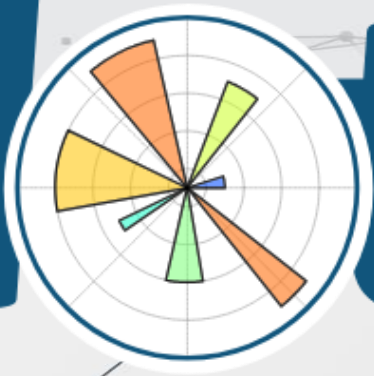
matplotlib



Line plot

Scatter plot

Histogram

Bar plot

Pie plot

What is Matplotlib?

Matplotlib is a comprehensive library for creating static, animated, and interactive visualizations in Python. Matplotlib makes easy things easy and hard things possible.

Create publication quality plots.

Make interactive figures that can zoom, pan, update.

Customize visual style and layout.

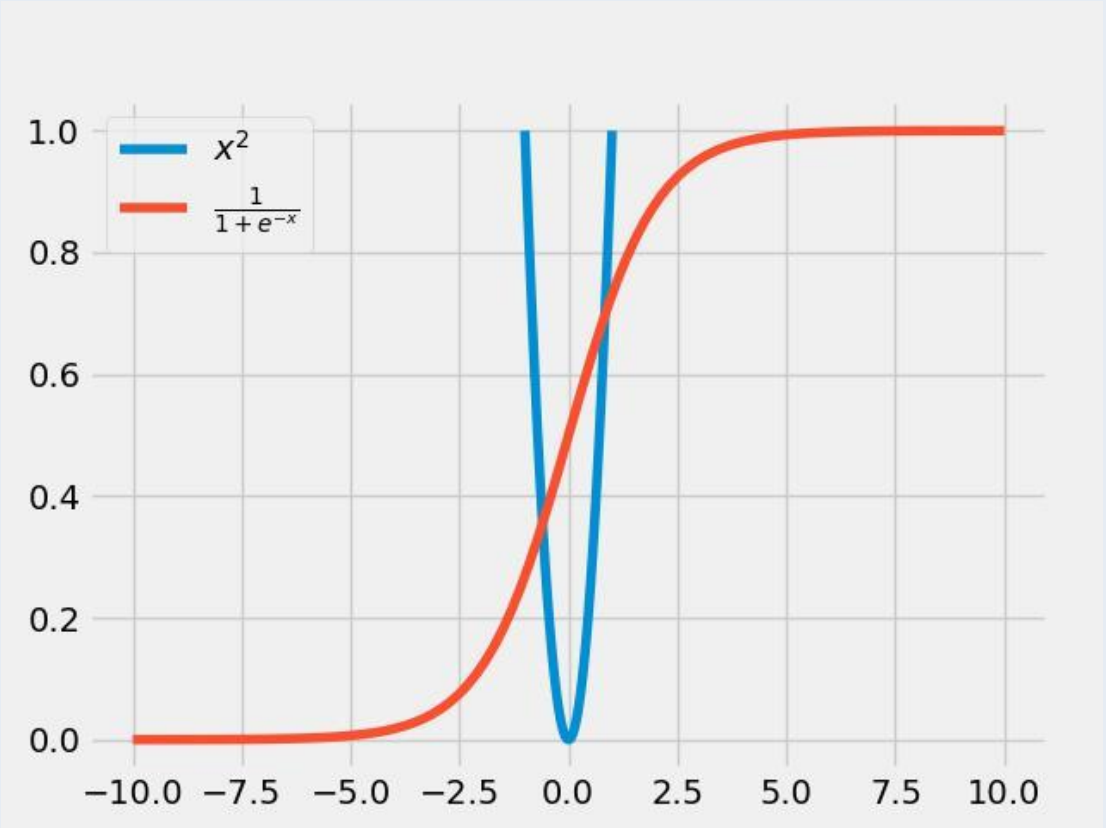
Export to many file formats.

Embed in JupyterLab and Graphical User Interfaces.

Use a rich array of third-party packages built on Matplotlib.

