as np

x = np.array(["A", "B", "C", "D"])
y = np.array([3, 8, 1, 10])

plt.bar(x,y)
plt.show()
```



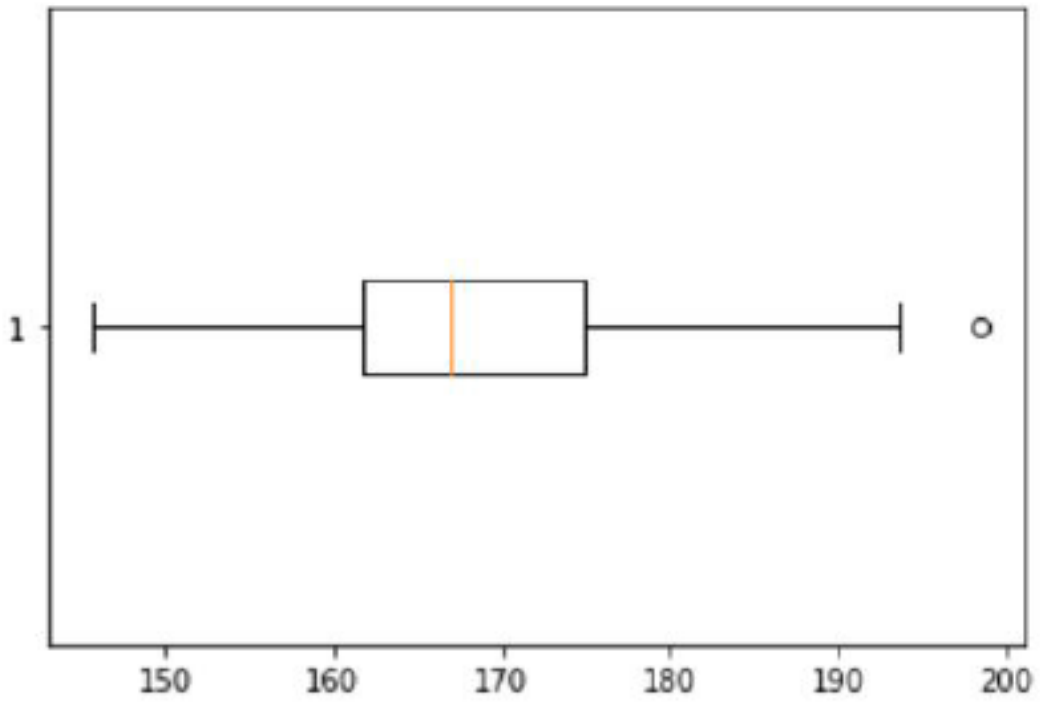
Histogram

```
import matplotlib.pyplot as plt
import numpy as np

x = np.random.normal(170, 10, 250)

plt.hist(x)
plt.show()
```



Box Plot

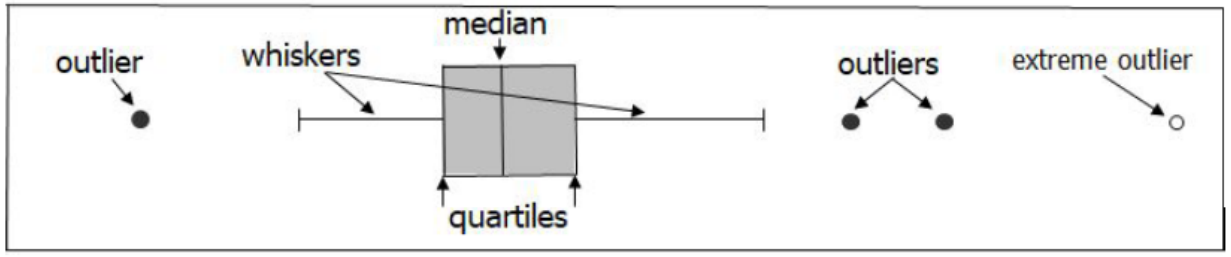
```
import matplotlib.pyplot as plt
import numpy as np

x = np.random.normal(170, 10, 250)

