Seaborn

**Seaborn** is a Python visualization library based on Matplotlib that provides a high-level interface for drawing attractive and informative statistical graphics. It integrates well with pandas DataFrames and provides functions for creating complex plots with simple commands.

**1. Basics of Seaborn**

**1.1. Installing Seaborn**

You can install Seaborn using pip:

pip install seaborn

**1.2. Basic Plots**

**Example**: Scatter Plot

import seaborn as sns

import matplotlib.pyplot as plt

# Create a DataFrame

import pandas as pd

data = pd.DataFrame({

'x': [1, 2, 3, 4, 5],

'y': [2, 3, 5, 7, 11]

})

# Scatter plot

sns.scatterplot(data=data, x='x', y='y')

plt.title('Scatter Plot')

plt.show()

**Example**: Line Plot

# Line plot

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

plt.title('Line Plot')

plt.show()

**Example**: Histogram

import numpy as np

# Generate some data

data = np.random.randn(1000)

# Histogram

sns.histplot(data, kde=True) # kde=True adds a Kernel Density Estimate

plt.title('Histogram')

plt.show()

**Example**: Box Plot

# Create a DataFrame with multiple categories

data = pd.DataFrame({

'category': ['A', 'B', 'C', 'A', 'B', 'C'] \* 20,

'value': np.random.randn(120)

})

# Box plot

sns.boxplot(data=data, x='category', y='value')

plt.title('Box Plot')

plt.show()

**Advanced Seaborn Plots**

**2.1. PairPlots and PairGrids**

**PairPlot**: Useful for visualizing pairwise relationships in a dataset.

**Example**:

# Load the iris dataset

iris = sns.load\_dataset('iris')

# Pair plot

sns.pairplot(iris, hue='species')

plt.title('Pair Plot')

plt.show()

**PairGrid**: Offers more control compared to PairPlot. You can specify what to plot on the diagonal and off-diagonal.

**Example**:

# PairGrid example

g = sns.PairGrid(iris, diag\_sharey=False)

g.map\_lower(sns.scatterplot)

g.map\_diag(sns.kdeplot)

plt.title('Pair Grid')

plt.show()

**2.2. FacetGrids**

**FacetGrid**: Creates a grid of subplots based on the values of one or more categorical variables.

**Example**:

# FacetGrid example

g = sns.FacetGrid(iris, col='species', hue='species')

g.map(sns.scatterplot, 'sepal\_length', 'sepal\_width')

g.add\_legend()

plt.show()

**Customizing Seaborn Visualizations**

**3.1. Custom Palettes and Styles**

**Custom Palettes**: Seaborn allows you to use and create custom color palettes.

**Example**:

# Custom color palette

palette = sns.color\_palette(["#FF5733", "#33FF57", "#3357FF"])

sns.scatterplot(data=iris, x='sepal\_length', y='sepal\_width', hue='species', palette=palette)

plt.title('Custom Palette')

plt.show()

**Custom Styles**: Modify the overall style of the plots.

**Example**:

# Set style

sns.set\_style('whitegrid')

# Plot with custom style

sns.lineplot(data=iris, x='sepal\_length', y='sepal\_width', hue='species')

plt.title('Custom Style')

plt.show()

**3.2. Annotating Plots**

**Annotating**: Add text annotations to plots for better understanding.

**Example**:

# Scatter plot with annotation

plt.figure(figsize=(8, 6))

sns.scatterplot(data=iris, x='sepal\_length', y='sepal\_width', hue='species')

# Annotate

for i in range(len(iris)):

plt.text(iris.sepal\_length[i], iris.sepal\_width[i], iris.species[i], fontsize=9)

plt.title('Scatter Plot with Annotations')

plt.show()

**Integrating Seaborn with Matplotlib**

**4.1. Combining Seaborn and Matplotlib Elements**

**Example**: Use Seaborn to create a plot and Matplotlib to further customize it.

# Create a seaborn plot

sns.lineplot(data=iris, x='sepal\_length', y='sepal\_width', hue='species')

# Customize with matplotlib

plt.title('Seaborn Plot with Matplotlib Customizations')

plt.xlabel('Sepal Length')

plt.ylabel('Sepal Width')

plt.grid(True)

plt.show()

**4.2. Advanced Plot Customizations**

**Example**: Combine Seaborn plots with Matplotlib annotations and adjustments.

# Create a seaborn plot

ax = sns.scatterplot(data=iris, x='sepal\_length', y='sepal\_width', hue='species')

# Advanced customization with matplotlib

ax.set\_title('Advanced Customizations')

ax.set\_xlabel('Sepal Length')

ax.set\_ylabel('Sepal Width')

ax.legend(title='Species', loc='upper left')

plt.grid(True)

plt.show()

**Summary**

* **Seaborn Basics**: Includes simple plots like scatter, line, histogram, and box plots.
* **Advanced Seaborn Plots**: Covers PairPlots, PairGrids, and FacetGrids for exploring data relationships and facets.
* **Customizing Seaborn Visualizations**: Customizes plots using color palettes, styles, and annotations.
* **Integrating with Matplotlib**: Combines Seaborn with Matplotlib for further customization and advanced plot features.