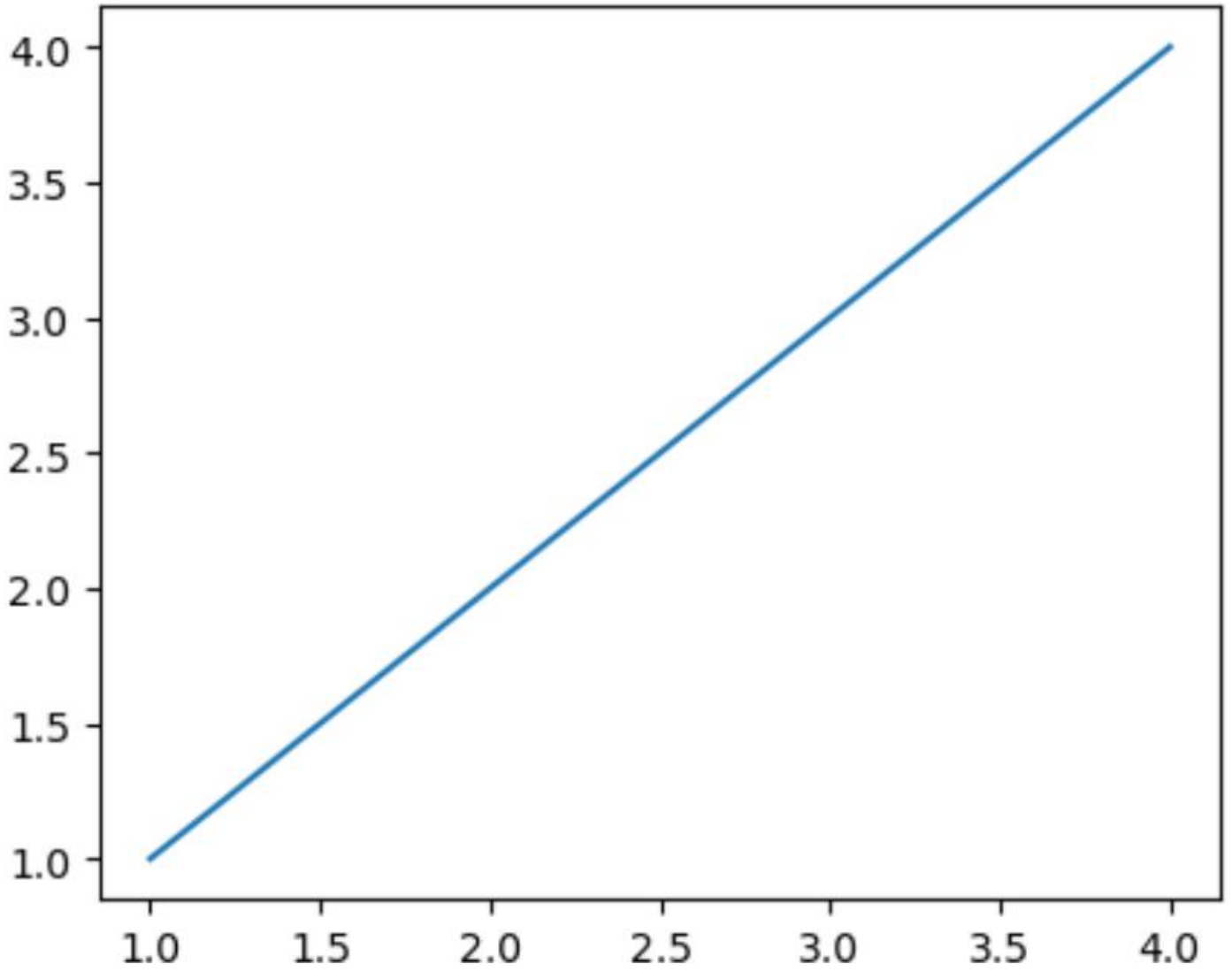
Line plot

- Best for visualizing trends or changes over a continuous interval.
- Example: Plot a stock price over time.



