matplotlib

Cheat sheet — Version 3.5.0

Quick start

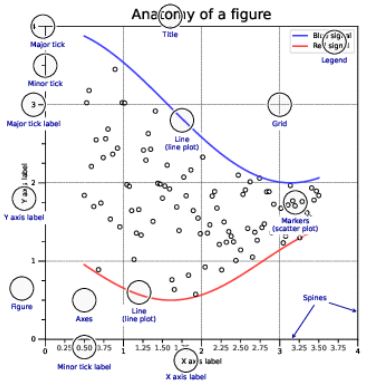
```
import numpy as np
import matplotlib as mpl
import matplotlib.pyplot as plt


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

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

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

Anatomy of a figure



Subplots layout

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

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

```
ax.inset_axes(extent)
```

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

Getting help

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

Basic plots

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

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

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

```
imshow(Z,…)
```
Z, cmap, interpolation, extent, origin

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

```
pcolormesh([X],[Y],Z,…)
```
X, Y, **Z**, vmin, vmax, cmap

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

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

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

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

Advanced plots

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

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

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

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

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

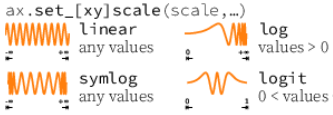
```
barbs([X],[Y], U, V, …)
```
X, Y, **U**, **V**, C, length, pivot, sizes

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

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

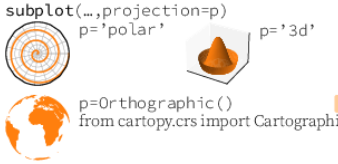
Scales

```
ax.set_[xy]scale(scale,…)
```



Projections

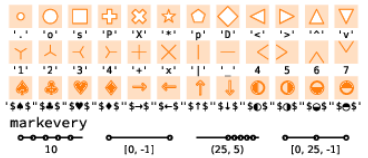
```
subplot(…,projection=p)
```



Lines

```
linestyle or ls
"-"  ":"  "--"  "-."  (0,(0.01,2))
capstyle or dash_capstyle
"butt"  "round"  "projecting"
```

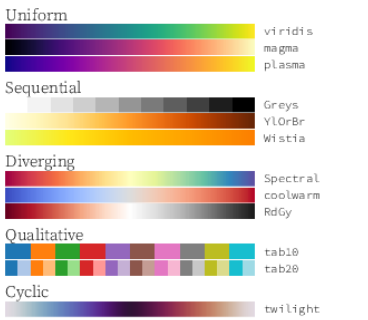
Markers



Colors

Colormaps

```
plt.get_cmap(name)
```



Tick locators

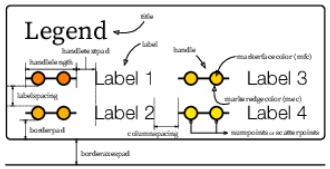
```
from matplotlib import ticker
ax.[xy]axis.set_[minor|major]_locator(locator)
ticker.NullLocator()
ticker.MultipleLocator(0.5)
ticker.FixedLocator([0, 1, 5])
ticker.LinearLocator(numticks=3)
ticker.IndexLocator(base=0.5, offset=0.25)
ticker.AutoLocator()
ticker.MaxNLocator(n=4)
ticker.LogLocator(base=10, numticks=15)
```

Tick formatters

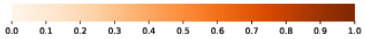
```
from matplotlib import ticker
ax.[xy]axis.set_[minor|major]_formatter(formatter)
ticker.NullFormatter()
ticker.FixedFormatter(['zero', 'one', 'two', …])
ticker.FuncFormatter(lambda x, pos: "[%.2f]" % x)
ticker.FormatStrFormatter('>%d<')
ticker.ScalarFormatter()
ticker.StrMethodFormatter('{x}')
ticker.PercentFormatter(xmax=5)
```

Ornaments

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




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



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

Event handling

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

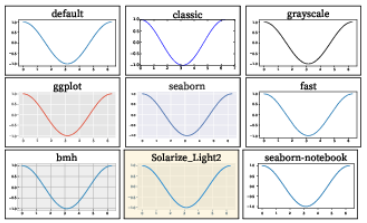
Animation

```
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

```
plt.style.use(style)
```



Quick reminder

```
ax.grid()
ax.set_[xy]lim(vmin, vmax)
ax.set_[xy]label(label)
ax.set_[xy]ticks(ticks, [labels])
ax.set_[xy]ticklabels(labels)
ax.set_title(title)
ax.tick_params(width=10, …)
ax.set_axis_[on|off]()

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

Keyboard shortcuts

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

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