matplotlib

Cheat sheet — Version 3.2

Quick start

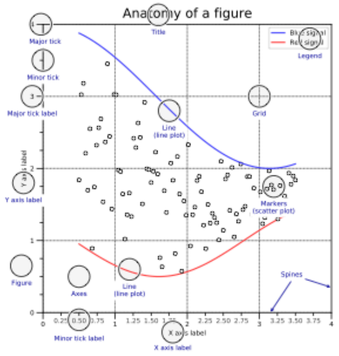
```
import numpy as np
import matplotlib as mpl
import matplotlib.pyplot as plt


X = np.linspace(0, 2*np.pi, 100)
Y = np.cos(X)

fig, ax = plt.subplots()
ax.plot(X,Y,color='C1')

fig.savefig("figure.pdf")
fig.show()
```

Anatomy of a figure



Subplots layout

`subplot[s](cols,rows,…)` API
`fig, axs = plt.subplots(3,3)`

`G = gridspec(cols,rows,…)` API
`ax = G[0,:]`

`ax.inset_axes(extent)` API

`d=make_axes_locatable(ax)` API
`ax=d.new_horizontal('10%')`

Getting help

- matplotlib.org
- github.com/matplotlib/matplotlib/issues
- discourse.matplotlib.org
- stackoverflow.com/matplotlib
- gitter.im/matplotlib
- twitter.com/matplotlib
- Matplotlib users mailing list

Basic plots

`plot([X],Y,[fmt],…)` API
X, **Y**, fmt, color, marker, linestyle

`scatter(X,Y,…)` API
X, **Y**, [s]izes, [c]olors, markers, cmap

`bar[h](x,height,…)` API
x, **height**, width, bottom, align, color

`imshow(Z,[cmap],…)` API
Z, cmap, interpolation, extent, origin

`contour[f]([X],[Y],Z,…)` API
X, Y, **Z**, levels, colors, extent, origin

`quiver([X],[Y],U,V,…)` API
X, Y, **U**, **V**, C, units, angles

`pie(X,[explode],…)` API
Z, explode, labels, colors, radius

`text(x,y,text,…)` API
x, **y**, **text**, va, ha, size, weight, transform

`fill[_between][x]( … )` API
X, Y1, Y2, color, where

Advanced plots

`step(X,Y,[fmt],…)` API
X, **Y**, fmt, color, marker, where

`boxplot(X,…)` API
X, notch, sym, bootstrap, widths

`errorbar(X,Y,xerr,yerr,…)` API
X, **Y**, xerr, yerr, fmt

`hist(X, bins, …)` API
X, bins, range, density, weights

`violinplot(D,…)` API
D, positions, widths, vert

`barbs([X],[Y], U, V, …)` API
X, Y, **U**, **V**, C, length, pivot, sizes

`eventplot(positions,…)` API
positions, orientation, lineoffsets

`hexbin(X,Y,C,…)` API
X, **Y**, C, gridsize, bins

`xcorr(X,Y,…)` API
X, **Y**, normed, detrend

Scales

API

`ax.set_[xy]scale(scale,…)`

Projections

API

`subplot(…,projection=p)`

p='polar'

p='3d'

p=Orthographic() API
from cartopy.crs import Cartographic

Lines

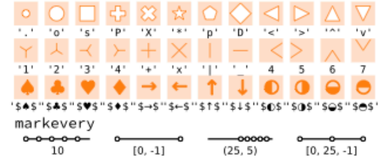
API

`linestyle or ls`

`capstyle or dash_capstyle`

Markers

API



Colors

API

Colormaps

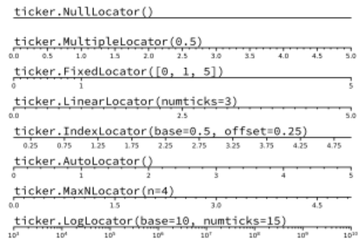
API

`plt.get_cmap(name)`

Tick locators

API

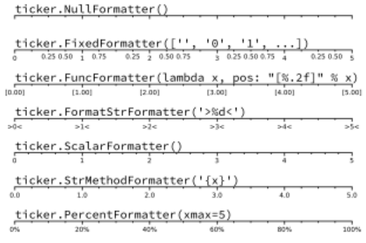
```
from matplotlib import ticker
ax.[xy]axis.set_[minor|major]_locator(locator)
```



Tick formatters

API

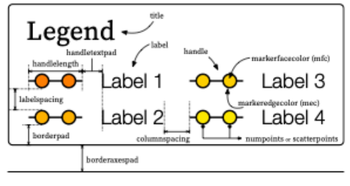
```
from matplotlib import ticker
ax.[xy]axis.set_[minor|major]_formatter(formatter)
```



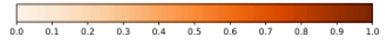
Ornaments

API

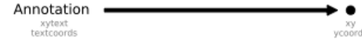
`ax.legend(…)`
handles, labels, loc, title, frameon



`ax.colorbar(…)` API
mappable, ax, cax, orientation



`ax.annotate(…)` API
text, **xy**, **xytext**, xycoords, textcoords, arrowprops



Event handling

API

```
fig, ax = plt.subplots()
def on_click(event):
  print(event)
fig.canvas.mpl_connect(
  'button_press_event', on_click)
```

Animation

API

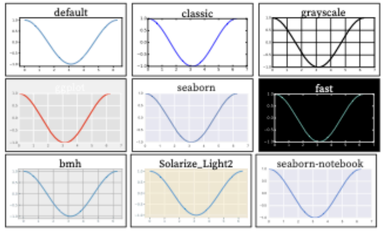
```
import matplotlib.animation as mpla

T = np.linspace(0,2*np.pi,100)
S = np.sin(T)
line, = plt.plot(T, S)
def animate(i):
  line.set_ydata(np.sin(T+i/50))
anim = mpla.FuncAnimation(
  plt.gcf(), animate, interval=5)
plt.show()
```

Styles

API

`plt.style.use(style)`



Quick reminder

```
ax.grid()
ax.patch.set_alpha(0)
ax.set_[xy]lim(vmin, vmax)
ax.set_[xy]label(label)
ax.set_[xy]ticks(list)
ax.set_[xy]ticklabels(list)
ax.set_[sup]title(title)
ax.tick_params(width=10, …)
ax.set_axis_[on|off]()

ax.tight_layout()
plt.gcf(), plt.gca()
mpl.rc('axes', linewidth=1, …)
fig.patch.set_alpha(0)
text=r'$\frac{-e^{i\pi}}{2^n}$'
```

Keyboard shortcuts

API

ctrl + s	Save	ctrl + w	Close plot
r	Reset view	f	Fullscreen 0/1
f	View forward	b	View back
p	Pan view	o	Zoom to rect
x	X pan/zoom	y	Y pan/zoom
g	Minor grid 0/1	G	Major grid 0/1
l	X axis log/linear	L	Y axis log/linear

Ten Simple Rules

READ

1. Know Your Audience
2. Identify Your Message
3. Adapt the Figure
4. Captions Are Not Optional
5. Do Not Trust the Defaults
6. Use Color Effectively
7. Do Not Mislead the Reader
8. Avoid "Chartjunk"
9. Message Trumps Beauty
10. Get the Right Tool