Line Plot

```
x = [1,2,3,4]
y = [1,2,3,4]
plt.plot(x,y)
```



Line Plot

The sigmoid function is defined as

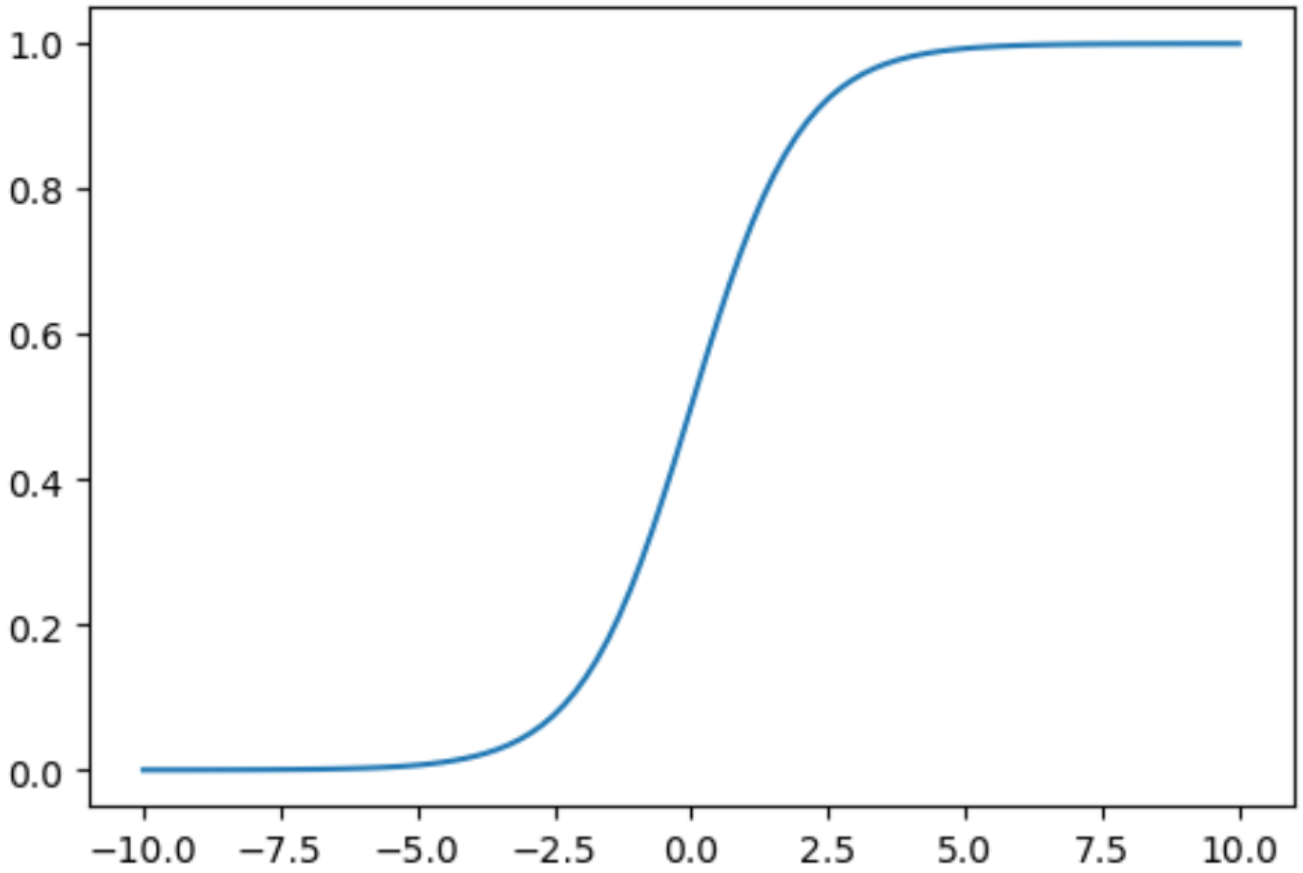
$$f(x) = \frac{1}{1+e^{-x}}$$

Behavior:

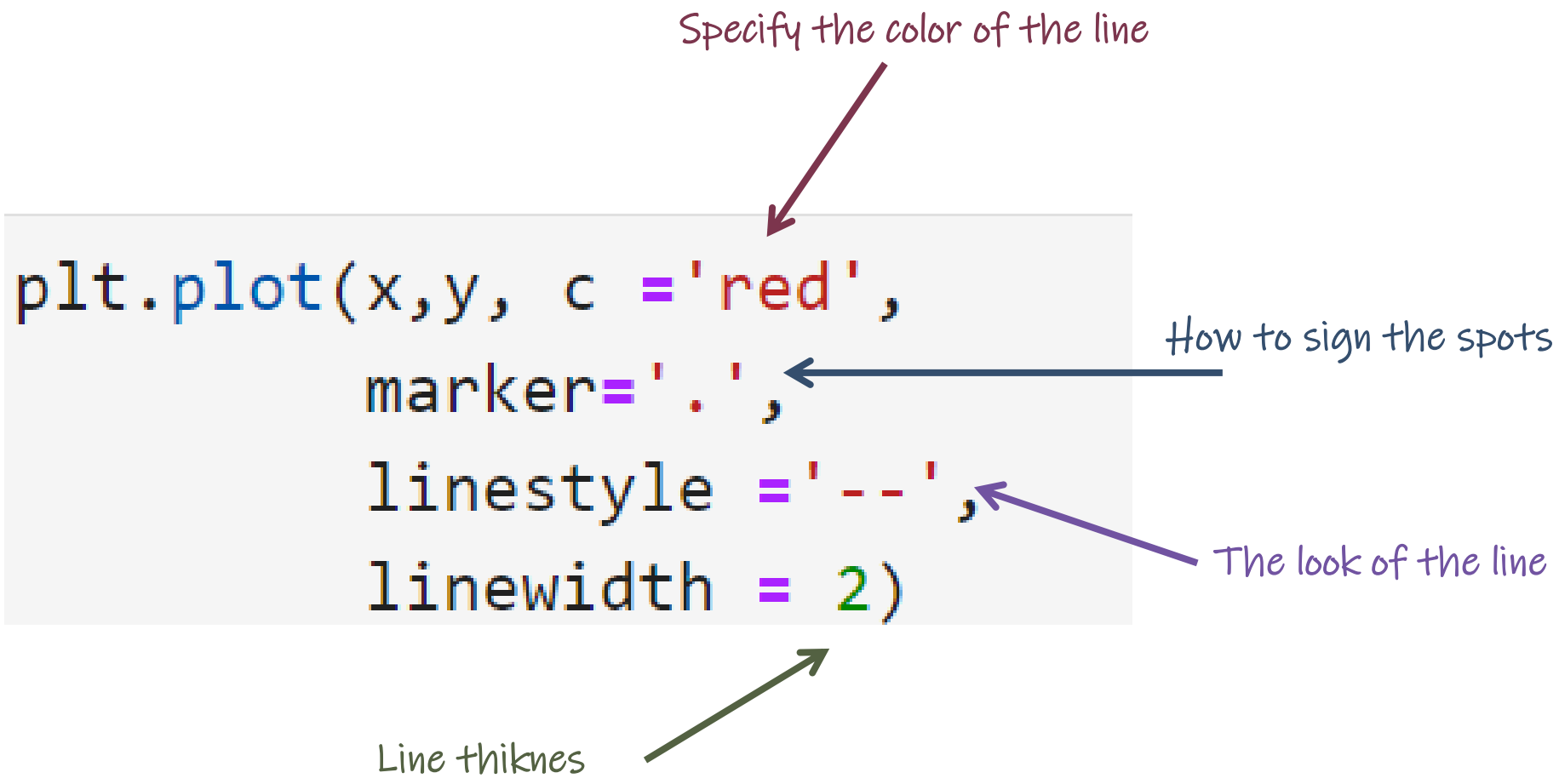
For $x \gg 0$, $e^{-x} \to 0$, so $f(x) \to 1$.

For $x \ll 0$, $e^{-x} \to \infty$, so $f(x) \to 0$.

At $x = 0$, $f(x) = 0.5$.