plt.boxplot(x,)
plt.show()
```

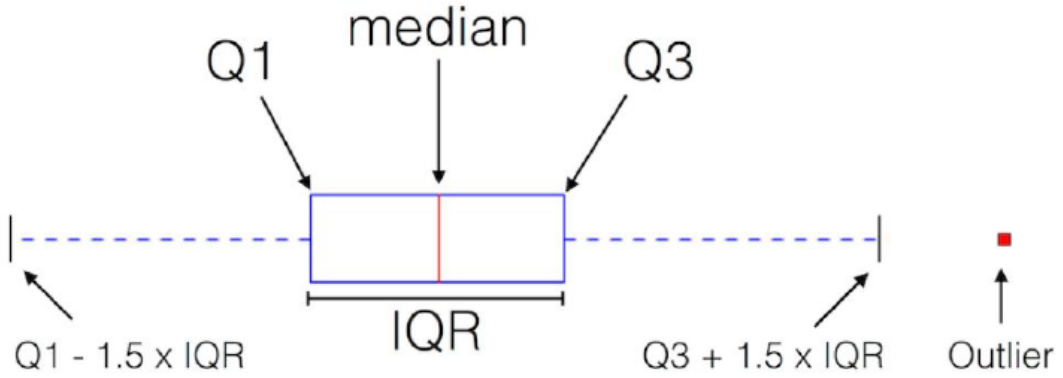


Box Plot

A box plot is a method for graphically depicting groups of numerical data through their quartiles.

A box plot generally shows **median, 25th and 75th percentiles, and outliers**.





Q1: *Quartile 1*, or median of the *left* data subset after dividing the original data set into 2 subsets via the median (25% of the data points fall below this threshold)

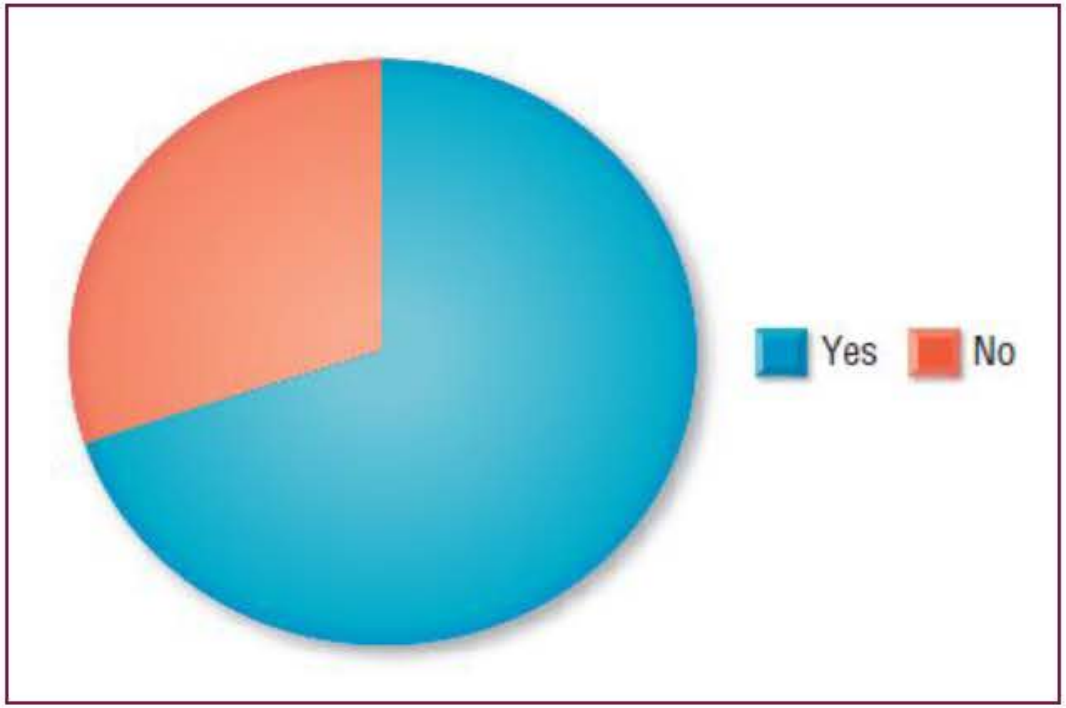
Q3: *Quartile 3*, median of the *right* data subset (75% of the data points fall below this threshold)

IQR: *Interquartile-range*, Q3 - Q1

Outliers: Data points are considered to be outliers if value < *Q1 - 1.5 x IQR* or *value > Q3 + 1.5 x IQR*

Pie Chart

- Often used with nominal and ordinal variables.
- Circle cut into “pie slices” that add up to 100%.
- Each pie slice represents an attribute for the variable.



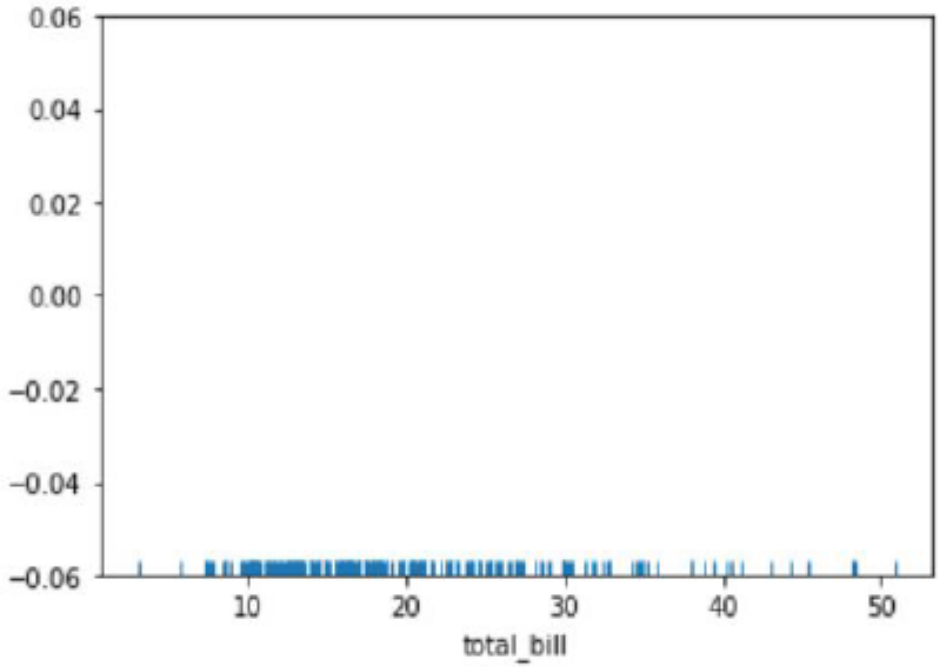
Seaborn Plot Types

Distributions Plots	Categorical Plots	Comparison Plots
• kdeplot • rugplot • displot • histplot	• barplot • countplot • boxplot • swarmplot • violinplot	• jointplot • pairplot • catplot • matrix plot • grid plot

Distribution Plots - rugplot

```
import seaborn as sns
tips = sns.load_dataset("tips")
sns.rugplot(x='total_bill',
data=tips)
sns.rugplot(tips['total_bill'])
```

	total_bill	tip	sex	smoker	day	time	size
0	16.99	1.01	Female	No	Sun	Dinner	2
1	10.34	1.66	Male	No	Sun	Dinner	3
2	21.01	3.50	Male	No	Sun	Dinner	3
3	23.68	3.31	Male	No	Sun	Dinner	2
4	24.59	3.61	Female	No	Sun	Dinner	4



Distribution Plots - displot

