

Lesson 17: Matplotlib Basics

Data Science with Python – BSc Course

45 Minutes

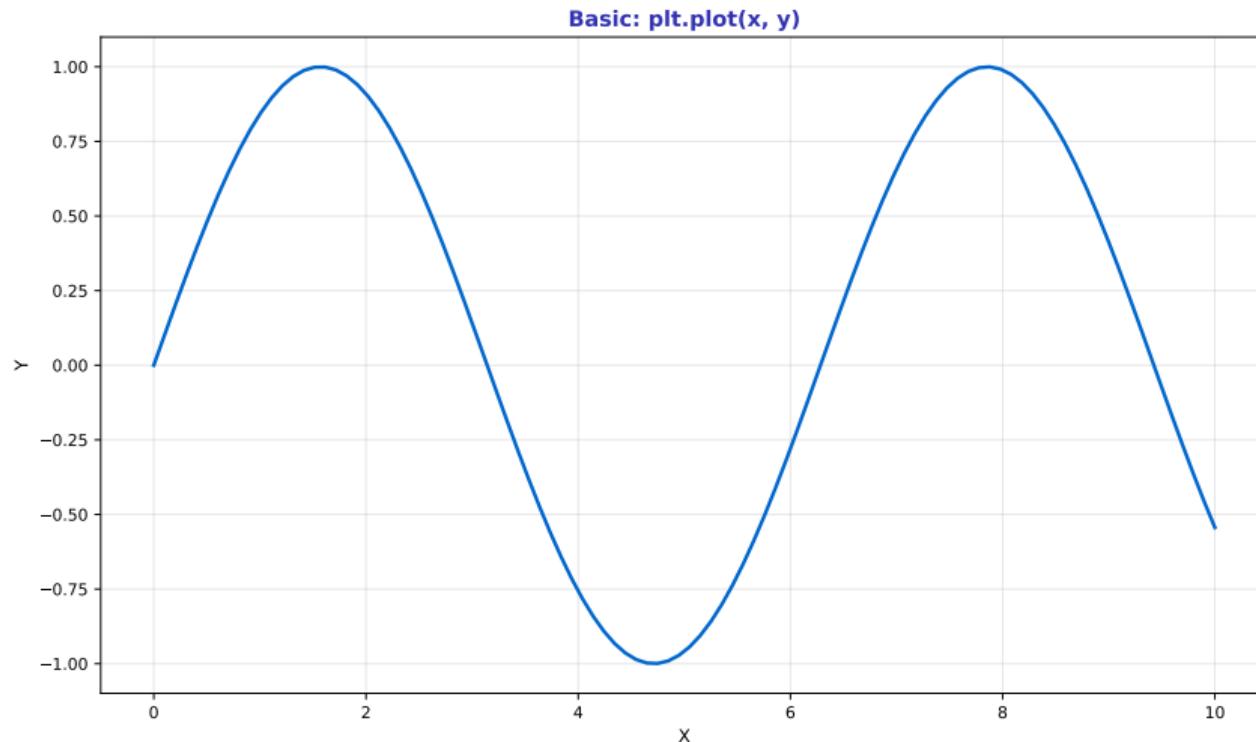
Learning Objectives

After this lesson, you will be able to:

- Create line, bar, and scatter plots
- Customize colors, labels, legends
- Build multi-panel figures
- Add annotations and formatting

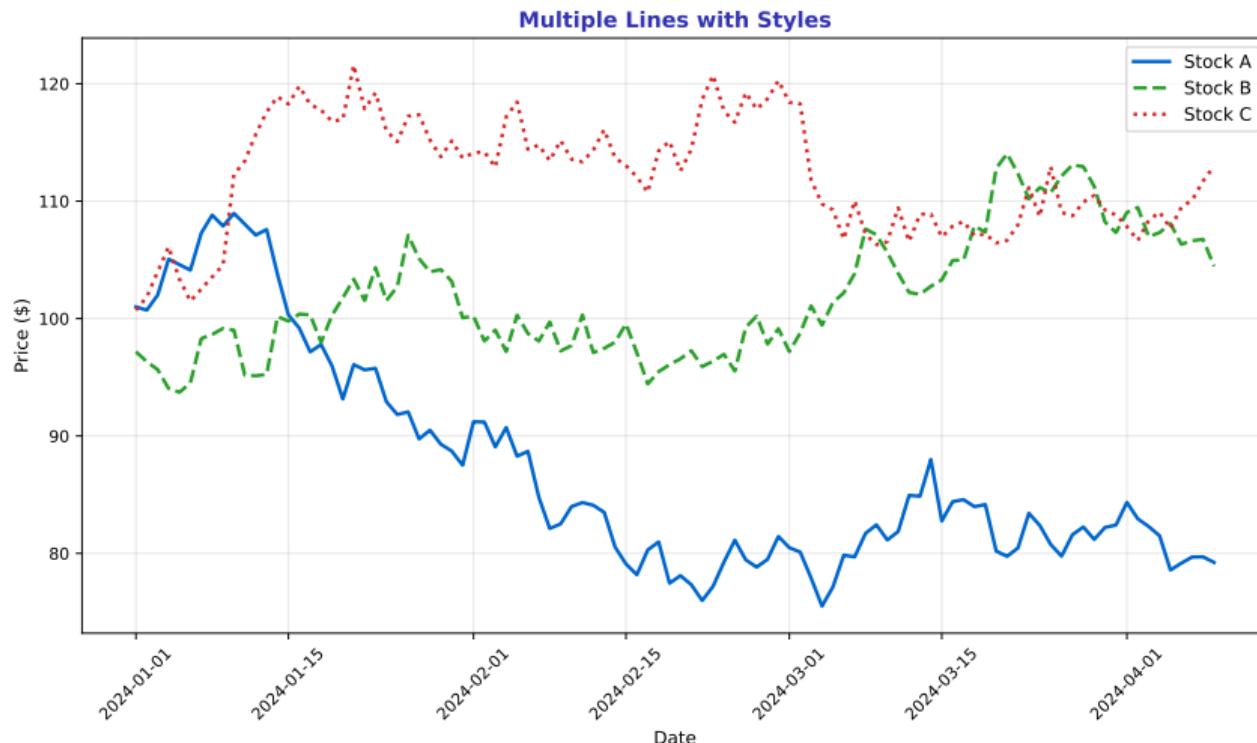
Finance application: Statistical analysis of market data

