Matplotlib Complete Notes: From Basics to Advanced

Chapter 1: Introduction to Matplotlib

- What is Matplotlib?

- Installation

- Importing Matplotlib

- Basic Plotting using pyplot

Chapter 2: Basic Plots

- Line Plot

- Bar Chart

- Histogram

- Scatter Plot

- Pie Chart

Chapter 3: Customizing Plots

- Titles and Labels

- Legends

- Grid

- Tick marks and rotation

- Line styles and colors

Chapter 4: Figures and Axes

- Understanding Figure and Axes

- Creating multiple plots using subplots

- The object-oriented API

Chapter 5: Advanced Plotting

- Stack plots

- Fill Between

- Box plots

- Violin plots

- Error bars

- Heatmaps

Chapter 6: Working with Colors and Styles

- Color maps

- Style sheets

- Custom color cycles

Chapter 7: Annotations and Text

- Adding annotations

- Adding mathematical expressions

- Adjusting font properties

Chapter 8: Interactive Plots

- Using %matplotlib notebook

- Zoom, Pan, Save with Toolbar

- Interactive widgets with ipywidgets

Chapter 9: 3D Plotting with mplot3d

- 3D line plot

- 3D scatter plot

- 3D surface plot

Chapter 10: Working with Images

- Reading and displaying images

- Modifying image data

- Color maps for images

Chapter 11: Saving and Exporting Figures

- Save in various formats (png, pdf, svg)

- Adjusting resolution and DPI

- Tight layout and bbox_inches

Chapter 12: Integrating with Pandas and NumPy

- Plotting directly from pandas DataFrame

- Plotting NumPy arrays

Chapter 13: Animation in Matplotlib

- FuncAnimation and ArtistAnimation

- Creating and saving animated plots

Chapter 14: Best Practices and Performance

- Optimizing large plots

- Using blitting

- Avoiding redraws

Chapter 15: Real-life Examples and Projects

- Time series data visualization

- Financial data charting

- Scientific plotting

- Dashboard integration with Tkinter or Flask

These notes cover all fundamental and advanced topics needed to master matplotlib.