```
import seaborn as sns
tips = sns.load_dataset("tips")
# Don't use distplot
sns.displot(x='total_bill',
data=tips)
sns.displot(tips['total_bill'])
```

	total_bill	tip	sex	smoker	day	time	size
0	16.99	1.01	Female	No	Sun	Dinner	2
1	10.34	1.66	Male	No	Sun	Dinner	3
2	21.01	3.50	Male	No	Sun	Dinner	3
3	23.68	3.31	Male	No	Sun	Dinner	2
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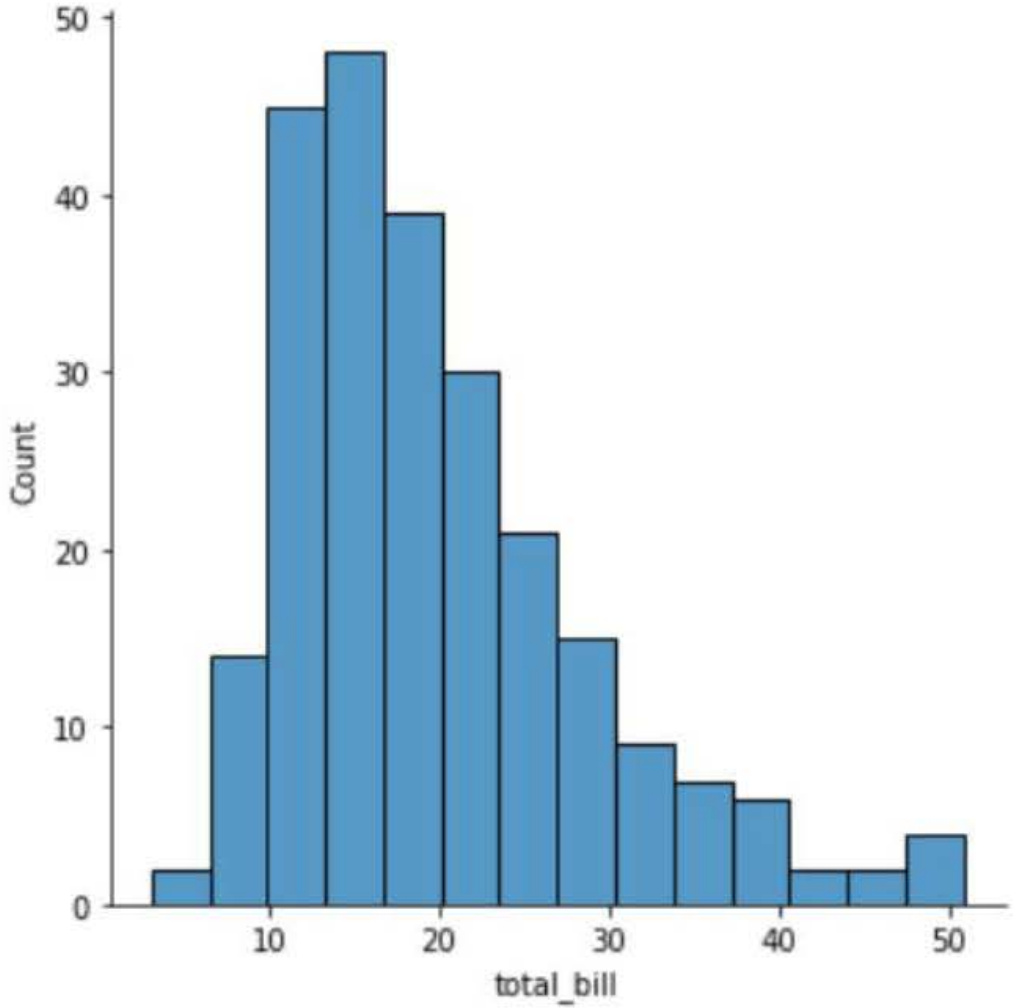

Distribution Plots - histplot

```
import seaborn as sns

tips = sns.load_dataset("tips")

sns.histplot(x='total_bill',
data=tips,      kde=True)

