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, 10, 100)
   Y = np.sin(X)
   ```

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

4. Observe

Choose

Matplotlib offers several kind 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, X, Y2)**
- **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.set_xlabel(None)**
- **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")**

Save (bitmap or vector format)