Basic Line Plot



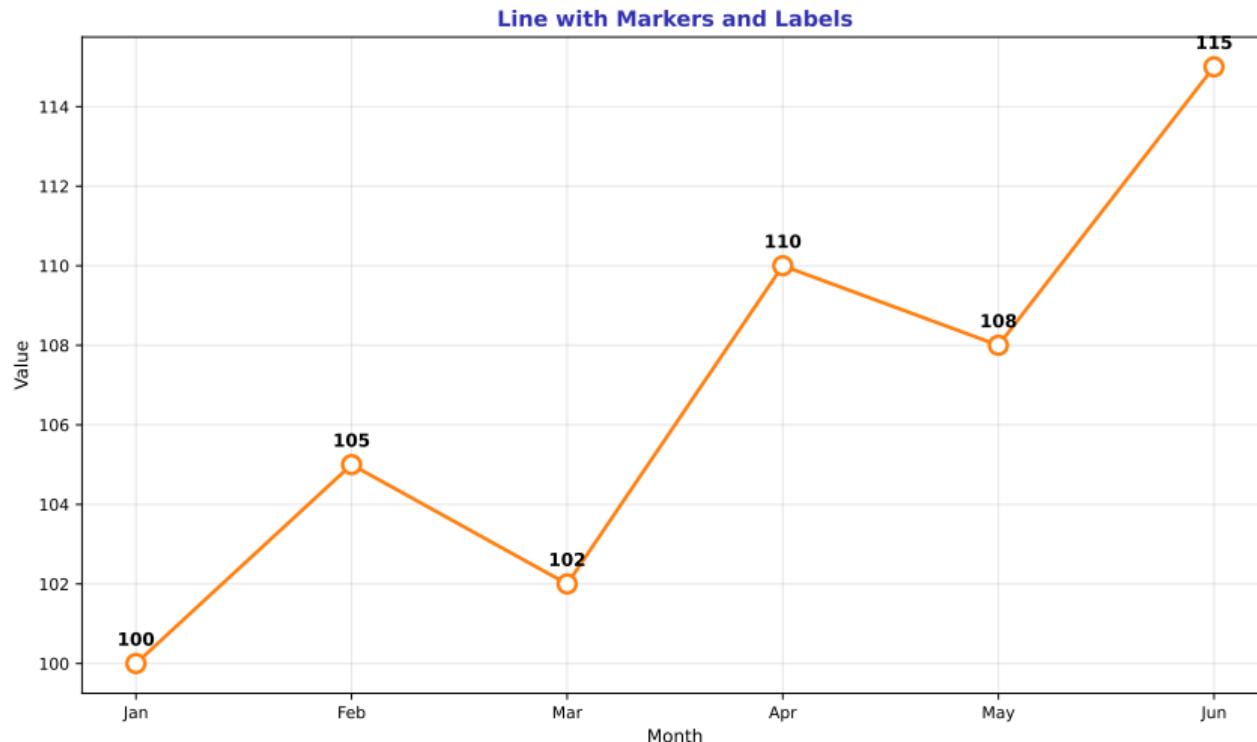
`plt.plot(x, y)` for simple line charts

Multiple Lines



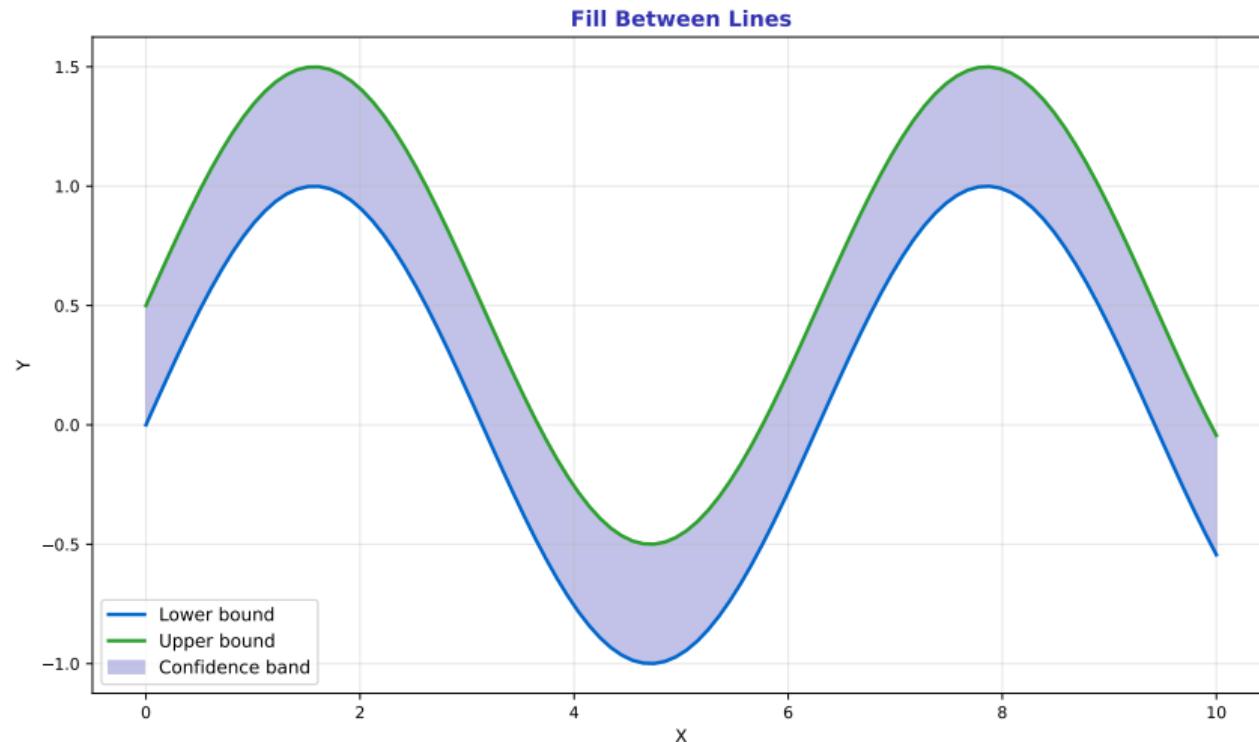
Comparing multiple time series

Line with Markers



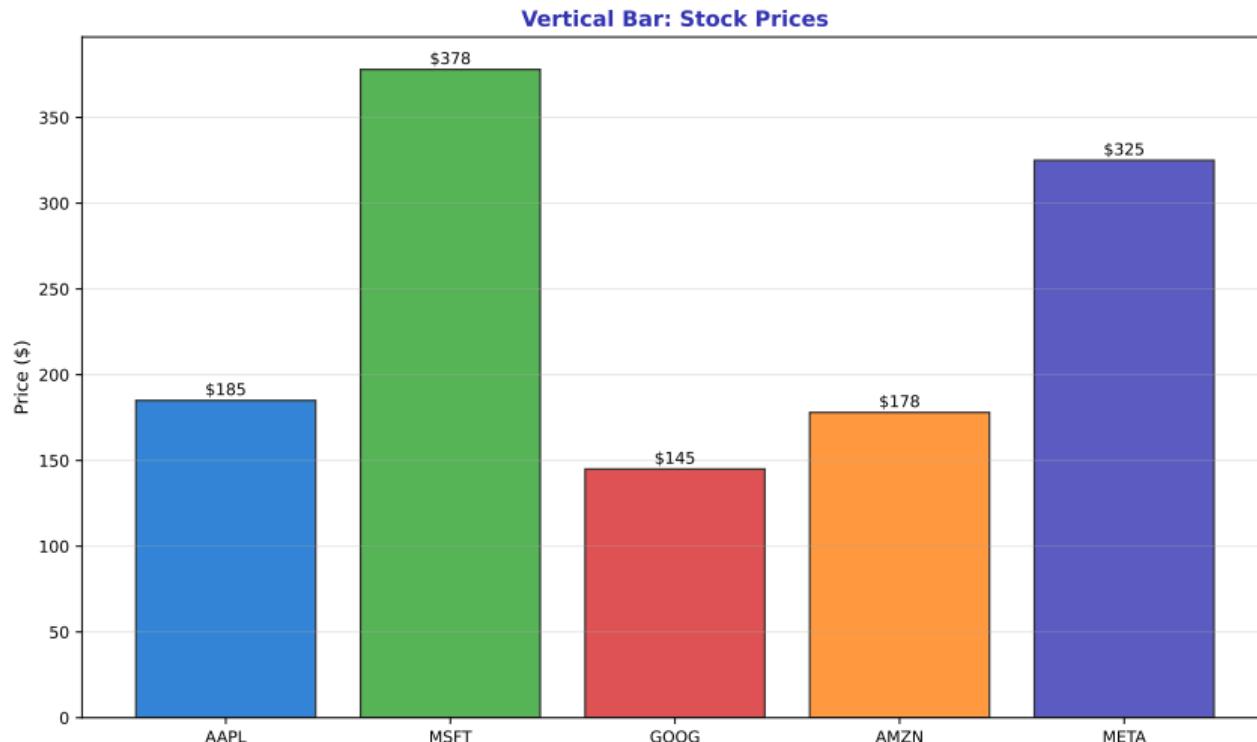
Adding data point markers

Fill Between



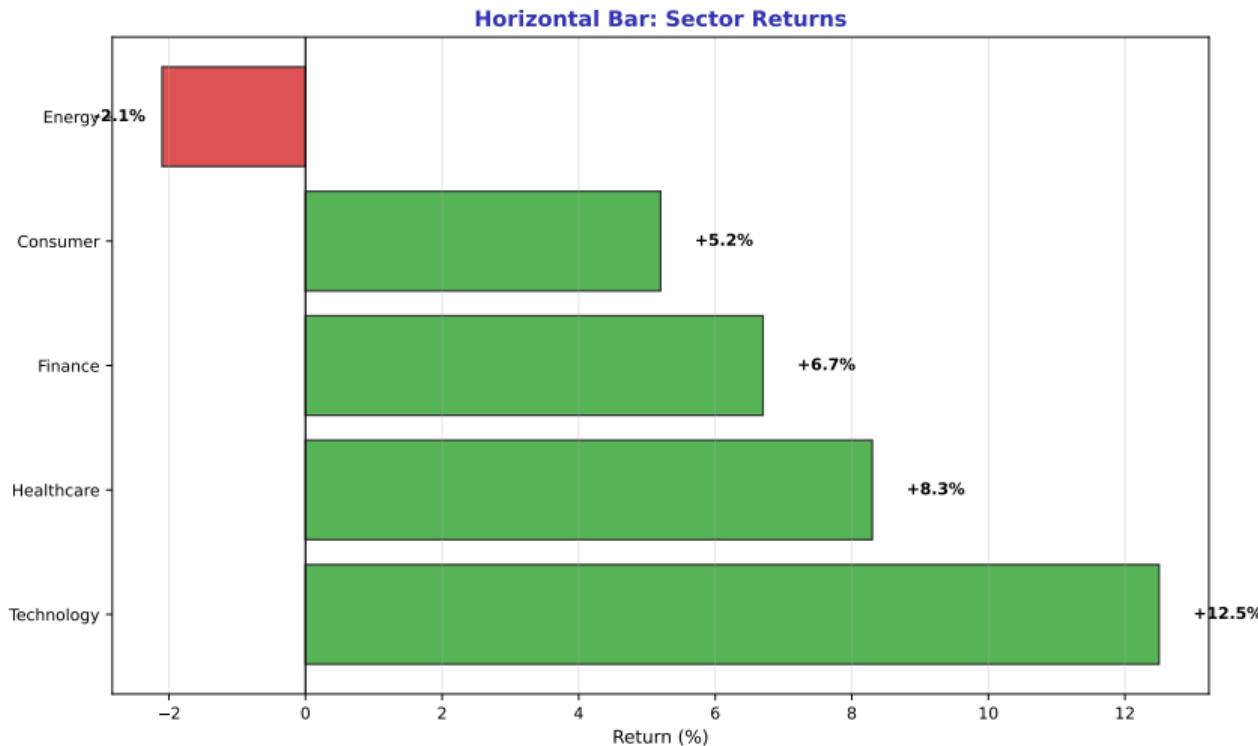
Shading area between lines

Vertical Bar



