Matplotlib for beginners

Matplotlib is a library for making 2D plots in Python. It is designed with the philosophy that you should be able to create simple plots with just a few commands:

1. Initialize
   ```python
   import numpy as np
   import matplotlib.pyplot as plt
   ```

2. Prepare
   ```python
   X = np.linspace(0, 4*np.pi, 1000)
   Y = np.sin(X)
   ```

3. Render
   ```python
   fig, ax = plt.subplots()
   ax.plot(X, Y)
   fig.show()
   ```

4. Observe
   ```python
   Z = np.random.normal(0, 1, (8,8))
   ax.contourf(Z)
   Z = np.random.uniform(0, 1, (8,8))
   ax.imshow(Z)
   ```

Choose

Matplotlib offers several kinds of plots (see Gallery):

- X = np.random.uniform(0, 1, 100)
  Y = np.random.uniform(0, 1, 100)
  ax.scatter(X, Y)
- X = np.arange(10)
  Y = np.random.uniform(0, 1, 10)
  ax.bar(X, Y)
- Z = np.random.uniform(0, 1, (8,8))
  ax.imshow(Z)

Tweak

You can modify pretty much anything in a plot, including limits, colors, markers, line width and styles, ticks and ticks labels, titles, etc.

- X = np.linspace(0, 10, 100)
  Y = np.sin(X)
  ax.plot(X, Y, color="black")
- X = np.linspace(0, 10, 100)
  Y = np.sin(X)
  ax.plot(X, Y, linestyle="--")
- X = np.linspace(0, 10, 100)
  Y = np.sin(X)
  ax.plot(X, Y, linewidth=5)
- X = np.linspace(0, 10, 100)
  Y = np.sin(X)
  ax.plot(X, Y, marker="o")

Organize

You can plot several data on the same figure, but you can also split a figure in several subplots (named Axes):

- X = np.linspace(0, 10, 100)
  Y1, Y2 = np.sin(X), np.cos(X)
  ax.plot(X, Y1, color="C0")
  ax.plot(X, Y2, color="C1")
- fig, (ax1, ax2) = plt.subplots((2,1))
  ax1.plot(X, Y1, color="C1")
  ax2.plot(X, Y2, color="C0")

Label (everything)

- ax.plot(X, Y)
  fig.suptitle(None)
  ax.set_title("A Sine wave")
- ax.plot(X, Y)
  ax.set_ylabel(None)
  ax.set_xlabel("Time")

Explore

Figures are shown with a graphical user interface that allows to zoom and pan the figure, to navigate between the different views and to show the value under the mouse.

- fig.savefig("my-first-figure.png", dpi=300)
- fig.savefig("my-first-figure.pdf")

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