sns.histplot(tips['total_bill'])
```

	total_bill	tip	sex	smoker	day	time	size
0	16.99	1.01	Female	No	Sun	Dinner	2
1	10.34	1.66	Male	No	Sun	Dinner	3
2	21.01	3.50	Male	No	Sun	Dinner	3
3	23.68	3.31	Male	No	Sun	Dinner	2
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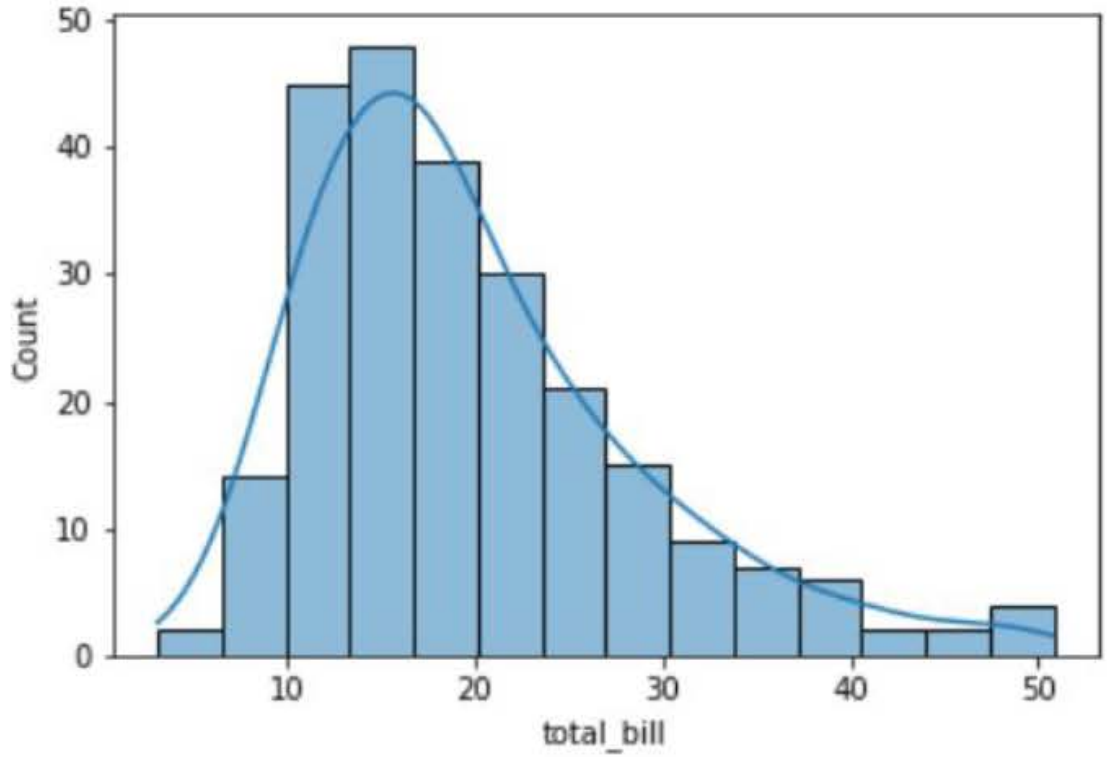
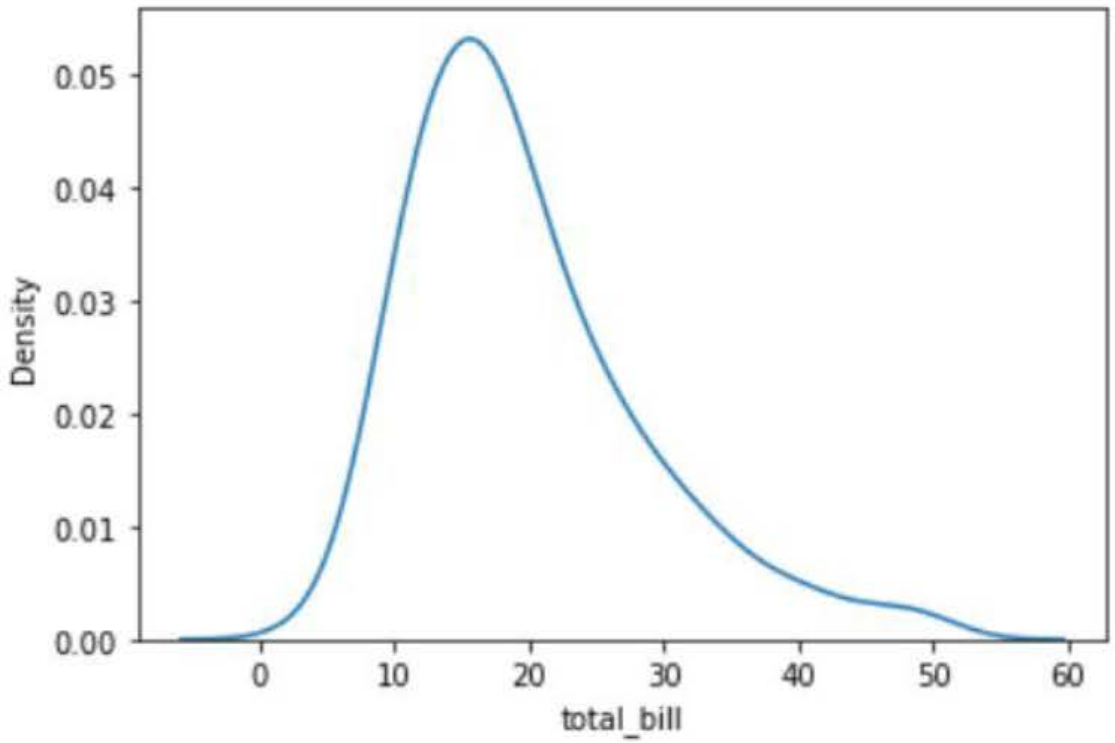


Distribution Plots - kde

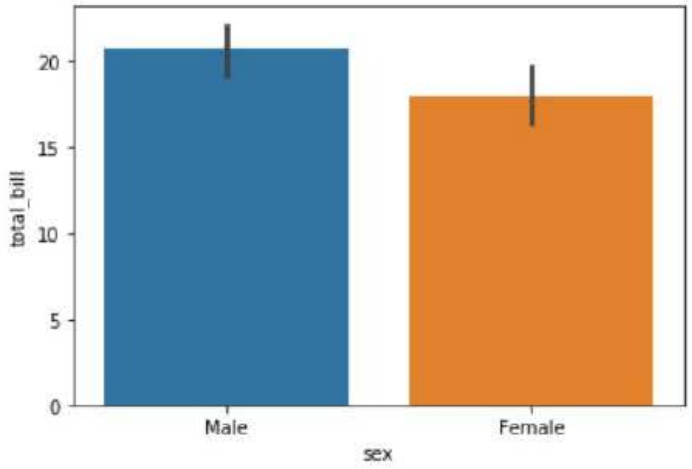
```
import seaborn as sns
tips = sns.load_dataset("tips")
sns.kdeplot(x='total_bill',
data=tips)
sns.kdetplot(tips['total_bill'])
```

	total_bill	tip	sex	smoker	day	time	size
0	16.99	1.01	Female	No	Sun	Dinner	2
1	10.34	1.66	Male	No	Sun	Dinner	3
2	21.01	3.50	Male	No	Sun	Dinner	3
3	23.68	3.31	Male	No	Sun	Dinner	2
4	24.59	3.61	Female	No	Sun	Dinner	4

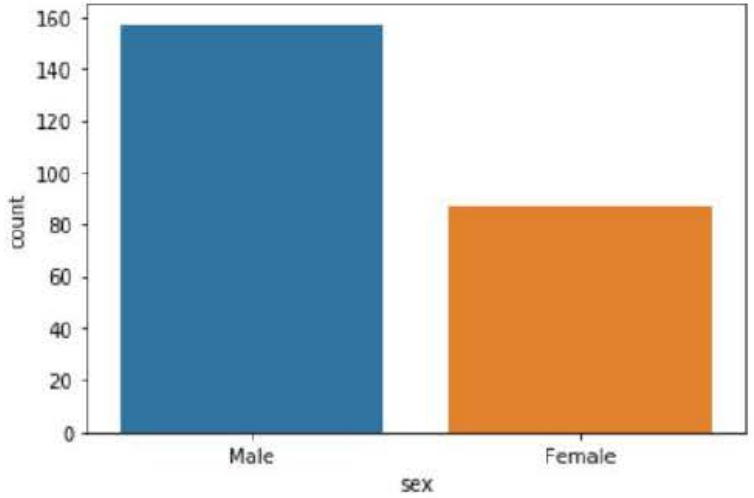


Categorical Plots

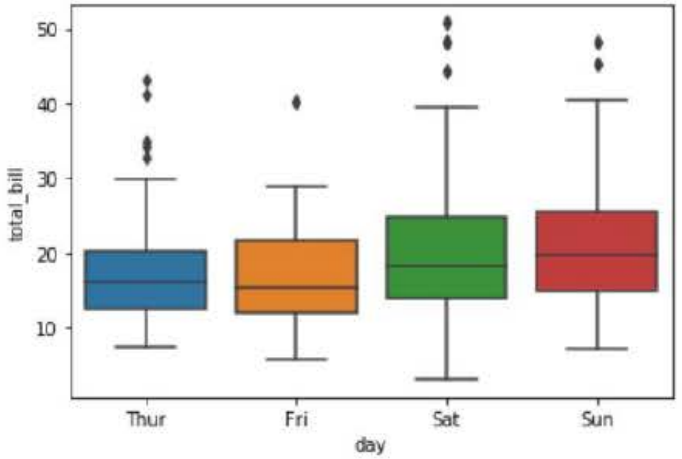
barplot



countplot



boxplot



Categorical Plots - countplot