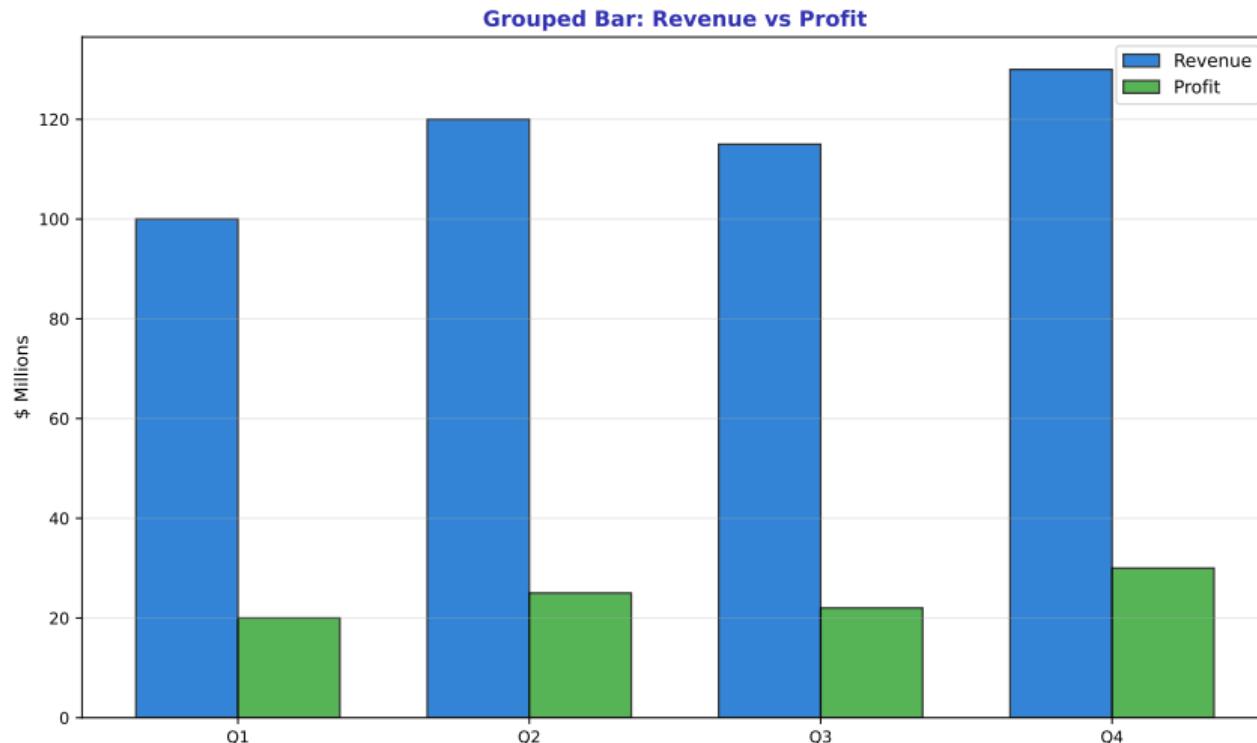
Comparing categorical values

Horizontal Bar



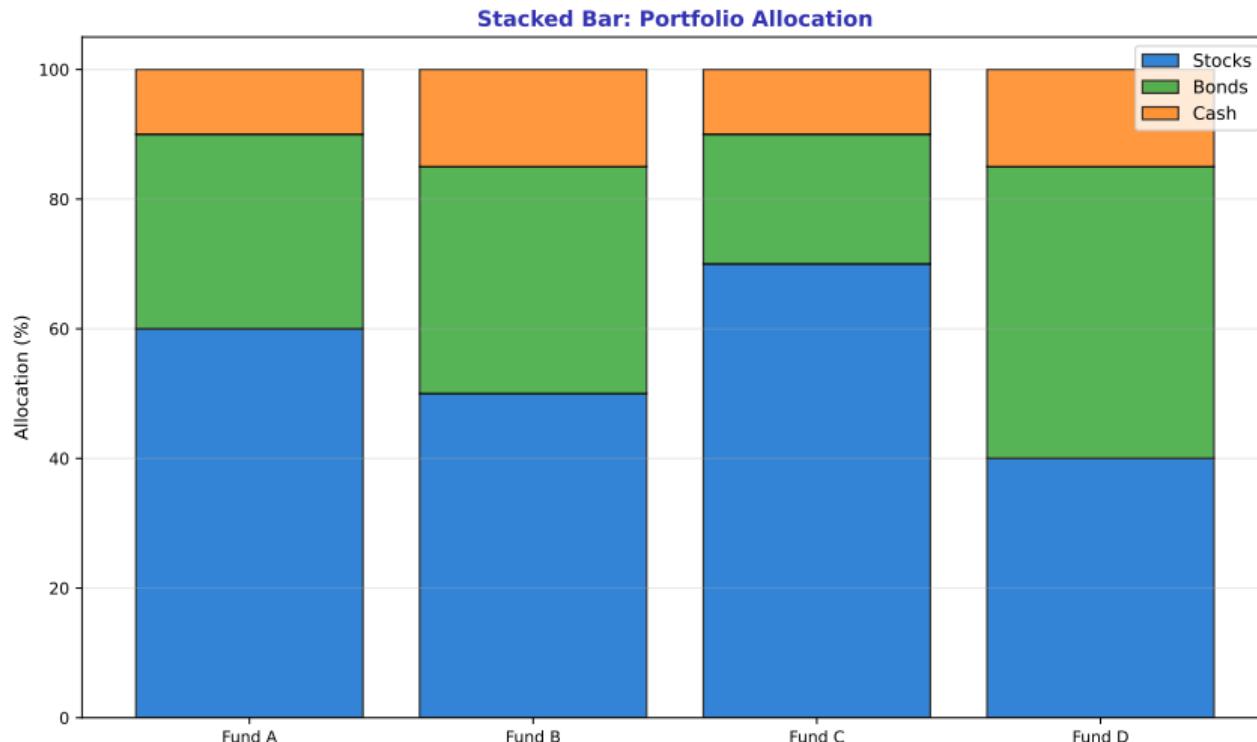
Better for long category names

Grouped Bar



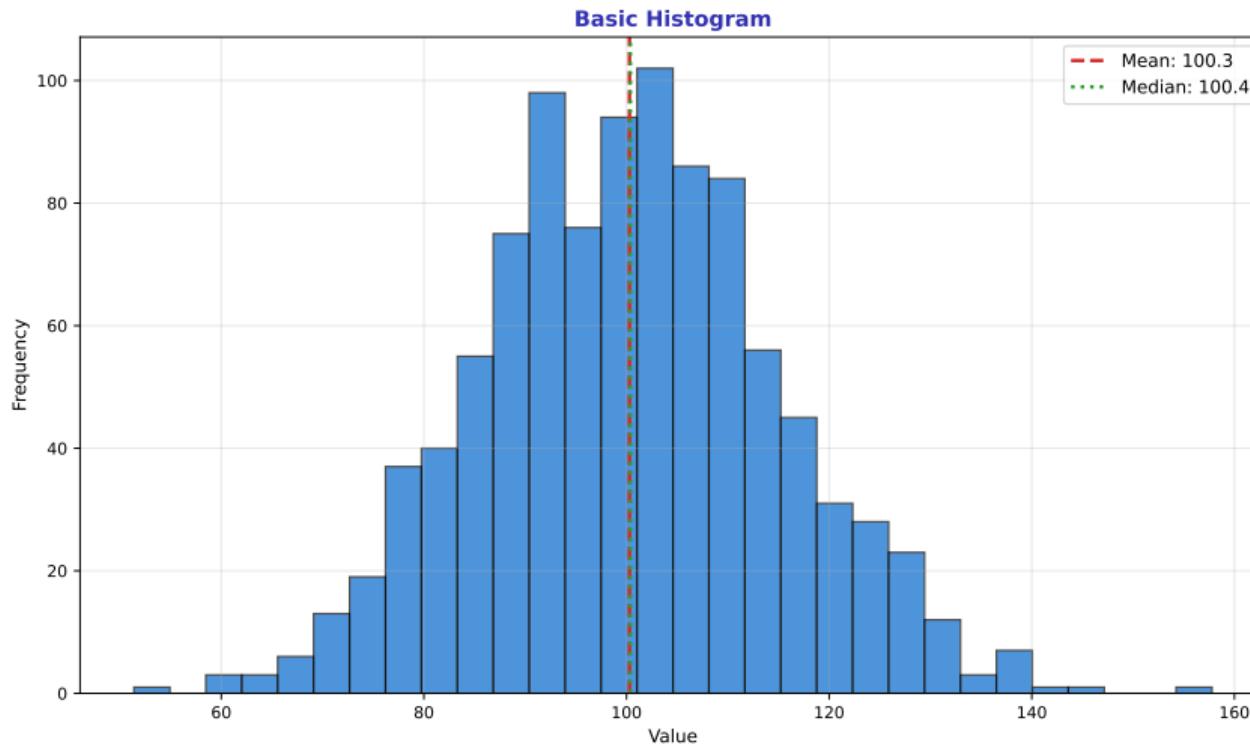
Comparing multiple series by category

Stacked Bar



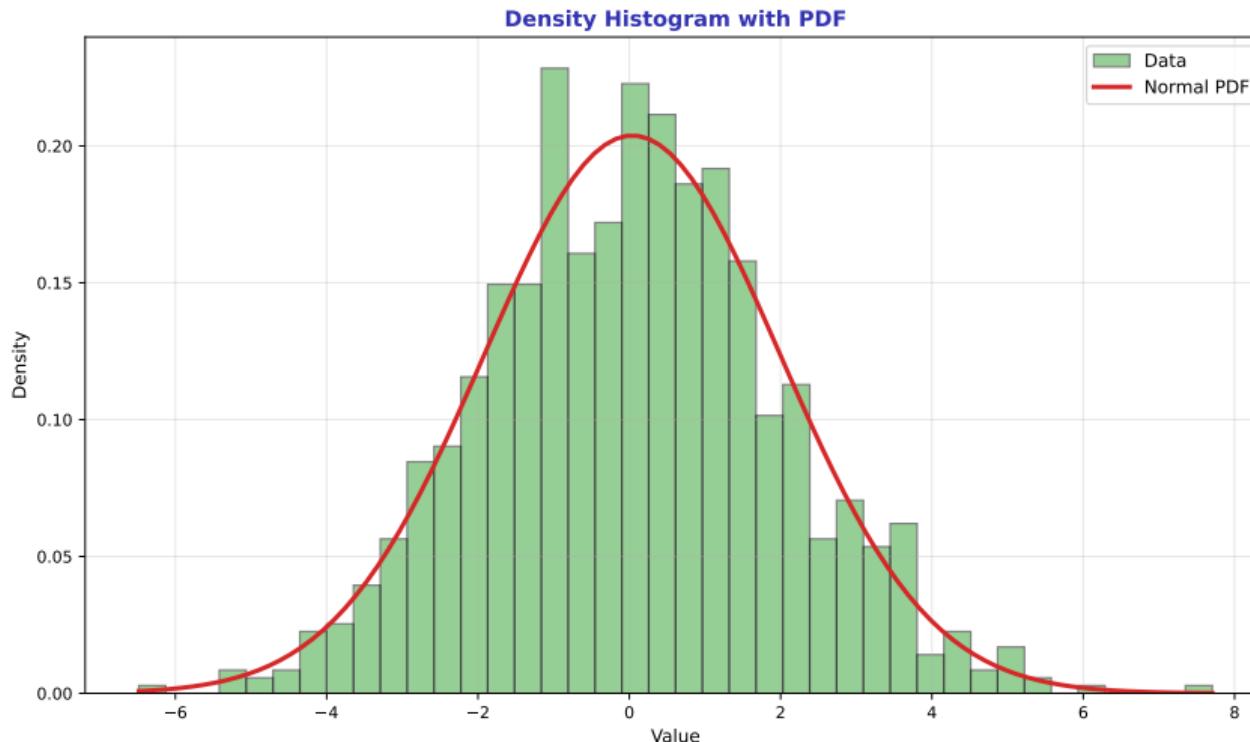
Showing composition of totals

Basic Histogram



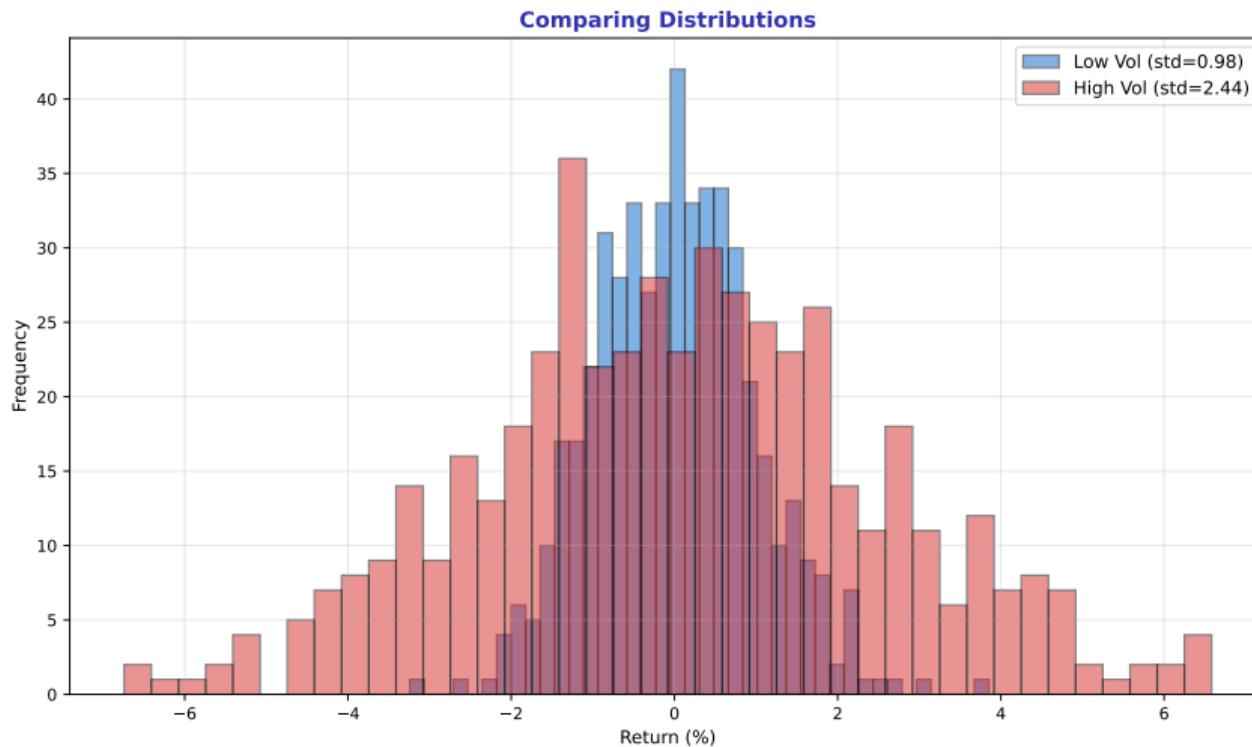
