ASCII Line Chart in Python using Matplotlib

Author: Saif Ullah

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Introduction

This document explains how to create an **ASCII Line Chart** in Python using the `NumPy` and `Matplotlib` libraries. An ASCII chart is printed directly to the console using characters, while Matplotlib provides the corresponding graphical output.

Step-by-Step Explanation

Step 1: Import Required Libraries
We import NumPy for numerical computations and Matplotlib for visualization.

Step 2: Create Data
Using `np.linspace()`, we generate 40 evenly spaced points between 0 and 10, and then compute their sine values using `np.sin()`.

Step 3: Normalize Values
The sine values are scaled to fit into a fixed ASCII height (15 lines). This helps map floating values into discrete text rows.

Step 4: Build ASCII Chart
We create a 2D list (matrix) of characters. Each value is represented by an asterisk (*) placed in the correct row according to its normalized value.

Step 5: Print and Plot
The ASCII chart is printed to the terminal, and Matplotlib is used to display a smooth sine curve.

Python Code Implementation

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

# Step 1: Create data
x = np.linspace(0, 10, 40)
y = np.sin(x)

# Step 2: Normalize values to fit ASCII height
```

```
height = 15
y_min, y_max = y.min(), y.max()
y_scaled = ((y - y_min) / (y_max - y_min) * (height - 1)).astype(int)

# Step 3: Build ASCII chart
canvas = [[' ' for _ in range(len(x))] for _ in range(height)]

for i, val in enumerate(y_scaled):
    canvas[height - val - 1][i] = '*'

# Step 4: Print the ASCII chart
for row in canvas:
    print(''.join(row))

# Step 5 (Optional): Also show the Matplotlib plot
plt.plot(x, y)
plt.title("Matplotlib + ASCII Line Chart")
plt.show()
```

Example Output

Below is a sample sine curve image similar to the one generated by the Matplotlib section of the above code.

Conclusion

This approach demonstrates how ASCII-based visualizations can be created in text-only environments for quick and lightweight data visualization. Matplotlib, on the other hand, provides a full graphical interface, allowing visual comparison with the ASCII version.

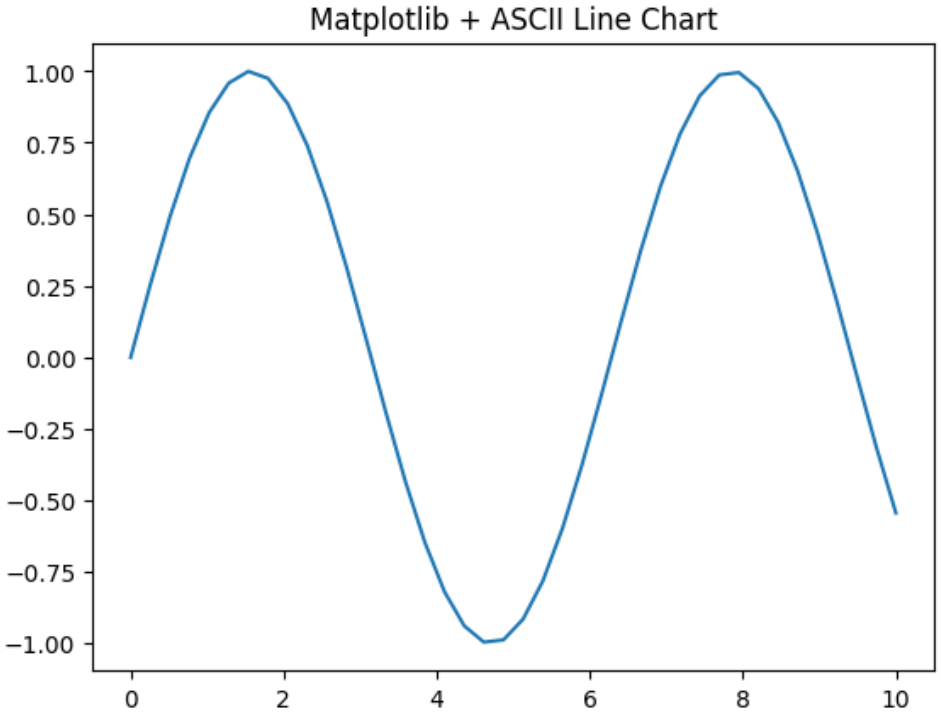

Figure 1: Matplotlib plot of the sine curve corresponding to the ASCII chart.