```
import seaborn as sns
tips = sns.load_dataset("tips")
sns.countplot(x='day',data=tips)
sns.countplot(tips['day'])
```

	total_bill	tip	sex	smoker	day	time	size
0	16.99	1.01	Female	No	Sun	Dinner	2
1	10.34	1.66	Male	No	Sun	Dinner	3
2	21.01	3.50	Male	No	Sun	Dinner	3
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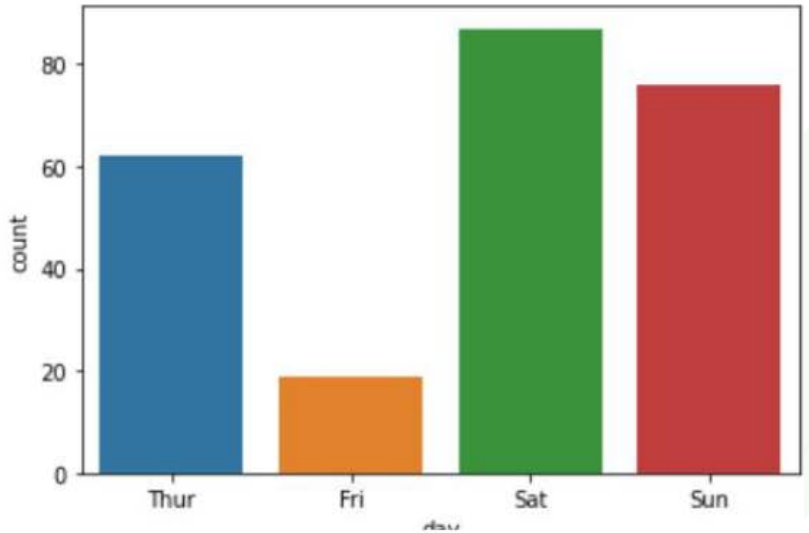

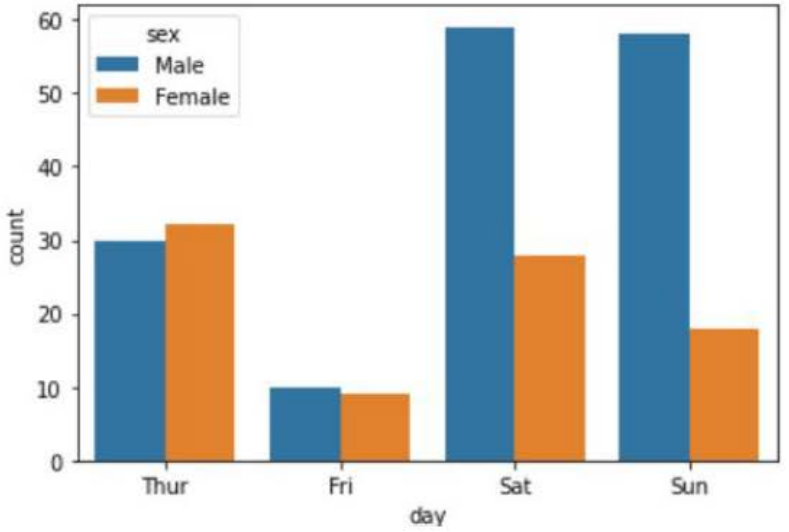

Categorical Plots - barplot