Distribution with mean and median

Density Histogram



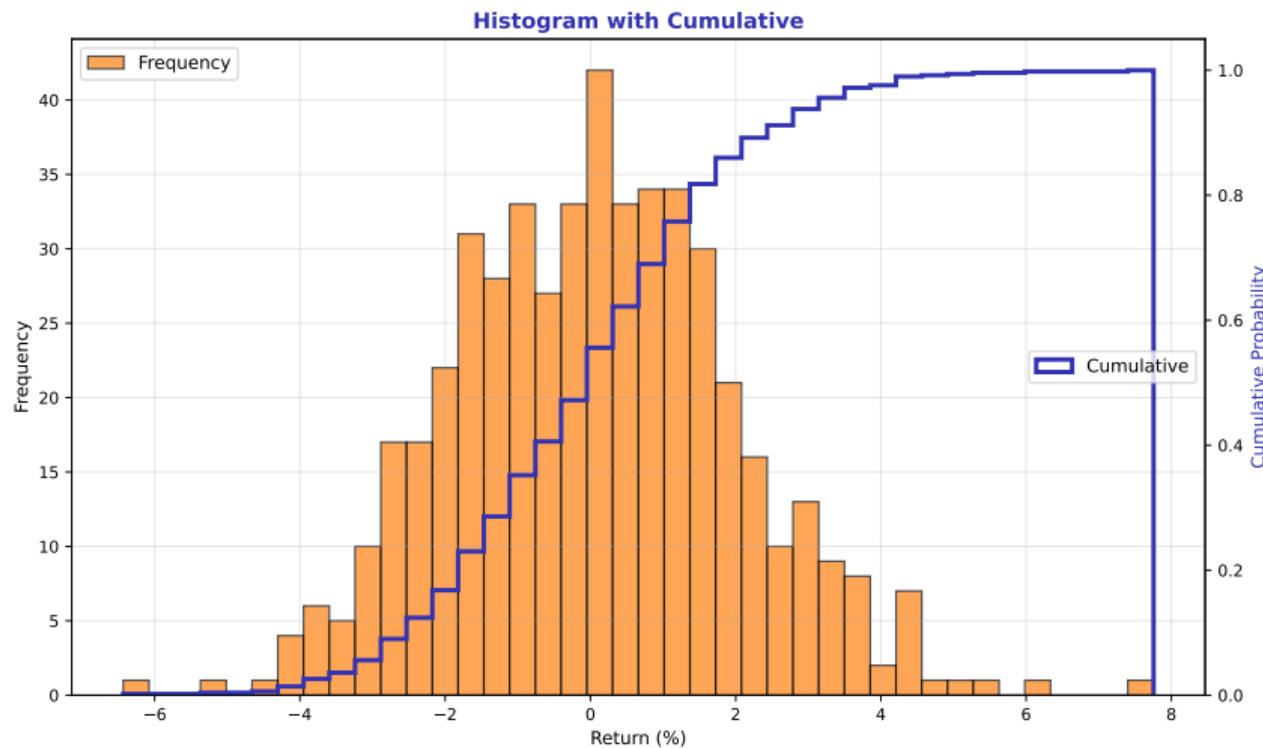
Normalized with PDF overlay

Comparing Distributions



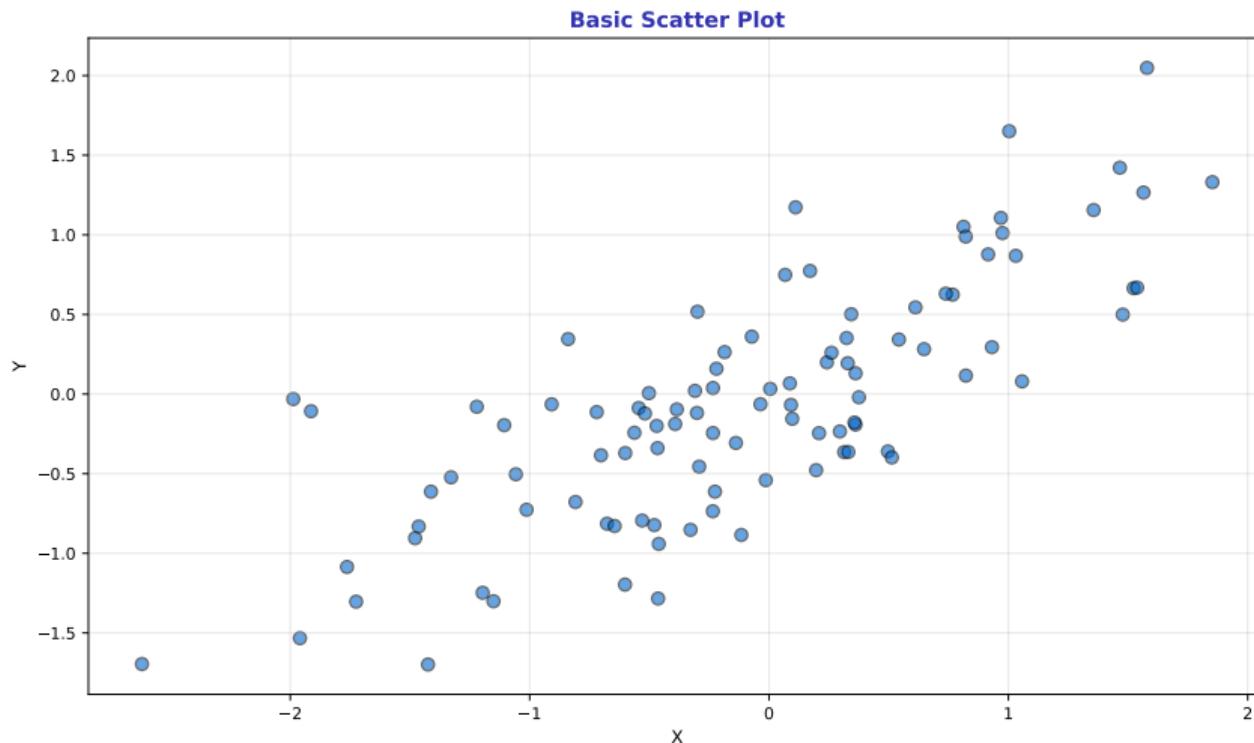
Multiple overlapping histograms

Cumulative Histogram



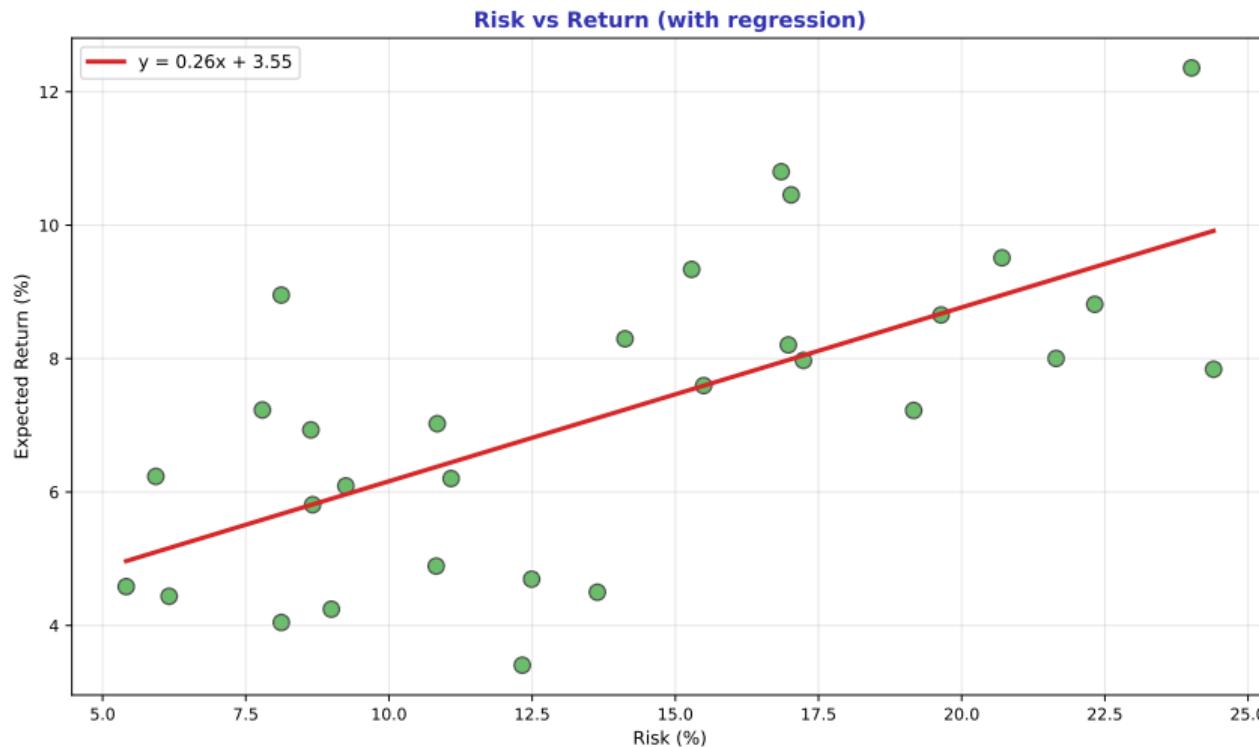
Frequency with CDF

Basic Scatter



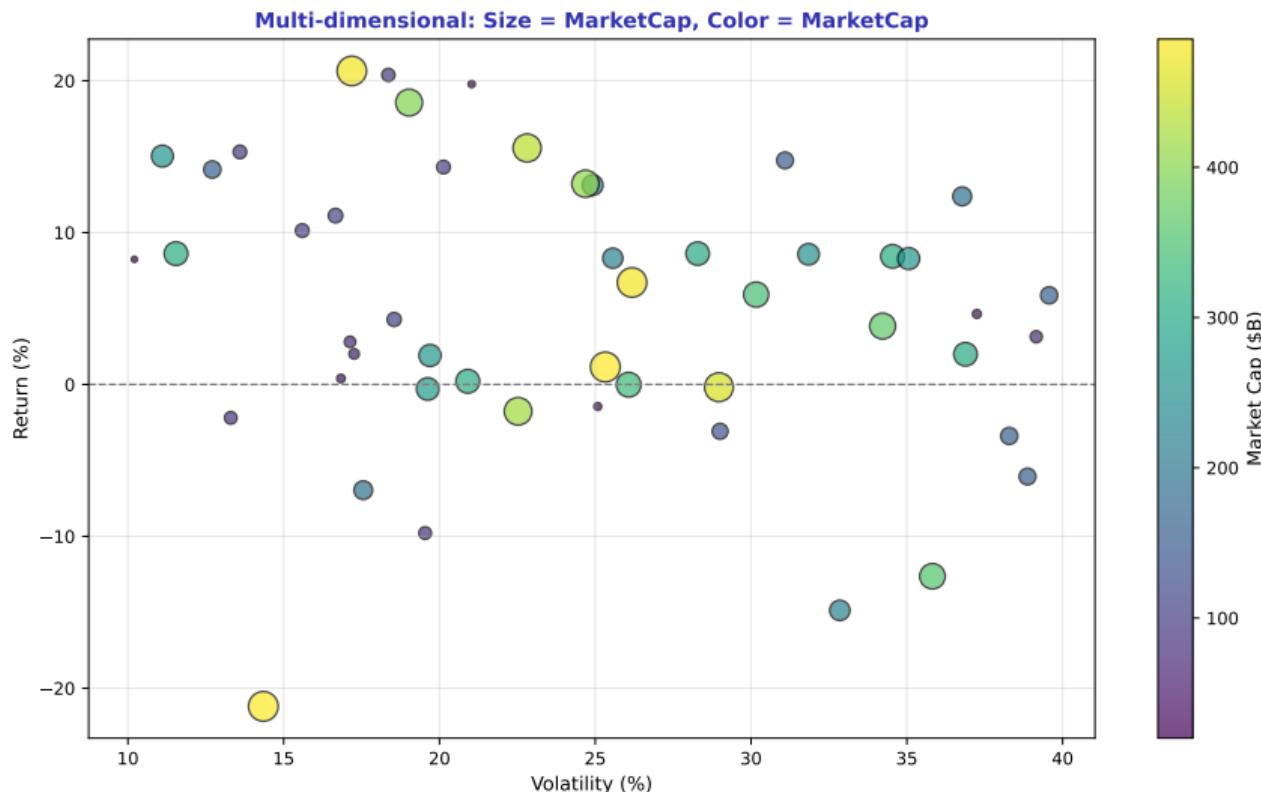
Simple X vs Y relationship

Scatter with Regression



