

Lab 1 and 2

September 29, 2024

0.1 Basics

```
[10]: import pandas as pd

# Load CSV data into a DataFrame
data = pd.read_csv("./data/random_data.csv")

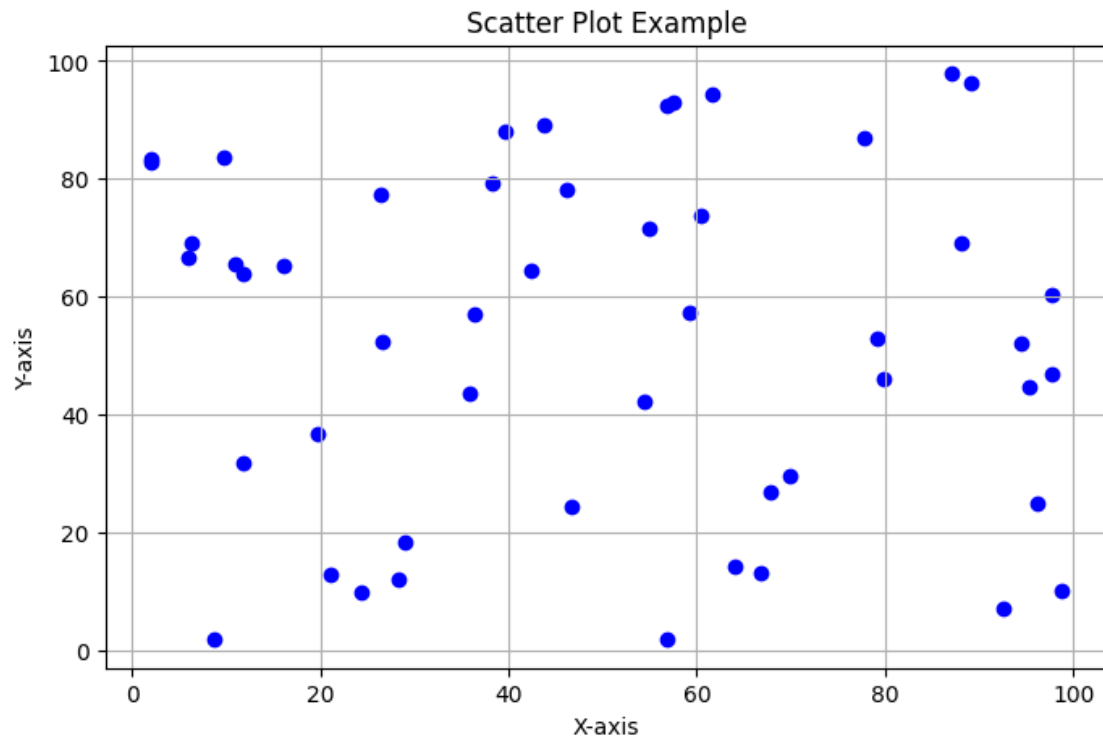
# Display the first few rows of the DataFrame
print(data.head())
```

	x	y	z	category
0	54.881350	71.518937	602.763376	A
1	54.488318	42.365480	64.589411	B
2	43.758721	89.177300	96.366276	A
3	38.344152	79.172504	52.889492	B
4	56.804456	92.559664	7.103606	A

Scatter Plot

```
[11]: import matplotlib.pyplot as plt

# Scatter plot
plt.figure(figsize=(8, 5))
plt.scatter(data["x"], data["y"], color="blue")
plt.title("Scatter Plot Example")
plt.xlabel("X-axis")
plt.ylabel("Y-axis")
plt.grid(True)
plt.show()
```