```
import seaborn as sns
tips = sns.load_dataset("tips")
sns.barplot(x='day', y="total_bill", data=tips)
sns.barplot(x='day', y="total_bill", data=tips, hue='sex')
```

	total_bill	tip	sex	smoker	day	time	size
0	16.99	1.01	Female	No	Sun	Dinner	2
1	10.34	1.66	Male	No	Sun	Dinner	3
2	21.01	3.50	Male	No	Sun	Dinner	3
3	23.68	3.31	Male	No	Sun	Dinner	2
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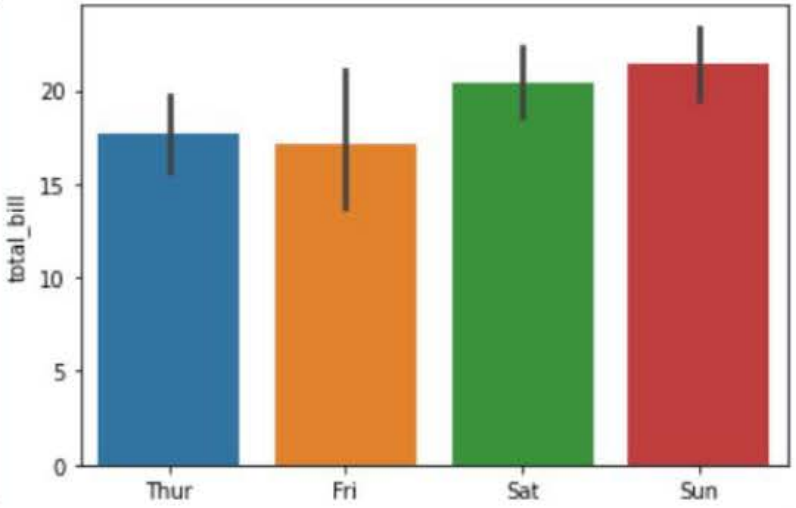

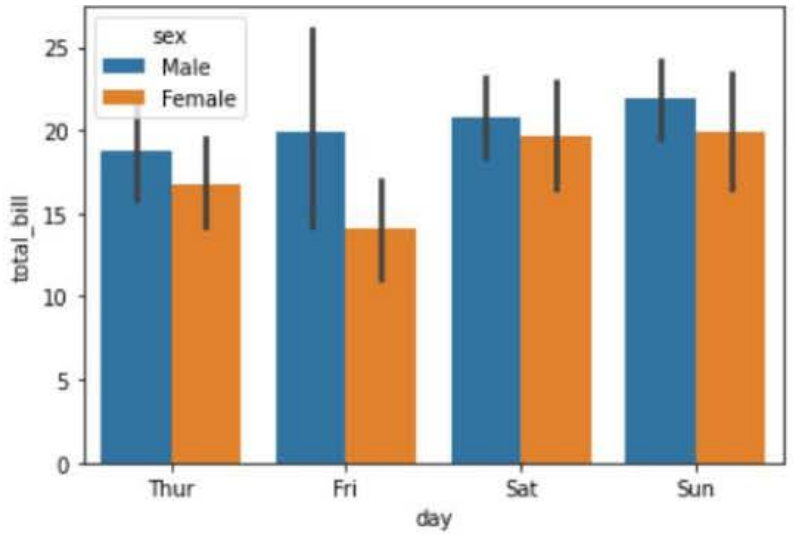

Categorical Plots - boxplot