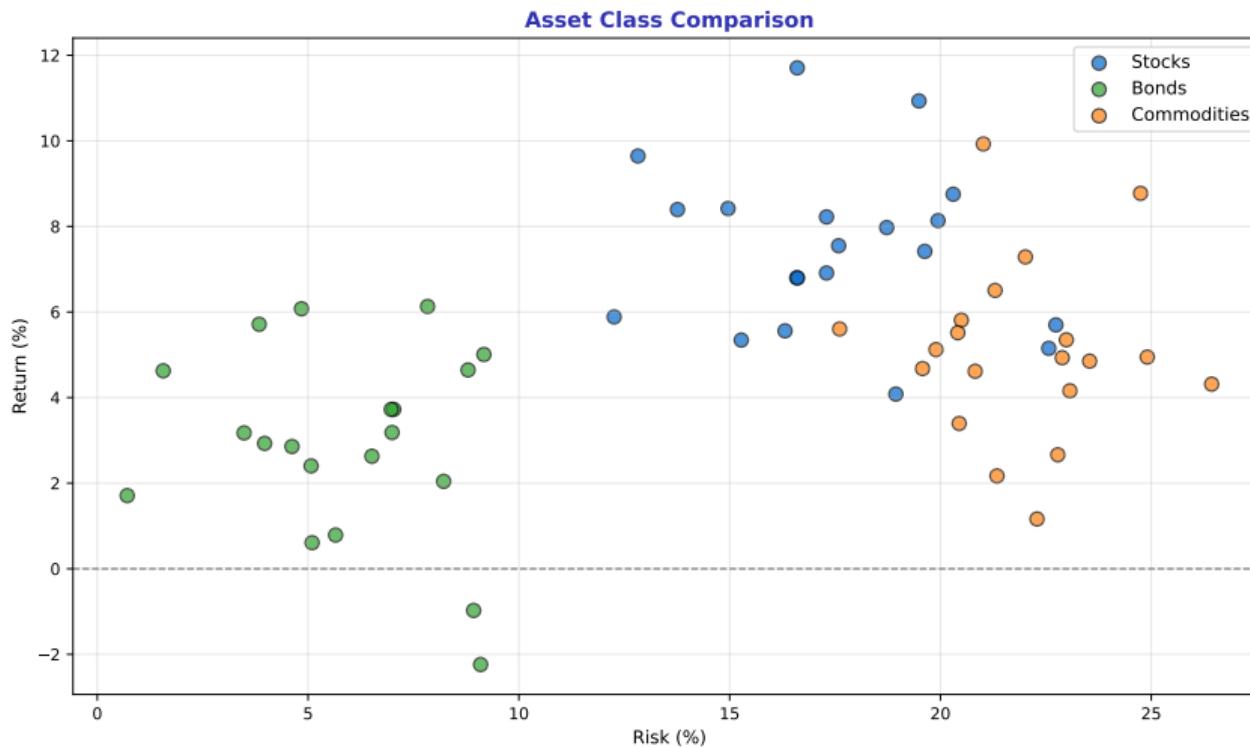
Adding trend line

Multidimensional Scatter



Size and color encoding

Grouped Scatter



Comparing categories

add_subplot (sin)

fig.add_subplot(2, 2, 1): sin(x)

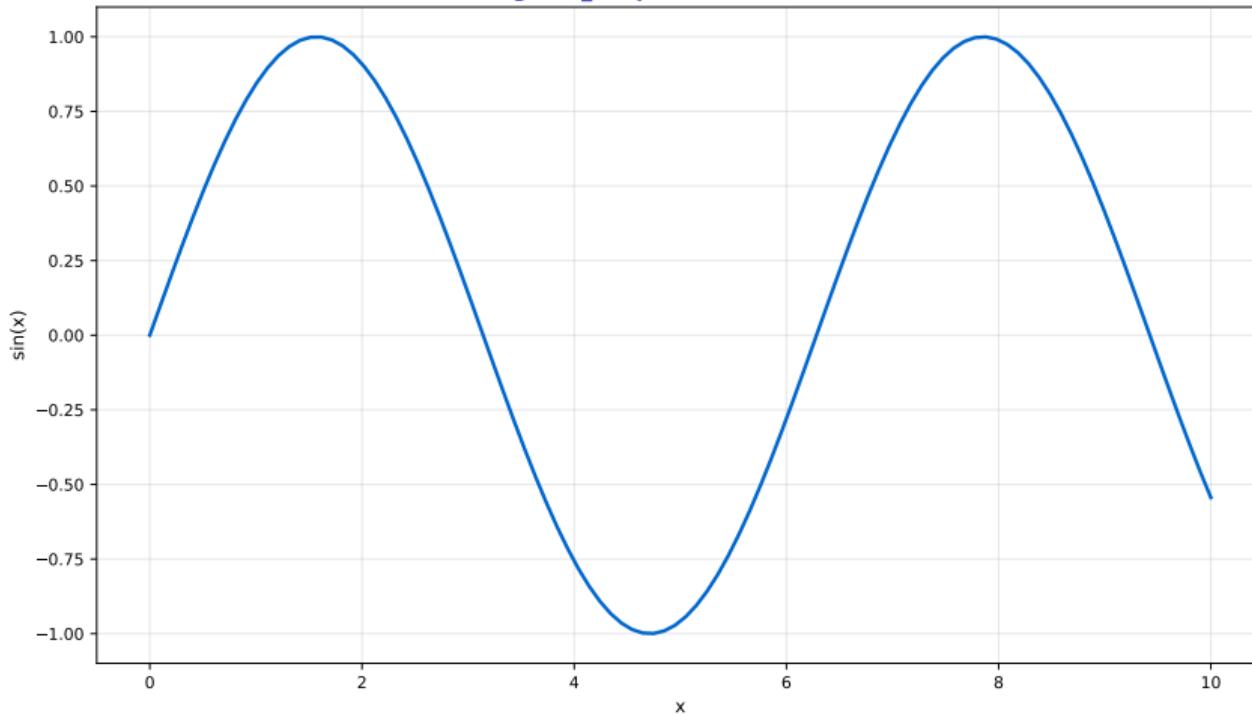
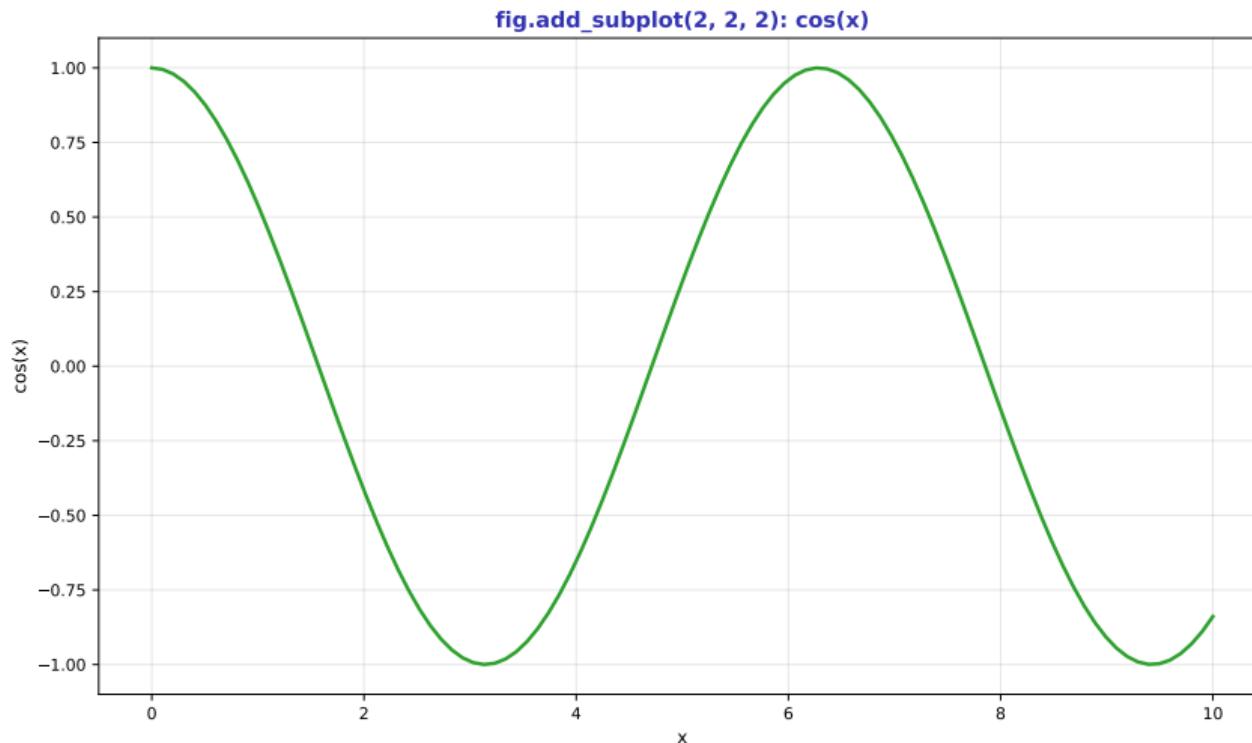


fig.add_subplot(rows, cols, index)

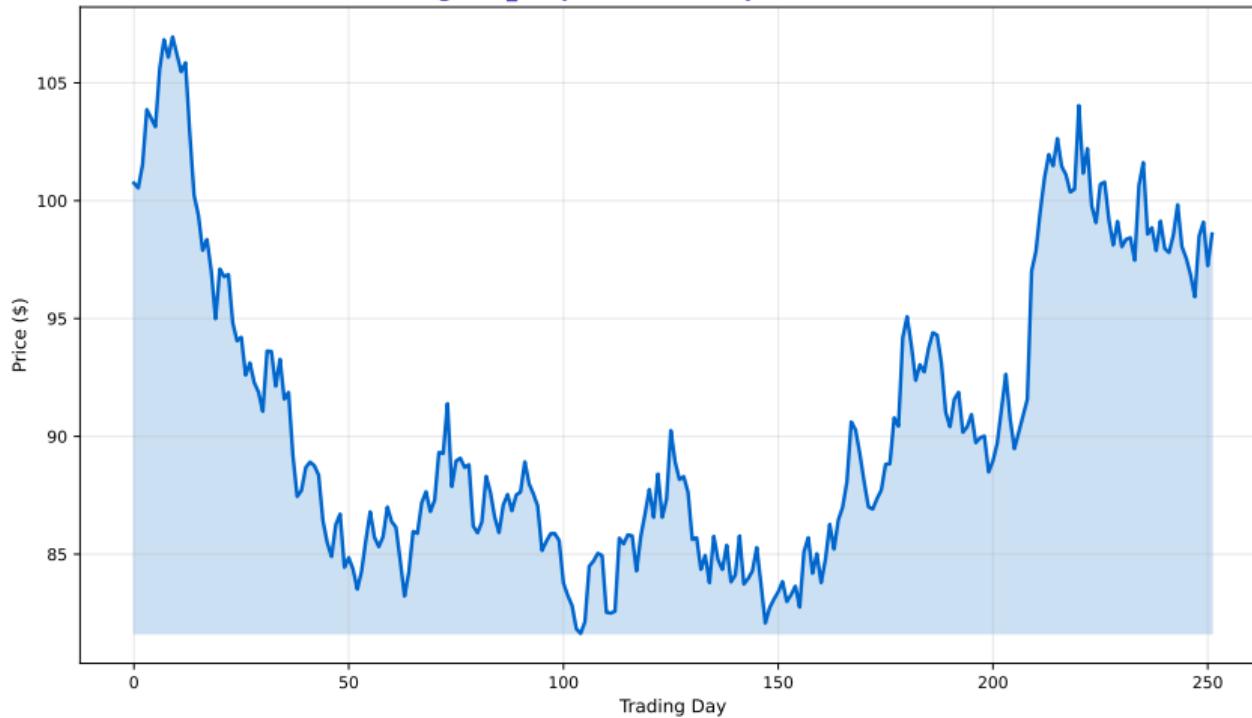
add_subplot (cos)