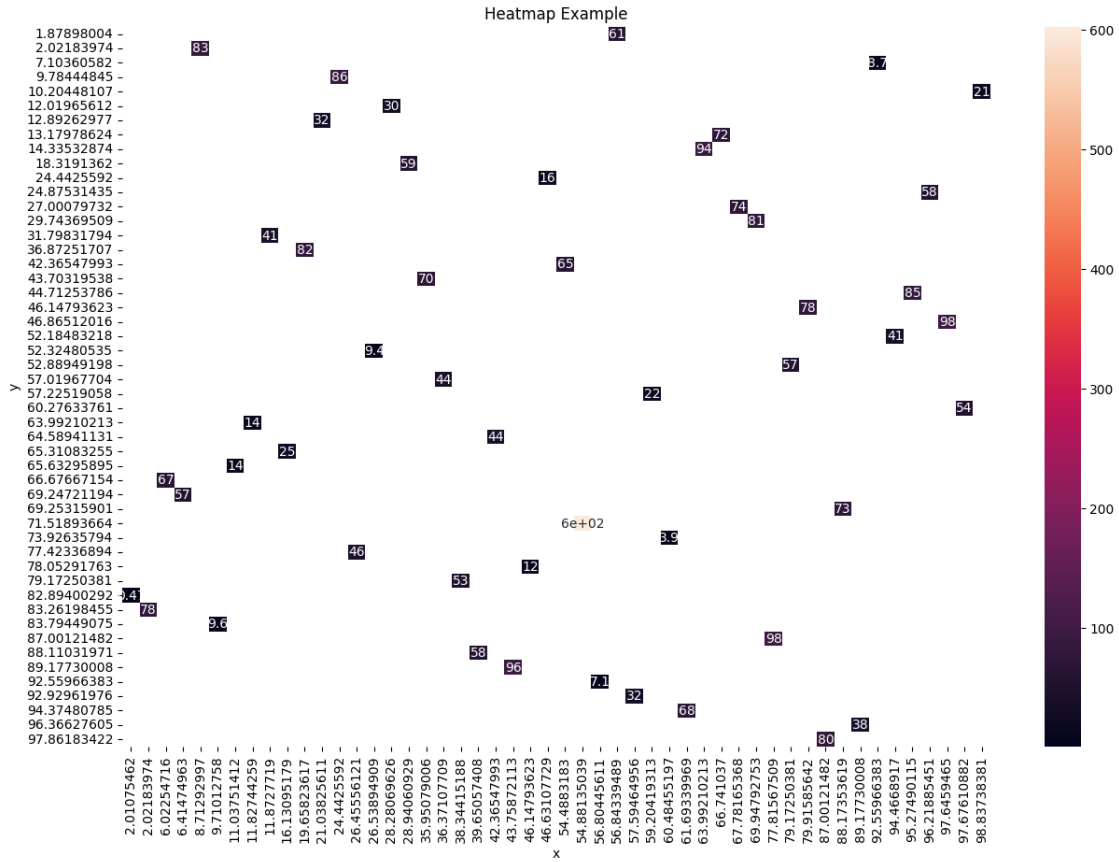


Heatmap

```
[12]: import seaborn as sns

# Create a pivot table for the heatmap
heatmap_data = data.pivot_table(index="y", columns="x", values="z")

# Heatmap
plt.figure(figsize=(15, 10))
sns.heatmap(heatmap_data, annot=True)
plt.title("Heatmap Example")
plt.show()
```