```
import seaborn as sns
tips = sns.load_dataset("tips")
sns.boxplot(x='day',
y="total_bill", data=tips)
```

	total_bill	tip	sex	smoker	day	time	size
0	16.99	1.01	Female	No	Sun	Dinner	2
1	10.34	1.66	Male	No	Sun	Dinner	3
2	21.01	3.50	Male	No	Sun	Dinner	3
3	23.68	3.31	Male	No	Sun	Dinner	2
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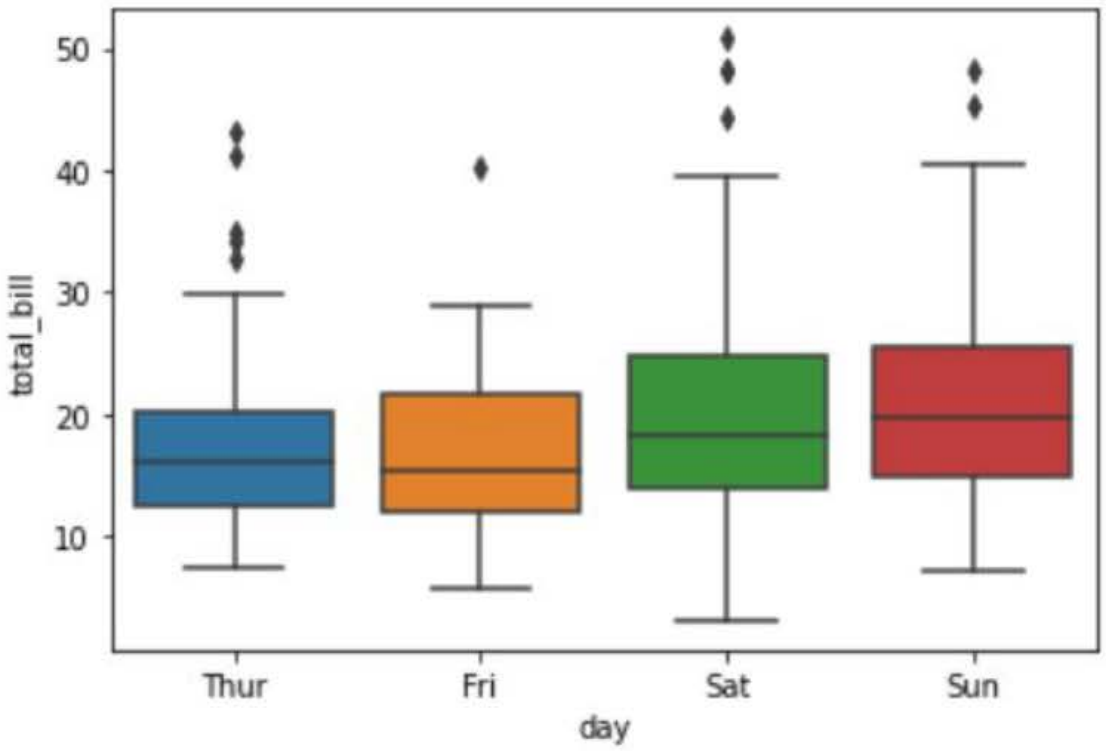
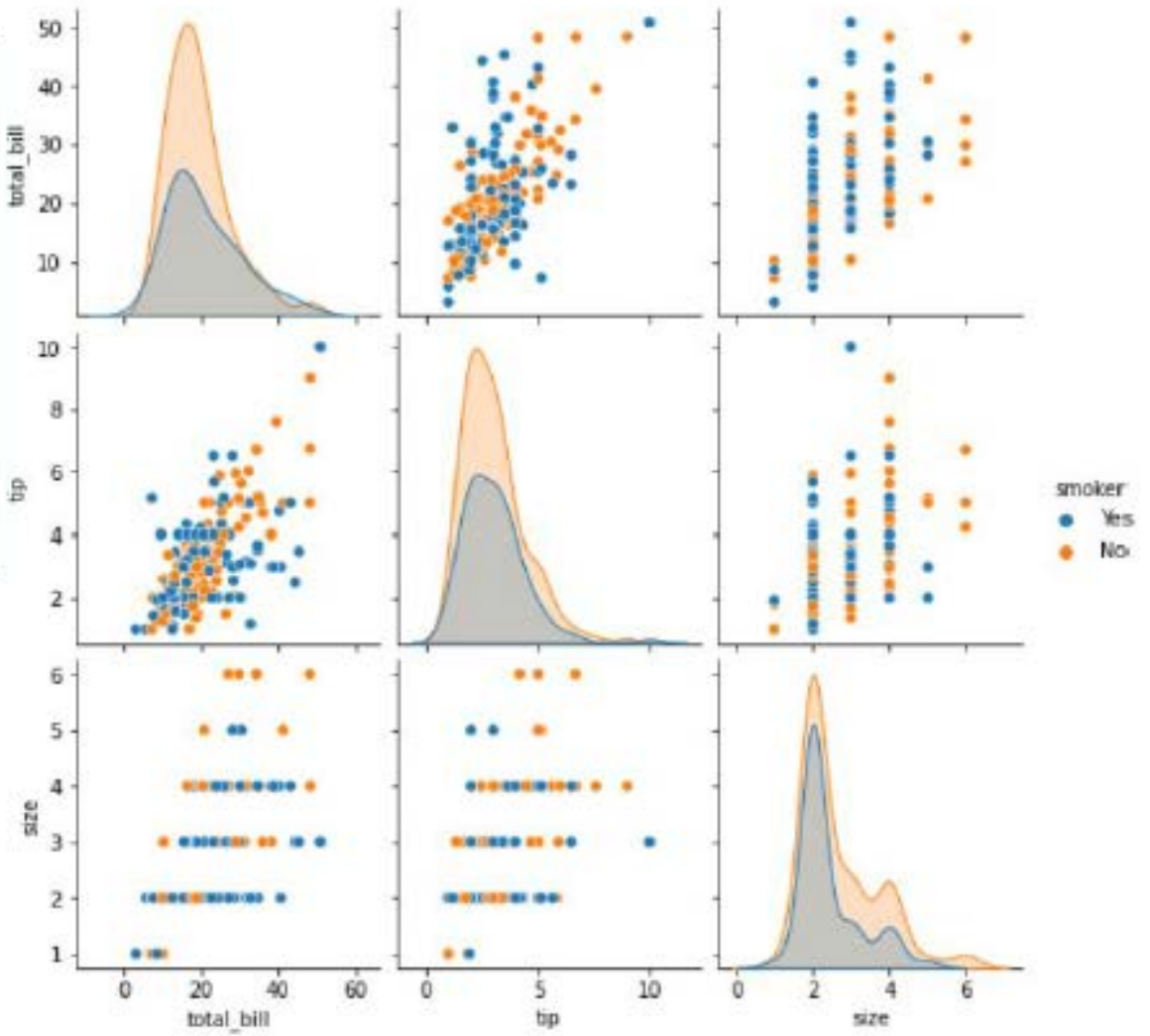


Comparison Plots - pairplot

```
import seaborn as sns
tips = sns.load_dataset("tips")

sns.pairplot(tips,hue="smoker")