Multiple axes in one figure

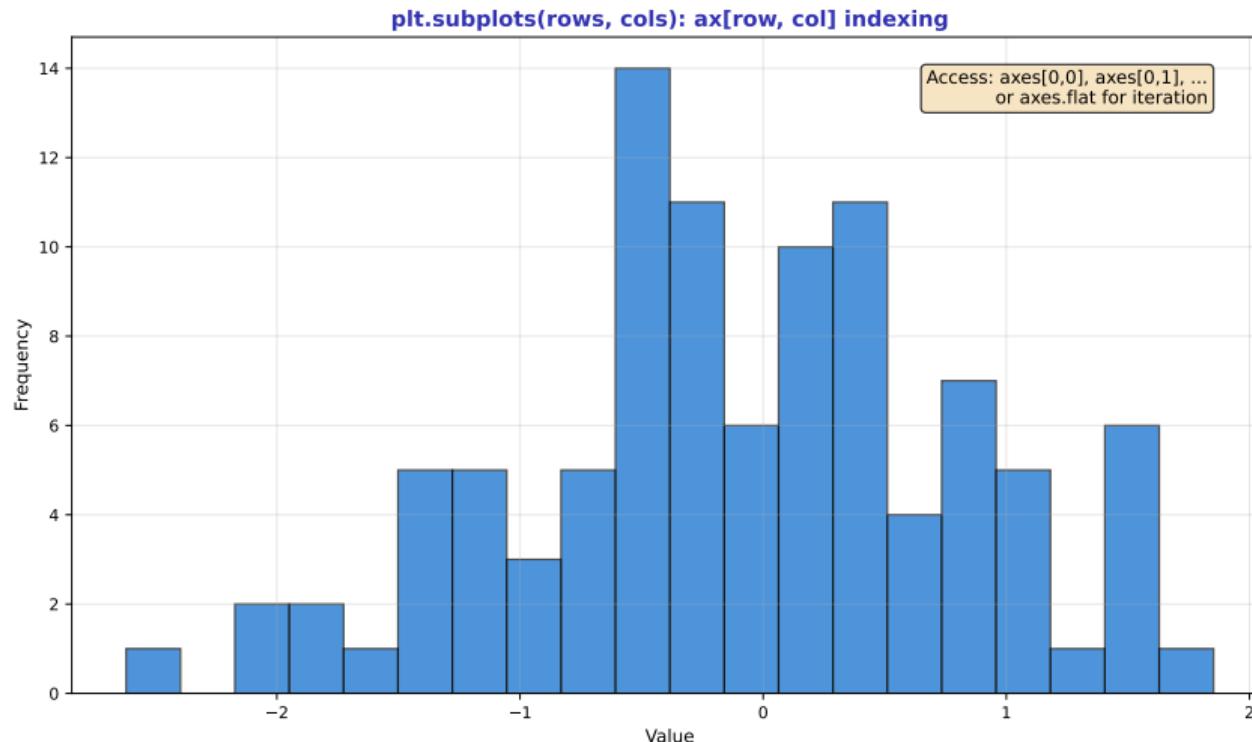
Spanning Subplot

`fig.add_subplot(2, 1, 2) - Spans full width`



Subplot spanning multiple positions

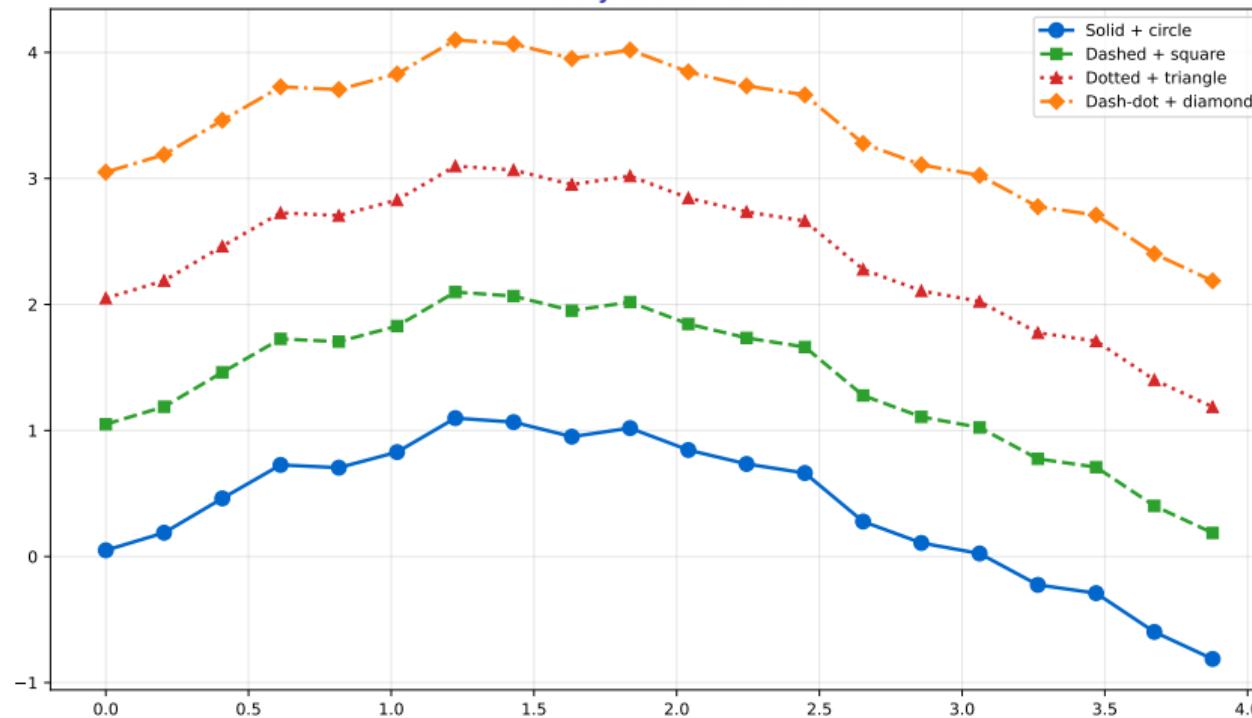
Subplots Iteration



`plt.subplots(rows, cols) and indexing`

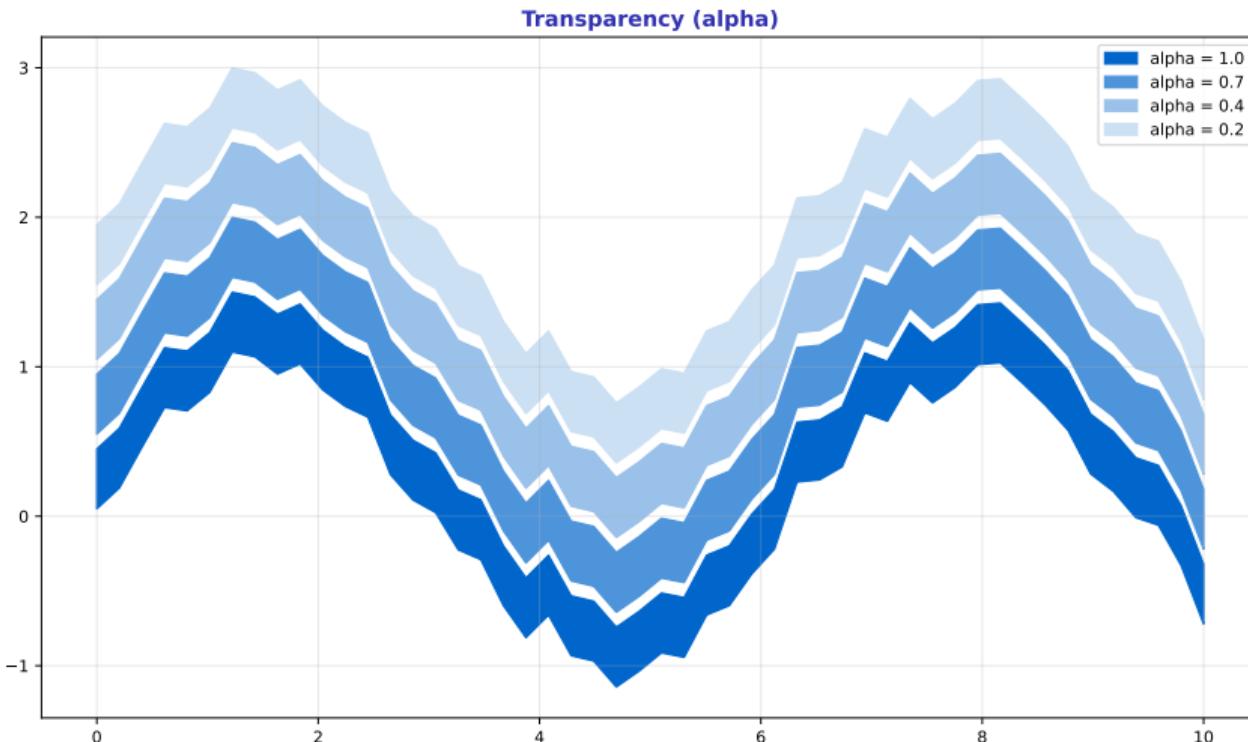
Line Styles

Line Styles and Markers



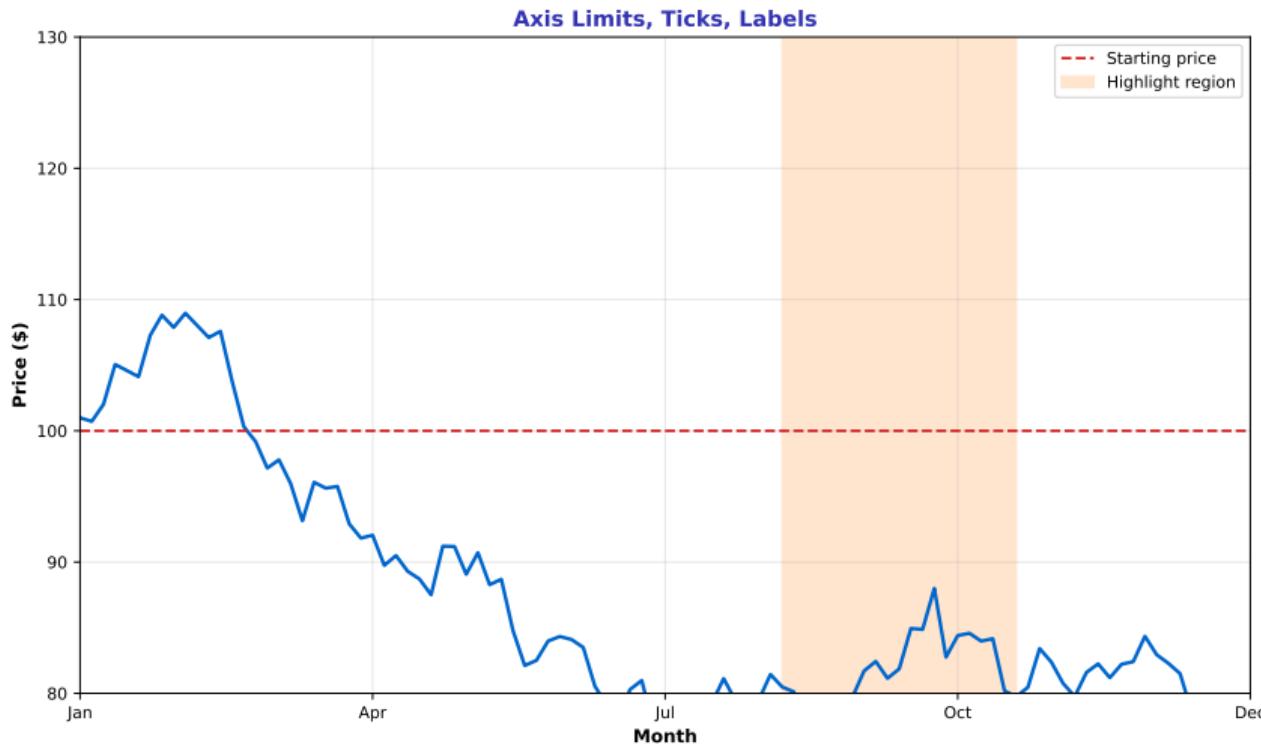
Solid, dashed, dotted, markers

Transparency



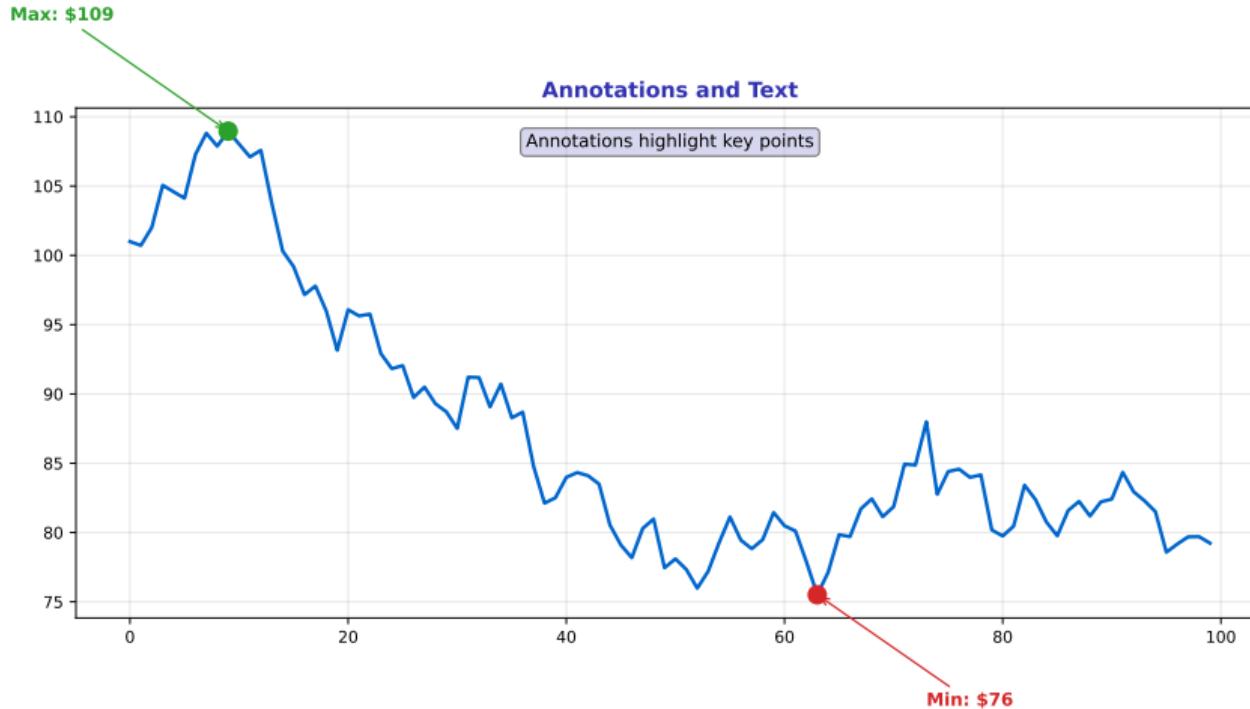
Using alpha for layering

