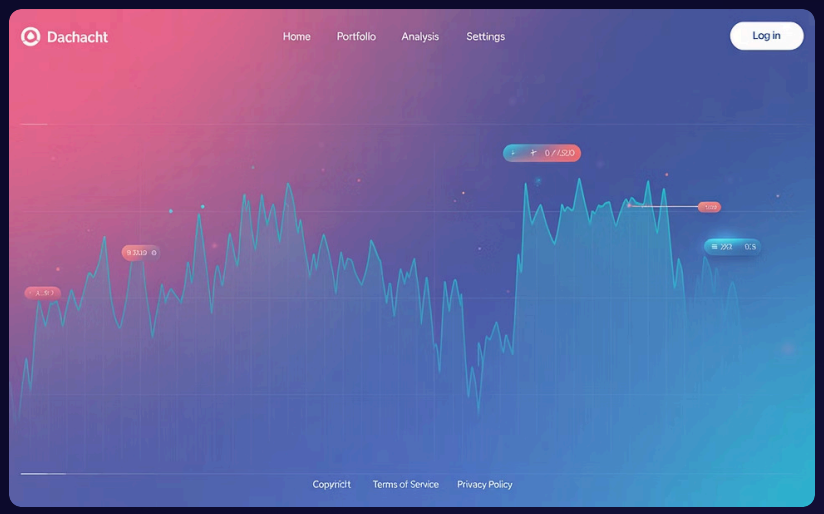
Data Visualization with Matplotlib and Seaborn

Welcome to Week 3! Today we'll explore how to transform raw data into compelling visual stories using Python's most powerful visualization libraries.

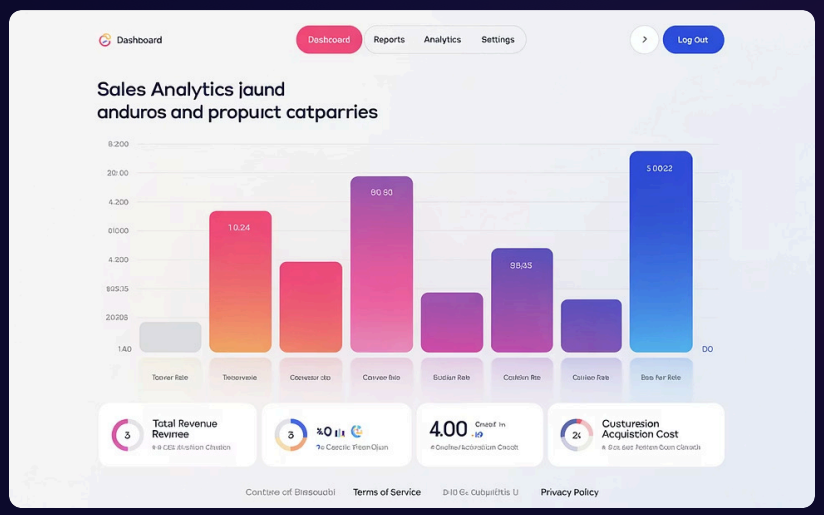
by S MM

Introduction to Matplotlib



Line Plots

Perfect for tracking changes over time. They reveal trends, cycles, and fluctuations in sequential data.