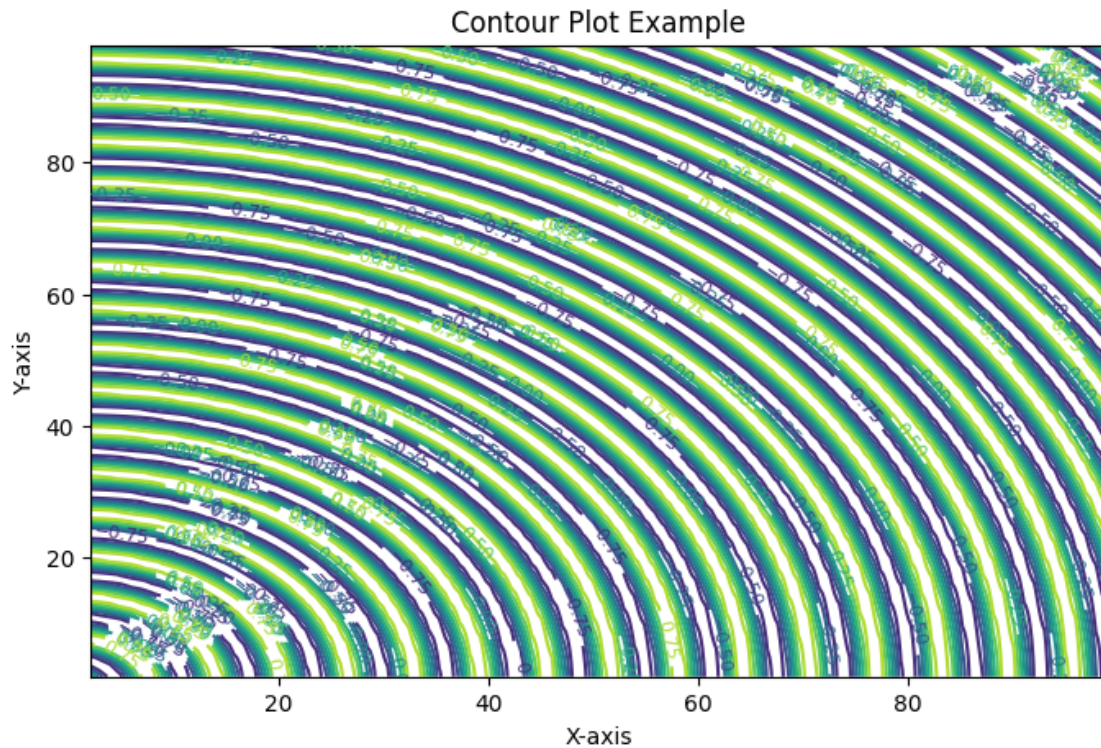


Contour Plot

```
[13]: import matplotlib.pyplot as plt
import numpy as np

# Generate grid data for contour plot
x = np.linspace(data["x"].min(), data["x"].max(), 100)
y = np.linspace(data["y"].min(), data["y"].max(), 100)
X, Y = np.meshgrid(x, y)
Z = np.sin(np.sqrt(X**2 + Y**2))

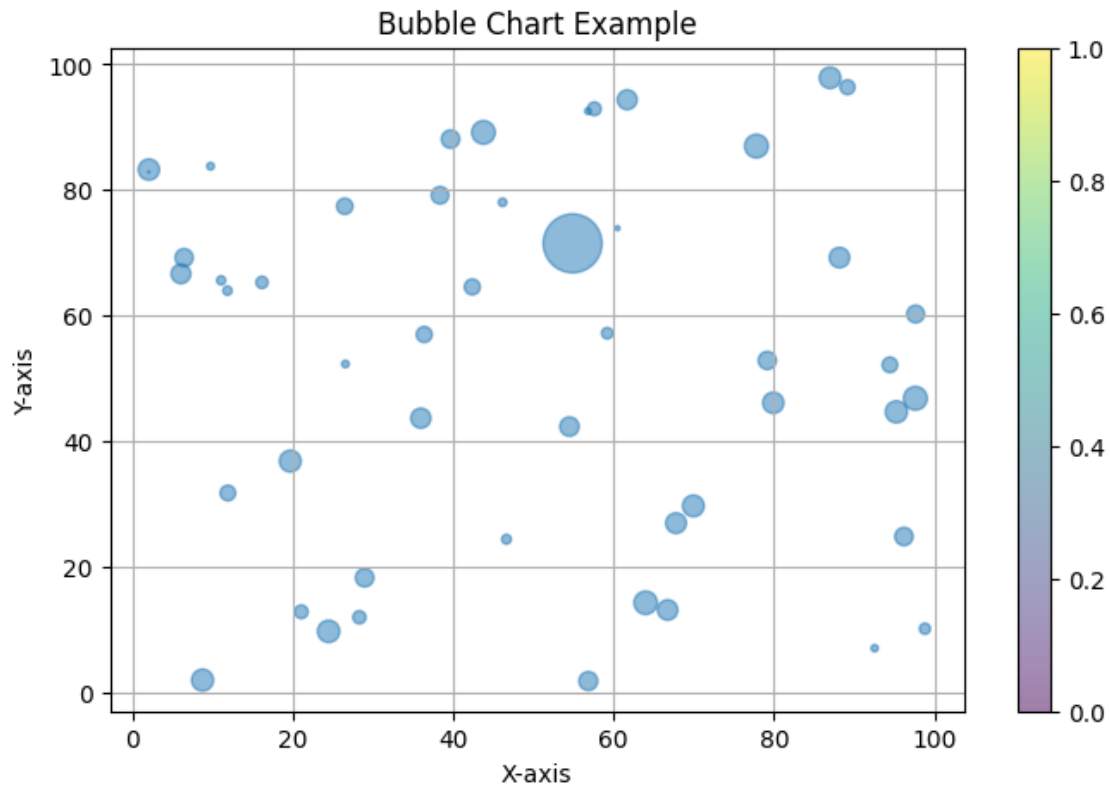
# Contour plot
plt.figure(figsize=(8, 5))
contour = plt.contour(X, Y, Z, cmap="viridis")
plt.clabel(contour, inline=True, fontsize=8)
plt.title("Contour Plot Example")
plt.xlabel("X-axis")
plt.ylabel("Y-axis")
plt.show()
```