Axis Customization



Limits, ticks, labels

Annotations and Text



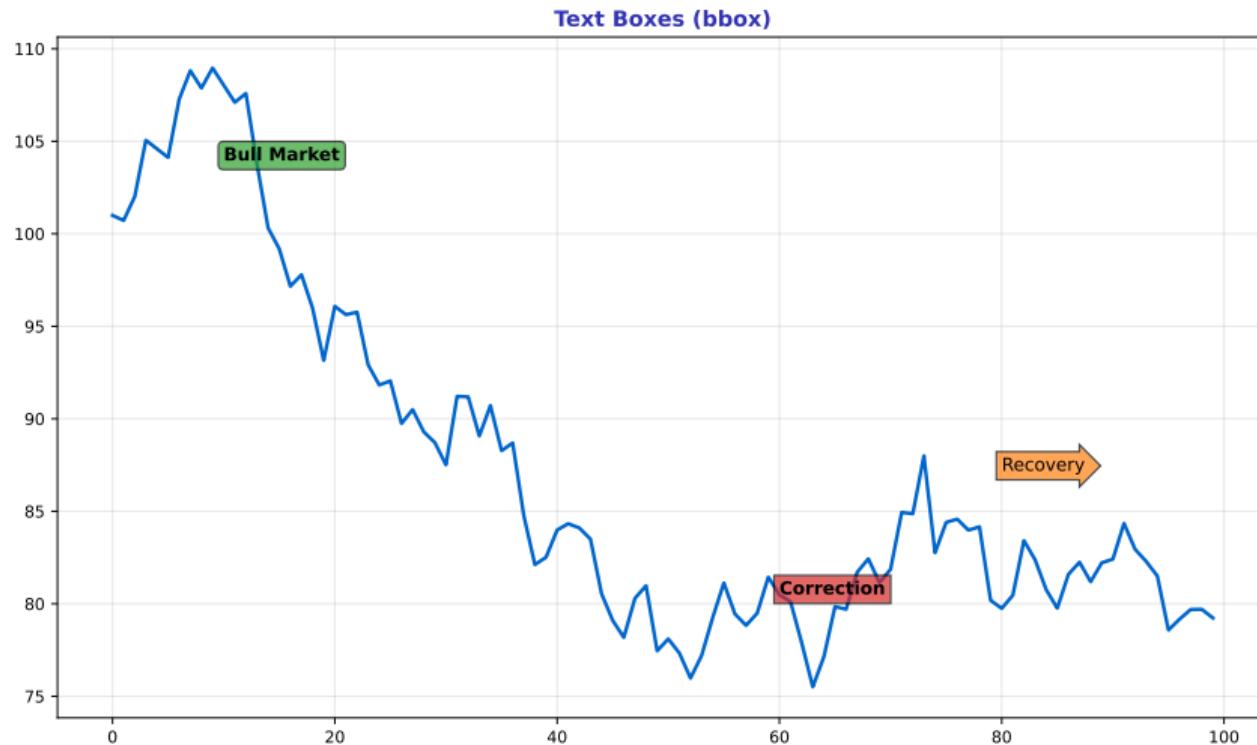
Highlighting key points

Arrow Styles



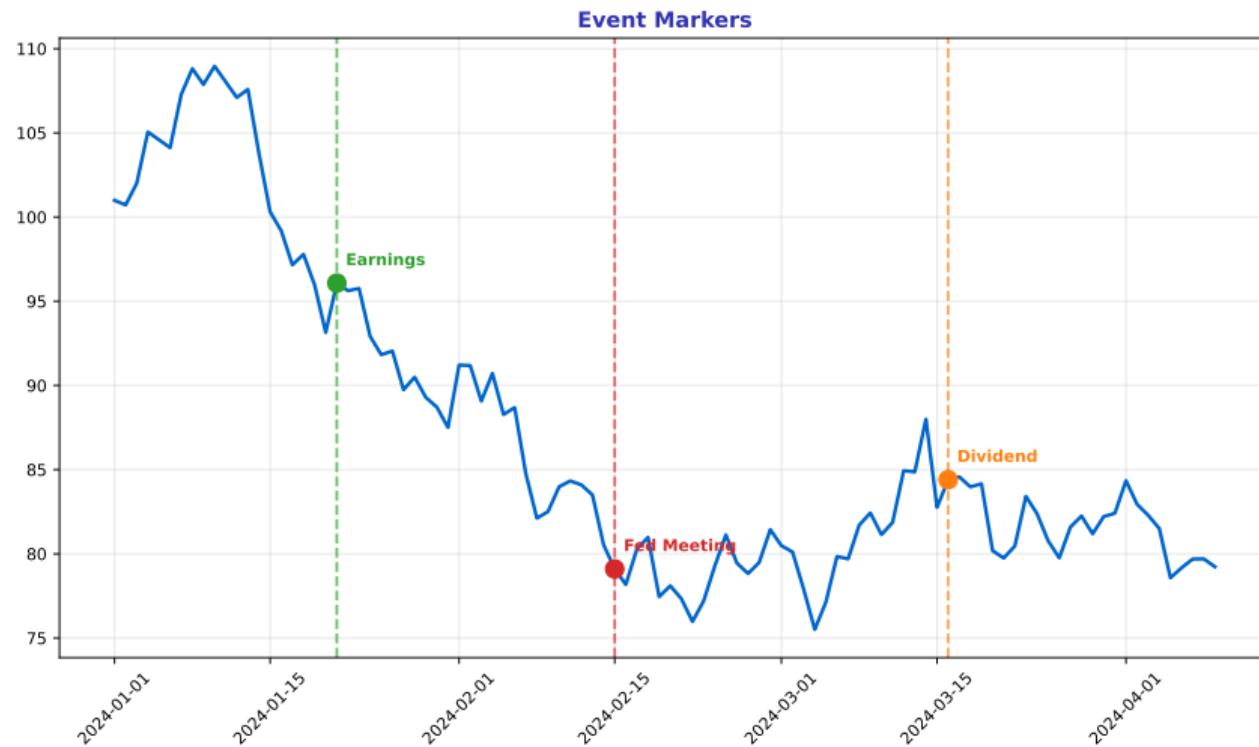
Different annotation arrows

Text Boxes



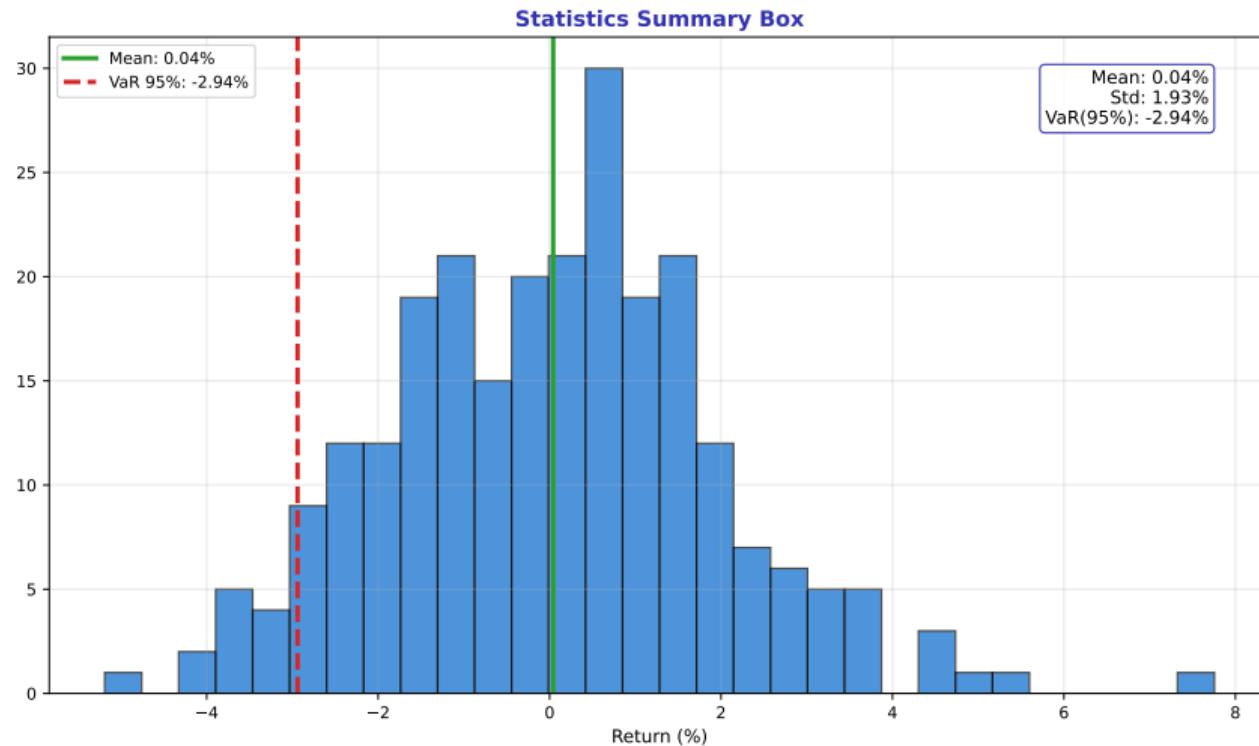
bbox styles for annotations

Event Markers



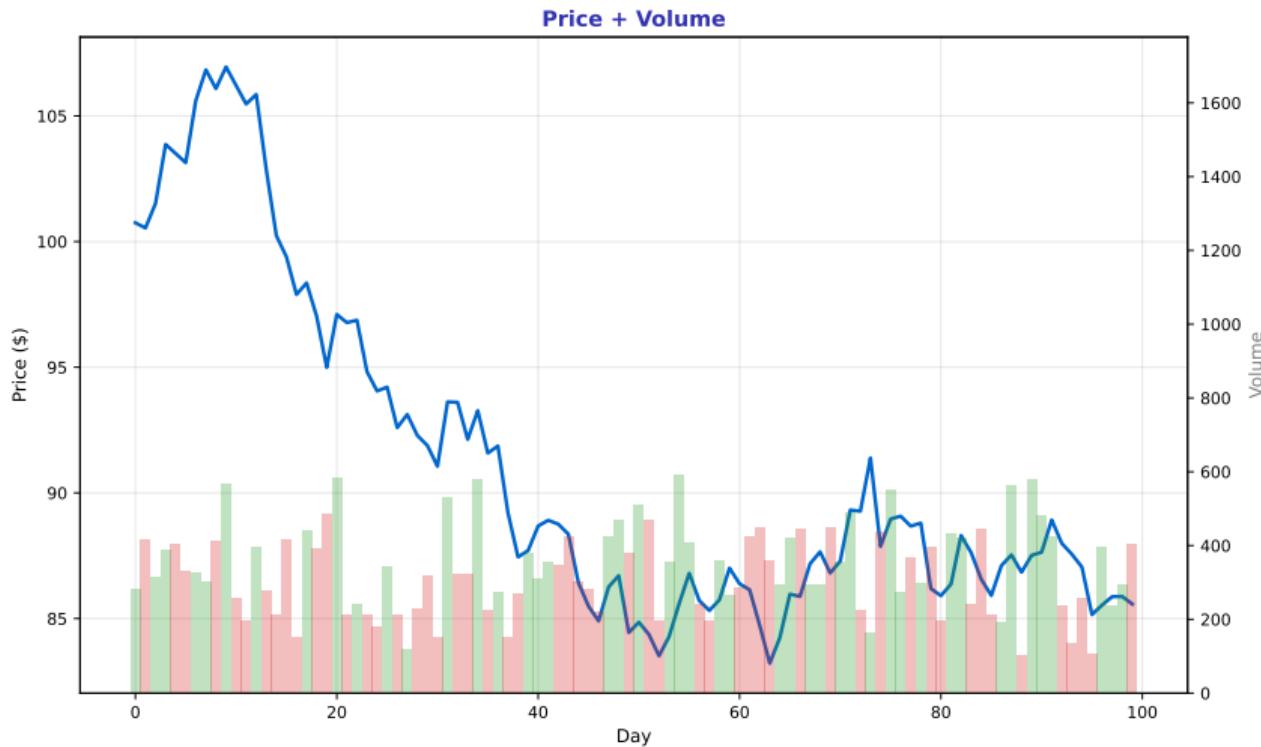
Highlighting specific dates

Statistics Box



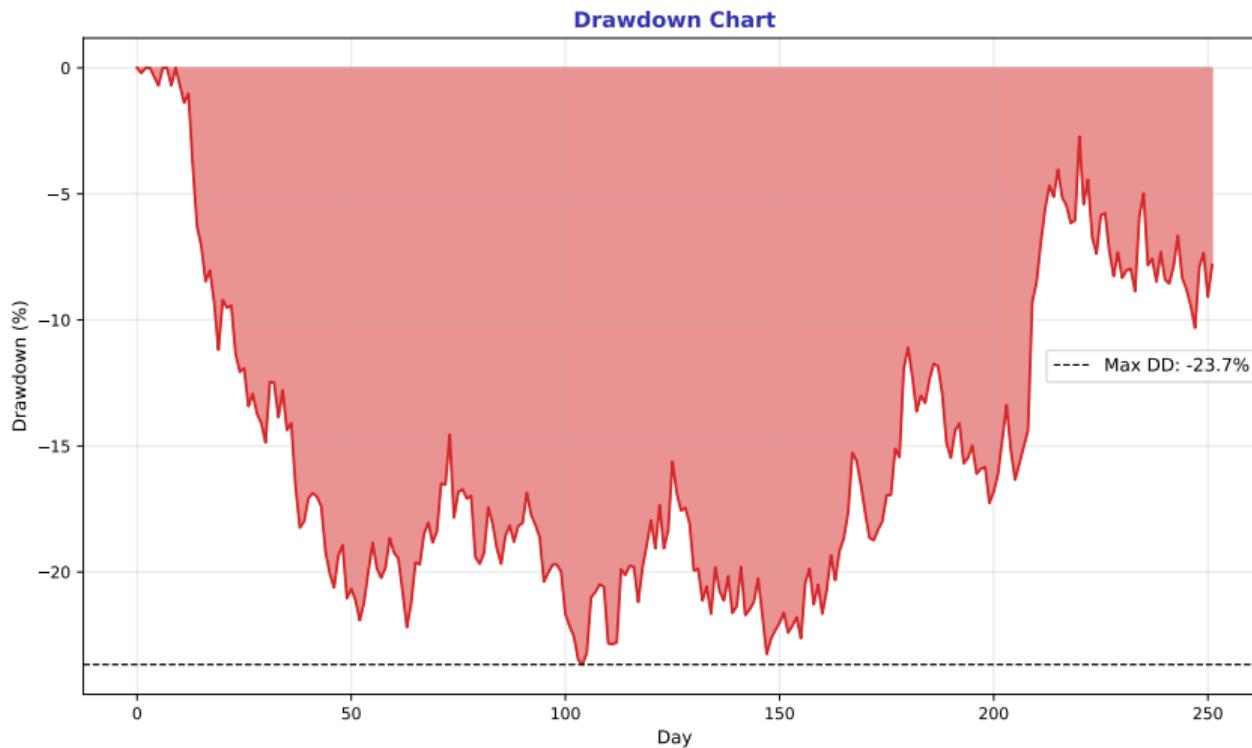
Key metrics annotation

Price + Volume



Dual axis chart