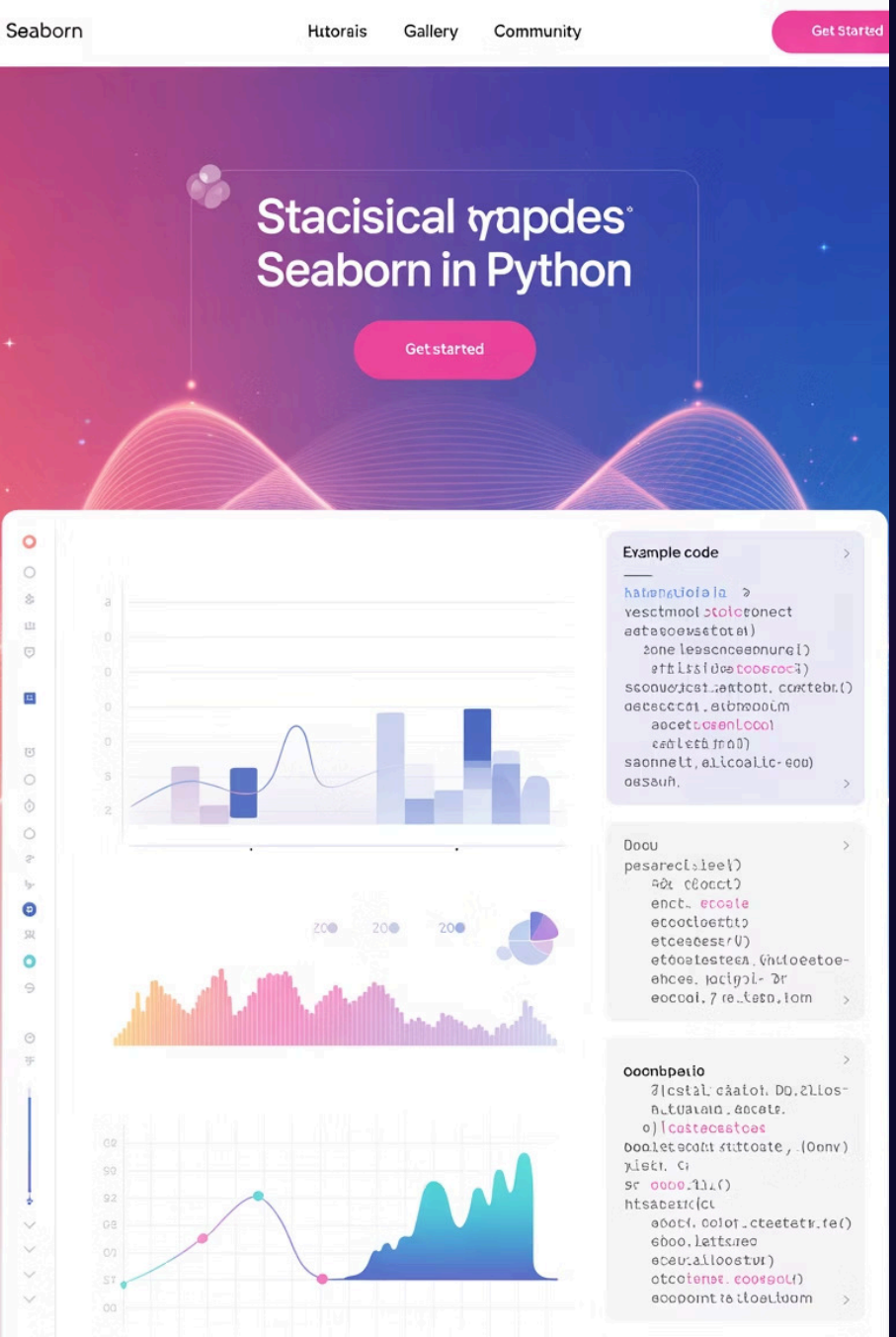


Bar Charts

Ideal for comparing quantities across categories. They show differences at a glance.

Pie Charts

Best for showing proportions of a whole. They illustrate relative contributions to a total.



Statistical Visualization with Seaborn

Histograms

Show distribution of a single variable. Reveal central tendency, spread, and outliers.

Boxplots

Display median, quartiles, and outliers. Compare distributions across multiple categories.

Heatmaps

Visualize correlation matrices. Show relationships between variables using color intensity.

Customizing Your Charts

Essential Elements

- Descriptive titles that explain the insight
- Clear axis labels with units
- Appropriate color schemes for data type
- Legends that explain categories

```
plt.figure(figsize=(10, 6))
plt.plot(x, y, color='#0077b6')
plt.title('Monthly Revenue Growth')
plt.xlabel('Month (2023)')
plt.ylabel('Revenue ($)')
plt.grid(True, alpha=0.3)
plt.tight_layout()
```

Choosing the Right Chart

Time Series

Use line charts for data points over time. Shows trends, seasonality, and cyclical patterns.

Relationships

Scatter plots for two variables. Heatmaps for multiple correlations.

Comparisons

Bar charts for comparing categories. Horizontal bars work well for many categories.

Distributions

Histograms or density plots for showing data spread. Box plots for multiple distributions.

Interpreting Visual Results

Look for Patterns

Identify trends, clusters, and outliers. Ask why they appear and what they mean.

Consider Context

Relate visual insights to business knowledge. Charts don't exist in isolation.

Question Assumptions

Check if visualizations confirm or challenge your hypotheses. Be open to surprises.

Remember: the goal isn't just pretty pictures. Good visualizations lead to actionable insights.

Activity: Visual Storytelling

Your Task

Create a visual narrative using the retail sales dataset. Tell a compelling story through carefully chosen visualizations.

Requirements

- Use at least 3 different chart types
- Include proper titles and labels
- Write brief interpretations of each chart

Process

1. Explore the dataset and identify key questions
2. Select appropriate visualizations for each question
3. Create and customize your charts
4. Arrange charts in a logical narrative flow
5. Present your findings to the class

Key Takeaways

1 Master Basic Chart Types

Learn the fundamental visualizations in Matplotlib and Seaborn. They form the building blocks of data storytelling.

2 Choose Charts Strategically

Match visualization types to your data and the story you want to tell. The right chart makes insights obvious.

3 Customize for Clarity

Proper labels, colors, and formatting make visualizations accessible. Details matter for understanding.

4 Focus on Insights

The ultimate goal is to reveal patterns and guide decisions. Let your visuals lead to actionable conclusions.