#  corner=True
```



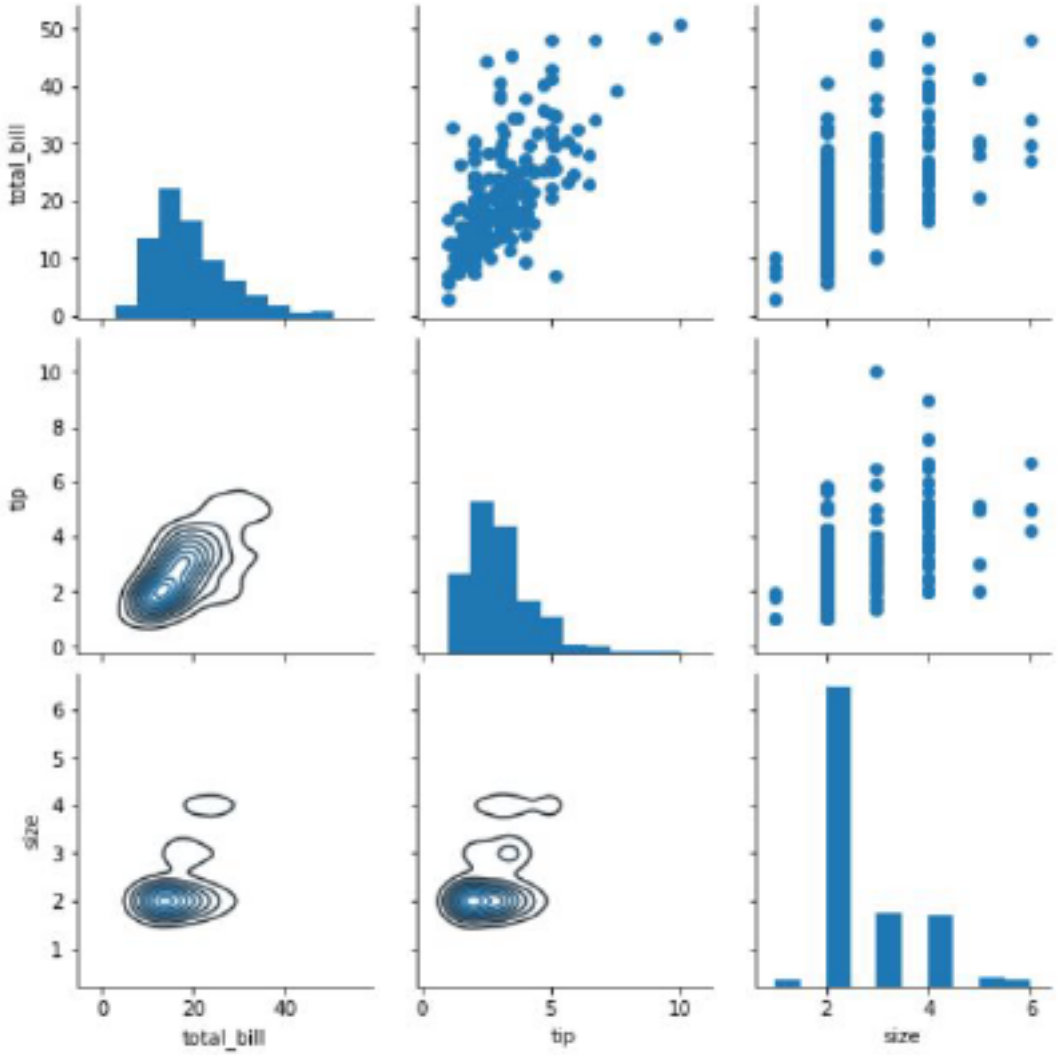
Grids

PairGrid

```
import seaborn as sns
tips = sns.load_dataset("tips")

g = sns.PairGrid(tips)
# g = g.map(sns.scatterplot)

g = g.map_upper(sns.scatterplot)
g = g.map_diag(sns.histplot)
g = g.map_lower(sns.kdeplot)
```



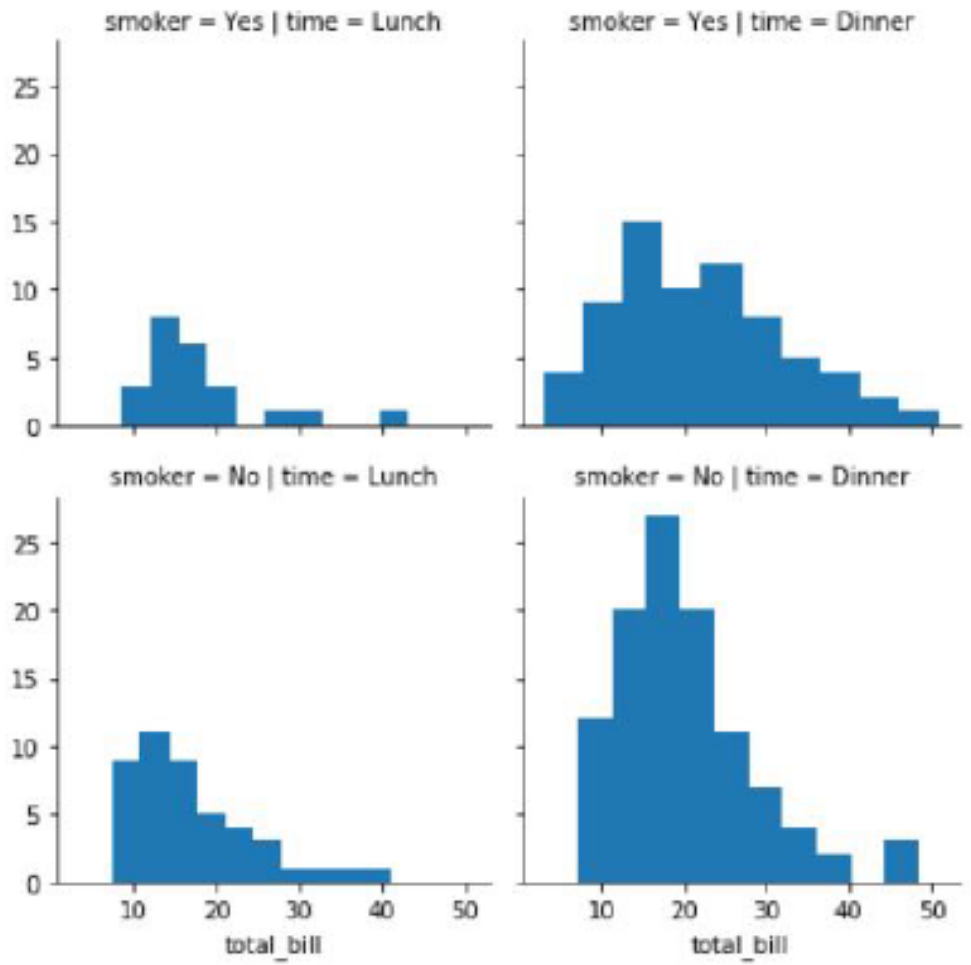
Grids

FacetGrid

```
import seaborn as sns
tips =
sns.load_dataset("tips")


g=sns.FacetGrid( data = tips,
col="time",  row="smoker")


g=g.map(plt.hist,"total_bill")
```



Matrix Plots

heatmap

```
import seaborn as sns

sns.heatmap( df.corr() )
```