Drawdown



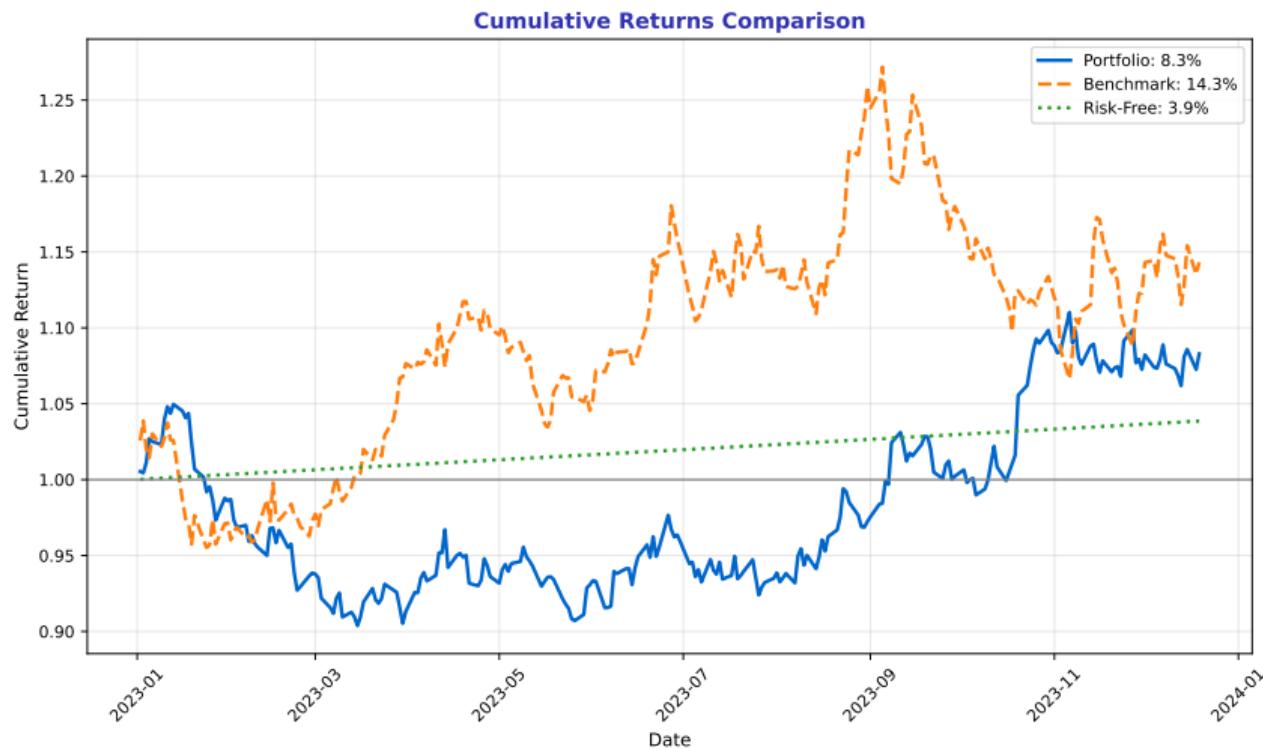
Visualizing losses from peak

Rolling Sharpe



Performance over time

Cumulative Returns



Strategy comparison

Key Takeaways:

- Line plots for time series, bar charts for categories
- Histograms show distributions, scatter plots show relationships
- Subplots combine multiple views
- Customization: colors, styles, annotations, text boxes
- Finance applications: price/volume, drawdown, Sharpe, returns

Statistics + Visualization = Data Science foundation