Bubble chart

```
[14]: import matplotlib.pyplot as plt

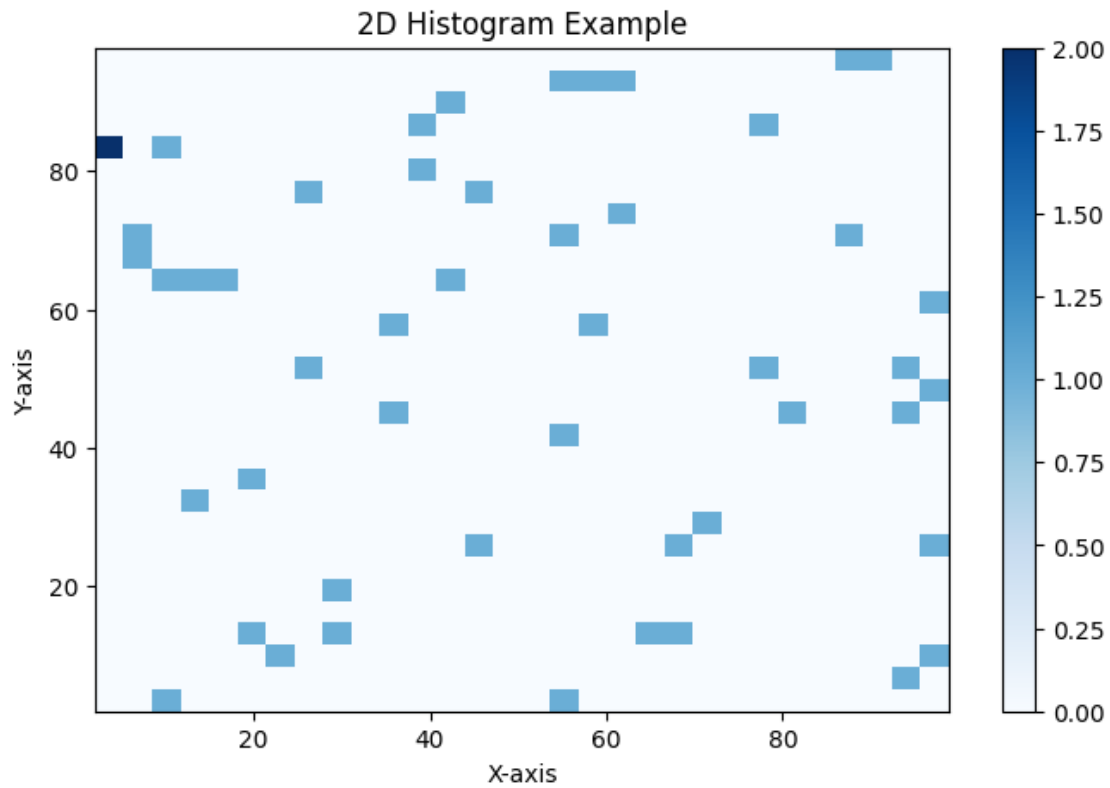
# Bubble chart
plt.figure(figsize=(8, 5))
plt.scatter(data["x"], data["y"], s=data["z"], alpha=0.5)
plt.colorbar()
plt.title("Bubble Chart Example")
plt.xlabel("X-axis")
plt.ylabel("Y-axis")
plt.grid(True)
plt.show()
```



