Multi-Data Series Violin Plot

1. **Task Description**

Create a violin plot with multiple data series.

A violin plot is a statistical visualization that shows the distribution of data across multiple categories, combining aspects of a box plot and a kernel density plot. Below is a detailed guide to create a violin plot with multiple data series using Python's `matplotlib` and `seaborn`.

Steps to Create a Violin Plot with Multiple Data Series

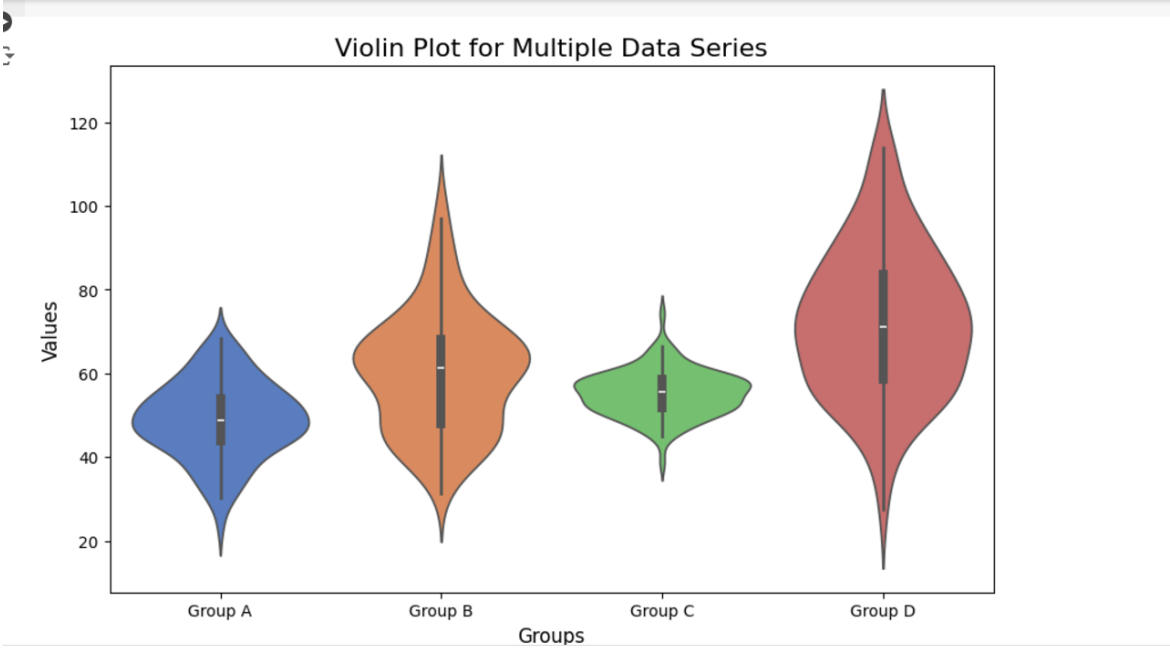
1. **Import Necessary Libraries**: Use `seaborn` for creating violin plots and `matplotlib` for fine-tuning visualizations.
2. **Prepare the Data**: Organize your data into a format suitable for plotting, such as a list of arrays, a dictionary, or a DataFrame. For multiple series, each category should have its own data series.
3. **Plot the Violin Plot**: Use `seaborn.violinplot()` for efficient plotting of multiple data series.
4. **Customize the Plot**: Add labels, titles, and other formatting options to make the plot more informative.

Output:

The result is a violin plot showing the distribution of values for each group (e.g., Group A, Group B). Each violin displays:

- The density of data points (thicker areas indicate more data points).
- Quartiles and median lines (if enabled).

2.Task Output



- **CODE:**

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

np.random.seed(42)
data_series = {
    "Group A": np.random.normal(50, 10, 100),
    "Group B": np.random.normal(60, 15, 100),
    "Group C": np.random.normal(55, 5, 100),
    "Group D": np.random.normal(70, 20, 100),
}

categories = list(data_series.keys())
data = [data_series[category] for category in categories]

plt.figure(figsize=(10, 6))
sns.violinplot(data=data, palette="muted")

plt.xticks(ticks=np.arange(len(categories)), labels=categories)
plt.title("Violin Plot for Multiple Data Series", fontsize=16)
```

```
  plt.xlabel("Groups", fontsize=12)
  plt.ylabel("Values", fontsize=12)

  plt.show()

```