

Import Library

```
from matplotlib import pyplot as plt
```

Basic Line Plot

```
x_values
days = [0, 1, 2, 3, 4, 5, 6]
y_values1
money_spent = [10, 12, 12, 10, 14, 22, 24]
y_values2
money_spent_2 = [11, 14, 15, 15, 22, 21, 12]
assignend to one plot
plt.plot(days, money_spent)
plt.plot(days, money_spent_2)
plt.show()
```

Subplots

```
# Create subplots
plt.subplots(rows, columns, index_of_subplot)
# Example
# First Subplot
plt.subplot(1, 2, 1)
plt.plot(x, y, color='green')
# Second Subplot
plt.subplot(1, 2, 2)
plt.plot(x, y, color='steel blue')
# Format Subplots
plt.subplots_adjust(left, right, top, bottom, wspace, hspace)
# margin between plots
```

The object that contains all subplots is called *figure*
Always put specific Attributes (color, markers, ...) for a subplot directly under `plt.plot()`

Linestyles

```
plt.plot(x, y, style=" ")
```

Keywords to put in for **style**:

color= green, #AAAAAA

linestyle= dotted: ., dashed: -- or -.

marker= o, *, s, x, d, h

linewidth= 1, 2, ...

alpha= 0.1 - 1

Boilerplate Styles:

```
plt.style.use("fivethirtyeight")
```

```
plt.style.use("ggplot")
```

```
plt.style.use("seaborn")
```

```
plt.style.use("default")
```

Legends

```
# Create Legend
```

```
plt.legend(first_line, "second_line", loc=)
```

```
# loc Numbercode
```

- 1 upper left
- 2 upper right
- 3 lower left
- 4 lower right
- 5 right
- 6 center left
- 7 center right
- 8 lower center
- 9 upper center
- 10 center

loc specifies the legends location (if not specified: finds "best" location)



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Figures

```
# Create Figure with custom size
plt.figure(figsize=(width, height))
plt.plot(x, y)
plt.savefig('table_and_nongrow.svg/
.pdf')
```

When we're making lots of plots, it's easy to end up with lines that have been plotted and not displayed. If we're not careful, these "forgotten" lines will show up in your new plots. In order to be sure that you don't have any stray lines, you can use the command **plt.close('all')** to clear all existing plots before you plot a new one.

Modify Ticks

```
# Specify subplot to modify
ax1 = plt.subplot(row, column, index)
# Attributes
ax1.set_xticks([2, 4])
ax1.set_yticks([1, 0.2, ...])
ax1.set_xlabel(['Jan ', 'Feb ', ' -
Apr '], rotation=30)
# rotation= degrees rotates the labels
ax1.set_ylabel(['10%', '20%', ...])
```

We have to do it this way, even if we only have one plot

Axis and Labels

Zoom in or out of the plot:

```
plt.axis(x_min, x_max, y_min, y_max)
```

Labeling the Axes:

```
plt.xlabel("str")/ plt.ylabel() / plt.title()
```

Add Text to Graph

```
plt.text(x_coord, y_coord, "text");
```

Simple Bar Chart

```
plt.bar(range(len(y_values)), y_values)
```

We use **range(len(y_values))** to get a tick for each value we want to represent in the Bar Chart

Scatter Plot

```
plt.scatter(x_values, y_values)
```

Side-By-Side Bars

We have to specify the location of each Dataset in the Plot using this pattern:

```
n = ? # Number of specific dataset
t = ? # Number of datasets
d = ? # Number of sets of bars
w = 0.8 # Width of each bar
x_values1 = [t*element + w*n for element in
range(d)]
```

Get x_values in the middle of both bars

```
middle_x = [ (a + b) / 2.0 for a, b in zip(x_
values1, x_values2)]
```

Stacked Bars

We use the keyword **bottom** to do this

The top bar will have **bottom** set as height

First Bar

```
video_game_hours = [1, 2, 2, 1, 2]
```

```
plt.bar(range(len(video_game_hours)),
video_game_hours)
```

Second Bar

```
book_hours = [2, 3, 4, 2, 1]
```

```
plt.bar(range(len(book_hours)),
```

```
book_hours,
```

```
bottom=video_game_hours)
```

Get each bottom for 3+ bars

```
sport_hours = np.add(video_game_hours,
```

```
book_hours)
```

If we want to compare "different sub-attributes from one attribute"

we can use stacked bar charts. For example:

Attribute: Entertainment hours

Sub-Attributes: Gaming, Reading, ...



Error Bars

```
# Use the keyword yerr to represent the error
range
values = [10, 13, 11, 15, 20]
yerr = [1, 3, 0.5, 2, 4] # single value possible
plt.bar(y, x, yerr=yerr, capsiz=10)
plt.show()
```

If we want to present an uncertainty Range within a Bar Chart we can use Error Bars

Fill Between (Line Plot)

```
x = range(3)
y = [10, 12, 13]
y_lower = [8, 10, 11]
y_upper = [i + 2 for i in y_values]
# Calculate a % deviation
y_lower_bound = [element - (element * error_in_ -
decimal) for element in original_list_of_y_
_values]
#this is the shaded error
plt.fill_between(y_lower, y_upper, alpha=0.2)
#this is the line itself
plt.plot(x, y)
plt.show()
```

Returns a shaded area around the line

Pie Chart

```
payment_names = ["Card Swipe", "Cash", "Apple
Pay", "Other"]
payment_freqs = [270, 77, 32, 11]
# Creating Pie Chart
plt.pie(payment_freqs)
plt.axis('equal')
# Two Methods for Labeling
# First Method
plt.legend(payment_names)
# Second Method (directly when creating)
plt.pie(payment_freqs, labels=payment_
names)
Show percentages of total in each slice:
```

Pie Chart (cont)

```
> plt.pie(payment_freqs, labels=payment_names, autopct='%0.1-
f%%')
# autopct takes a string formatting instruction
# %d%% -> round to decimal
plt.show()
```

Histogram

```
# Create one Histogram
plt.hist(data_set, range=(0, 10), bins=20)
# Specify number of bins (default = 10)
# Create multiple Histograms
plt.hist(a, alpha=0.5, normed=True)
plt.hist(b, histtype='step', linewidth=2,
normed=True)
# Specify alpha for opacity or use histtype to draw just the outline
# Use linewidth to specify the linewidth of the outline
# Use the keyword normed to normalize the histograms
```

Normalize divides the x_values by a constant such that the area under the curve sums to 1