Histogram

```
[15]: import matplotlib.pyplot as plt

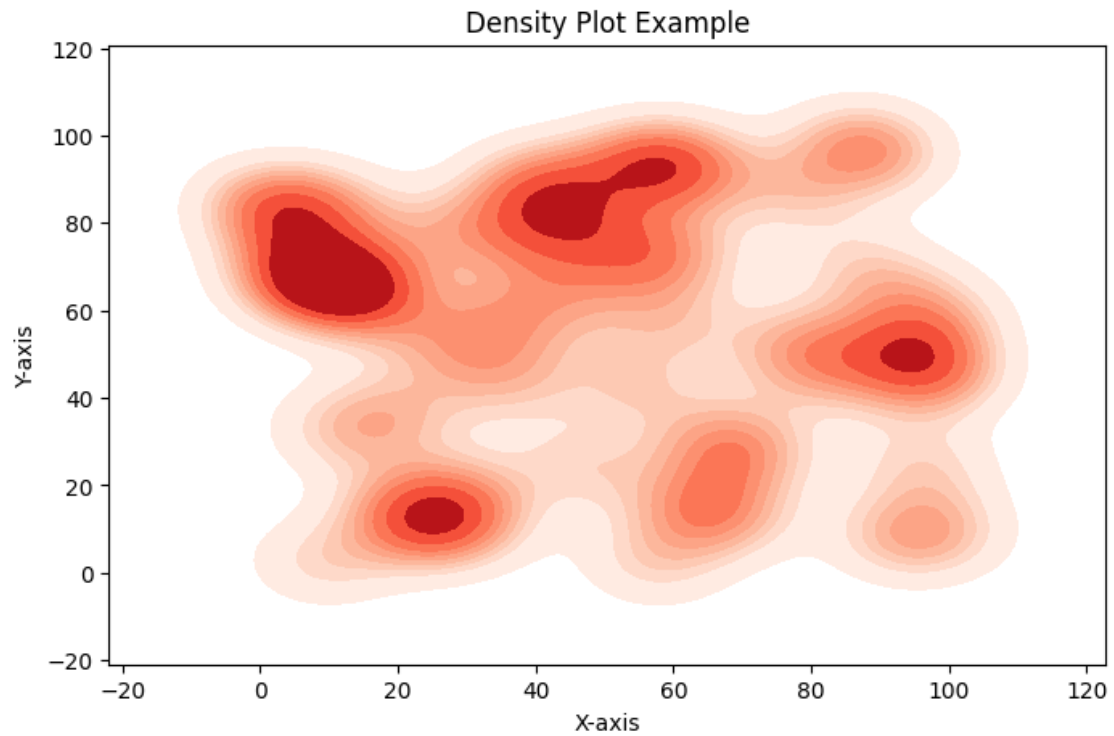
# 2D histogram
plt.figure(figsize=(8, 5))
plt.hist2d(data["x"], data["y"], bins=30, cmap="Blues")
plt.colorbar()
plt.title("2D Histogram Example")
plt.xlabel("X-axis")
plt.ylabel("Y-axis")
plt.show()
```



