**📊 Python Data Visualization Cheat Sheet – Matplotlib & Seaborn**

**🔹 Matplotlib – Basic Plots**

**Line Plot 📈**

🔹 **Used for** visualizing trends over time.

import matplotlib.pyplot as plt

x = [1, 2, 3, 4, 5]

y = [10, 20, 25, 30, 40]

plt.plot(x, y, marker='o', linestyle='-', color='b', label="Trend")

plt.xlabel("X-axis")

plt.ylabel("Y-axis")

plt.title("Line Plot Example")

plt.legend()

plt.grid(True)

plt.show()

**Bar Plot 📊**

🔹 **Used for** comparing categorical data.

categories = ['A', 'B', 'C', 'D']

values = [10, 25, 17, 30]

plt.bar(categories, values, color='skyblue', edgecolor='black')

plt.xlabel("Categories")

plt.ylabel("Values")

plt.title("Bar Plot Example")

plt.show()

**Scatter Plot 🔵**

🔹 **Used for** visualizing relationships between variables.

import numpy as np

x = np.random.rand(50)

y = np.random.rand(50)

plt.scatter(x, y, color='red', marker='x')

plt.xlabel("X-axis")

plt.ylabel("Y-axis")

plt.title("Scatter Plot Example")

plt.show()

**Histogram 📊**

🔹 **Used for** showing frequency distributions.

data = np.random.randn(1000)

plt.hist(data, bins=20, color='blue', edgecolor='black')

plt.xlabel("Value")

plt.ylabel("Frequency")

plt.title("Histogram Example")

plt.show()

**Pie Chart 🍕**

🔹 **Used for** displaying proportions.

labels = ['A', 'B', 'C', 'D']

sizes = [25, 35, 20, 20]

colors = ['gold', 'lightblue', 'lightgreen', 'pink']

plt.pie(sizes, labels=labels, colors=colors, autopct='%1.1f%%', startangle=90)

plt.title("Pie Chart Example")

plt.show()

**Box Plot 📦**

🔹 **Used for** showing data distribution and detecting outliers.

data = [np.random.randn(100), np.random.randn(100) + 2, np.random.randn(100) - 2]

plt.boxplot(data, labels=['A', 'B', 'C'])

plt.xlabel("Category")

plt.ylabel("Values")

plt.title("Box Plot Example")

plt.show()

**Heatmap (Using Seaborn) 🔥**

🔹 **Used for** showing relationships in matrices.

import seaborn as sns

data = np.random.rand(5, 5)

sns.heatmap(data, annot=True, cmap='coolwarm')

plt.title("Heatmap Example")

plt.show()

**🎨 Matplotlib Color Palettes**

**🔹 Basic Colors**

* 'r' = Red
* 'g' = Green
* 'b' = Blue
* 'c' = Cyan
* 'm' = Magenta
* 'y' = Yellow
* 'k' = Black

**🔹 Colormaps (for Gradients)**

|  |  |
| --- | --- |
| Colormap | Usage |
| viridis | Default colormap |
| plasma | Bright gradient |
| inferno | Darker colormap |
| coolwarm | Good for positive/negative values |

**🔹 Seaborn – Advanced Plots**

**Seaborn Line Plot**

🔹 **Used for** trends with confidence intervals.

import seaborn as sns

import pandas as pd

data = pd.DataFrame({'x': range(10), 'y': [i + (i%3) for i in range(10)]})

sns.lineplot(x='x', y='y', data=data, marker='o')

plt.title("Seaborn Line Plot")

plt.show()

**Seaborn Bar Plot**

🔹 **Used for** categorical comparisons.

sns.barplot(x=['A', 'B', 'C', 'D'], y=[10, 25, 17, 30], palette='coolwarm')

plt.title("Seaborn Bar Plot")

plt.show()

**Seaborn Scatter Plot**

🔹 **Used for** relationships between variables.

import numpy as np

x = np.random.rand(50)

y = np.random.rand(50)

sns.scatterplot(x=x, y=y, color='red', marker='x')

plt.title("Seaborn Scatter Plot")

plt.show()

**Seaborn Histogram (Distribution Plot)**

🔹 **Used for** showing distributions.

data = np.random.randn(1000)

sns.histplot(data, bins=20, color='blue', kde=True)

plt.title("Seaborn Histogram")

plt.show()

**Seaborn Pie Chart (Workaround using Matplotlib)**

labels = ['A', 'B', 'C', 'D']

sizes = [25, 35, 20, 20]

colors = sns.color\_palette('pastel')

plt.pie(sizes, labels=labels, colors=colors, autopct='%1.1f%%', startangle=90)

plt.title("Seaborn Pie Chart")

plt.show()

**Seaborn Box Plot**

🔹 **Used for** distribution and outliers.

sns.boxplot(data=[np.random.randn(100), np.random.randn(100) + 2, np.random.randn(100) - 2])

plt.title("Seaborn Box Plot")

plt.show()

**Seaborn Heatmap**

🔹 **Used for** visualizing correlations.

import seaborn as sns

import numpy as np

data = np.random.rand(5, 5)

sns.heatmap(data, annot=True, cmap='coolwarm')

plt.title("Seaborn Heatmap")

plt.show()

**🎨 Seaborn Color Palettes**

Seaborn provides **built-in color palettes** that can be used with palette=.

|  |  |
| --- | --- |
| Palette Name | Usage |
| deep | Default color palette |
| pastel | Soft colors |
| muted | Less saturated colors |
| bright | Vivid colors |
| dark | Darker colors |
| colorblind | Colorblind-friendly |

**🔹 Applying a Seaborn Color Palette**

sns.barplot(x=['A', 'B', 'C', 'D'], y=[10, 25, 17, 30], palette='pastel')

plt.title("Seaborn Bar Plot with Pastel Palette")

plt.show()

**📌 Final Summary**

|  |  |  |
| --- | --- | --- |
| Plot Type | Matplotlib Function | Seaborn Function |
| Line Plot | plt.plot() | sns.lineplot() |
| Bar Chart | plt.bar() | sns.barplot() |
| Scatter Plot | plt.scatter() | sns.scatterplot() |
| Histogram | plt.hist() | sns.histplot() |
| Pie Chart | plt.pie() | (Matplotlib only) |
| Box Plot | plt.boxplot() | sns.boxplot() |
| Heatmap | sns.heatmap() | sns.heatmap() |

✅ **Matplotlib** is great for static visualizations, while **Seaborn** enhances aesthetics.  
✅ **Use colormaps & color palettes** to improve visualization.  
✅ **Choose Seaborn for more elegant, readable charts.**