**Exercise 9**

**Aim**

To develop a data visualization program using the Iris dataset to display various plots using the Matplotlib library.

**Algorithm**

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| Step 1 | **:** | Start the Program. |
| Step 2 | **:** | Import the necessary libraries |
| Step 3 | **:** | Load the iris Dataset |
| Step 4 | **:** | Create a Scatter Plot, Line Plot, Box Plots, Bar Plot, Histogram, Pie Chart |
| Step 5 | **:** | Display all the plots |
| Step 6 | **:** | Stop the Program. |

**Program:**

import matplotlib.pyplot as plt

import seaborn as sns

import pandas as pd

# Load the Iris dataset

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

# Display the first few rows of the dataset

print(iris.head())

# Basic Plotting: Scatter Plot

plt.figure(figsize=(10, 6))

sns.scatterplot(data=iris, x='sepal\_length', y='sepal\_width', hue='species', style='species', s=100)

plt.title('Sepal Length vs Sepal Width')

plt.xlabel('Sepal Length (cm)')

plt.ylabel('Sepal Width (cm)')

plt.legend(title='Species')

plt.grid()

plt.show()

# Customization of Plots: Line Plot (average sepal width by species)

avg\_sepal\_width = iris.groupby('species')['sepal\_width'].mean().reset\_index()

plt.figure(figsize=(10, 6))

plt.plot(avg\_sepal\_width['species'], avg\_sepal\_width['sepal\_width'], marker='o', linestyle='-', color='b')

plt.title('Average Sepal Width by Species')

plt.xlabel('Species')

plt.ylabel('Average Sepal Width (cm)')

plt.grid()

plt.show()

# Subplots: Petal Length and Width

fig, axes = plt.subplots(1, 2, figsize=(12, 5))

sns.boxplot(ax=axes[0], data=iris, x='species', y='petal\_length', hue='species', palette='pastel', legend=False)

axes[0].set\_title('Boxplot of Petal Length by Species')

sns.boxplot(ax=axes[1], data=iris, x='species', y='petal\_width', hue='species', palette='pastel', legend=False)

axes[1].set\_title('Boxplot of Petal Width by Species')

plt.tight\_layout()

plt.show()

# Bar Plot: Count of Species

plt.figure(figsize=(8, 5))

sns.countplot(data=iris, x='species', hue='species', palette='Set2', legend=False)

plt.title('Count of Iris Species')

plt.xlabel('Species')

plt.ylabel('Count')

plt.show()

# Histogram: Distribution of Sepal Length

plt.figure(figsize=(8, 5))

plt.hist(iris['sepal\_length'], bins=20, color='skyblue', edgecolor='black')

plt.title('Distribution of Sepal Length')

plt.xlabel('Sepal Length (cm)')

plt.ylabel('Frequency')

plt.grid()

plt.show()

# Pie Chart: Species Distribution

species\_counts = iris['species'].value\_counts()

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

plt.pie(species\_counts, labels=species\_counts.index, autopct='%1.1f%%', startangle=90, colors=sns.color\_palette('pastel'))

plt.title('Distribution of Iris Species')

plt.axis('equal') # Equal aspect ratio ensures that pie is drawn as a circle.

plt.show()

# Save a Figure

plt.figure(figsize=(8, 5))

sns.countplot(data=iris, x='species', hue='species', palette='Set2', legend=False)

plt.title('Count of Iris Species')

plt.xlabel('Species')

plt.ylabel('Count')

plt.savefig('iris\_species\_count.png')

plt.show()

**Output**

**Result**

The Data Visualization Program was successfully executed using the Matplotlib library and displayed various plots of the Iris dataset.