Density Plot

```
[16]: import seaborn as sns

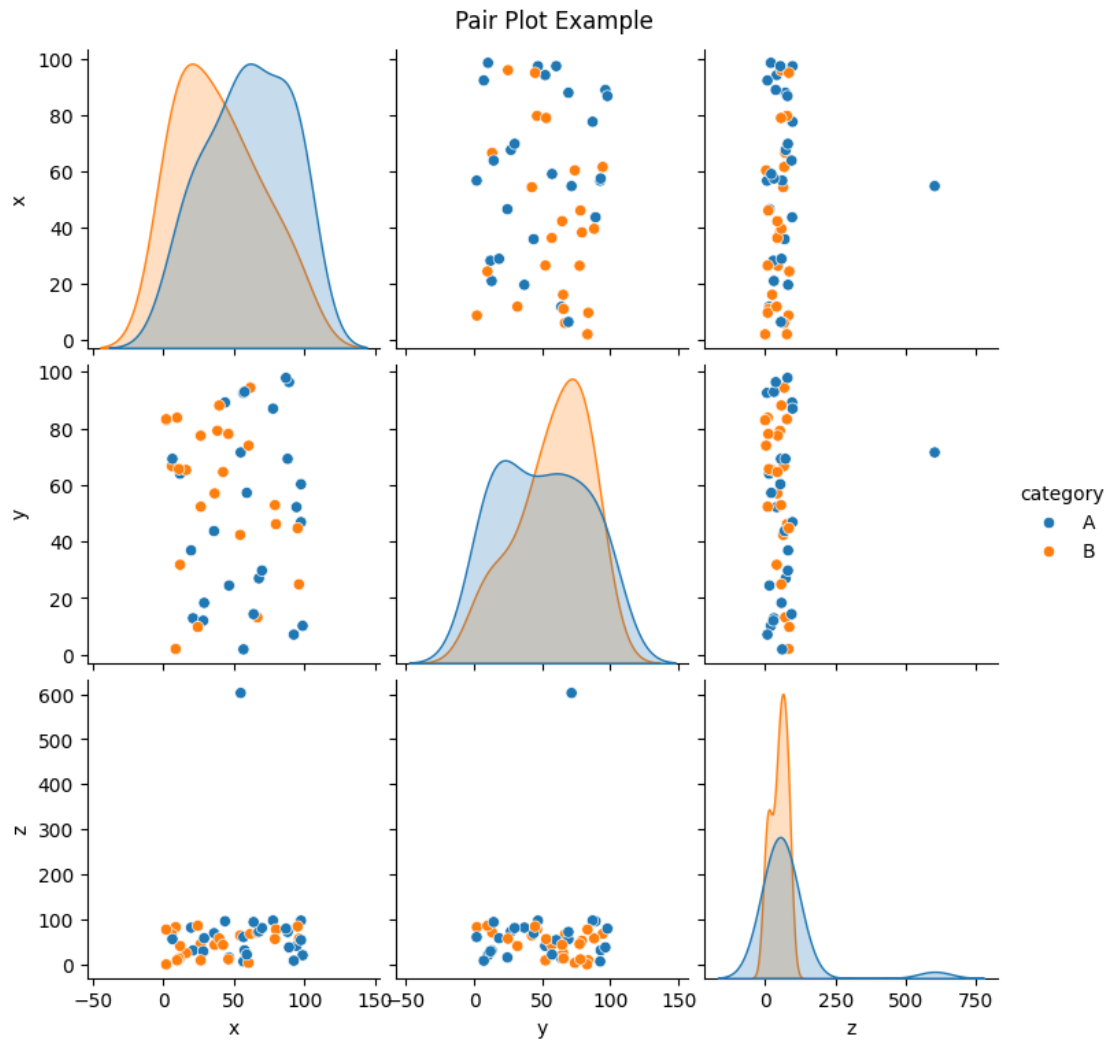
# Density plot
plt.figure(figsize=(8, 5))
sns.kdeplot(x=data["x"], y=data["y"], cmap="Reds", fill=True, bw_adjust=0.5)
plt.title("Density Plot Example")
plt.xlabel("X-axis")
plt.ylabel("Y-axis")
plt.show()
```



Pair Plot

```
[17]: import seaborn as sns

# Pair plot
sns.pairplot(data, hue="category") # Assuming 'category' is a categorical
    ↪variable
plt.suptitle("Pair Plot Example", y=1.02)
plt.show()
```



Hybrid

```
[18]: import matplotlib.pyplot as plt
import seaborn as sns

# Combined scatter and density plot
plt.figure(figsize=(8, 5))
sns.scatterplot(x="x", y="y", data=data, alpha=0.6)
sns.kdeplot(x=data["x"], y=data["y"], cmap="Reds", fill=True, bw_adjust=0.5)
plt.title("Combined Scatter and Density Plot Example")
plt.xlabel("X-axis")
plt.ylabel("Y-axis")
plt.grid(True)
plt.show()
```