Line Plot - customizing



Online help

colors:
https://matplotlib.org/stable/gallery/color/named_colors.html

Online help

- Linestyle

  https://matplotlib.org/stable/api/_as_gen/matplotlib.lines.Line2D.html#matplotlib.lines.Line2D.set_linestyle

- Markers

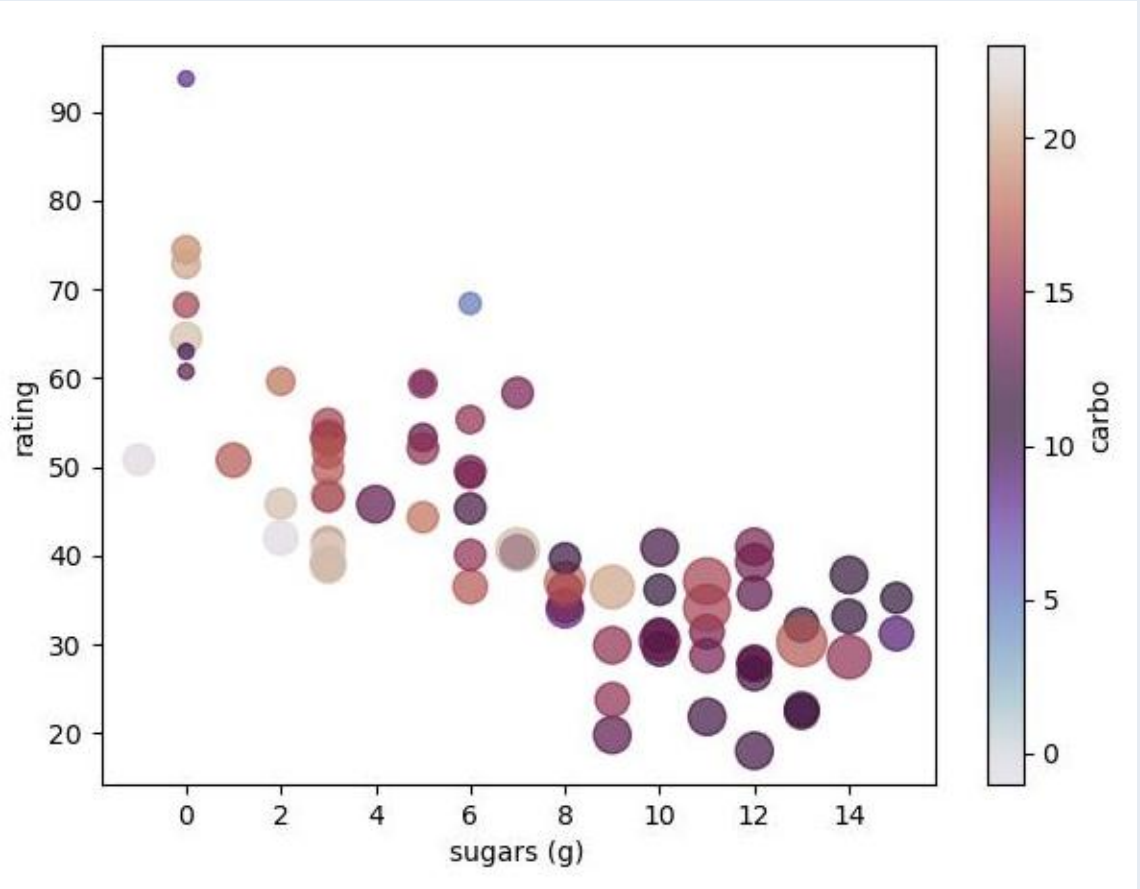
https://matplotlib.org/stable/api/markers_api.html

linestyle	description
`'-'` or `'solid'`	solid line
`'--'` or `'dashed'`	dashed line
`'-.'` or `'dashdot'`	dash-dotted line
`':'` or `'dotted'`	dotted line
`'none'`, `'None'`, `' '`, or `''`	draw nothing

marker	symbol	description
`"."`		point
`","`		pixel
`"o"`		circle
`"v"`		triangle_down
`"^"`		triangle_up
`"<"`		triangle_left
`">"`		triangle_right

Scatter plot

- Ideal for exploring relationships or correlations between two variables.
- Example: Plot height vs. weight of individuals.



Scatter plot

```
x = df['sugars']
y = df['rating']

plt.figure(figsize=(7, 5))
plt.scatter(x,y, alpha =0.5,
            s = 100,
            c =df['carbo'],
            cmap ='twilight'   )

#labels
plt.colorbar().set_label('carbo')
plt.xlabel('sugars (g)')
plt.ylabel('rating')
```

alpha : float, default: None
between 0 (transparent) and (opaque).

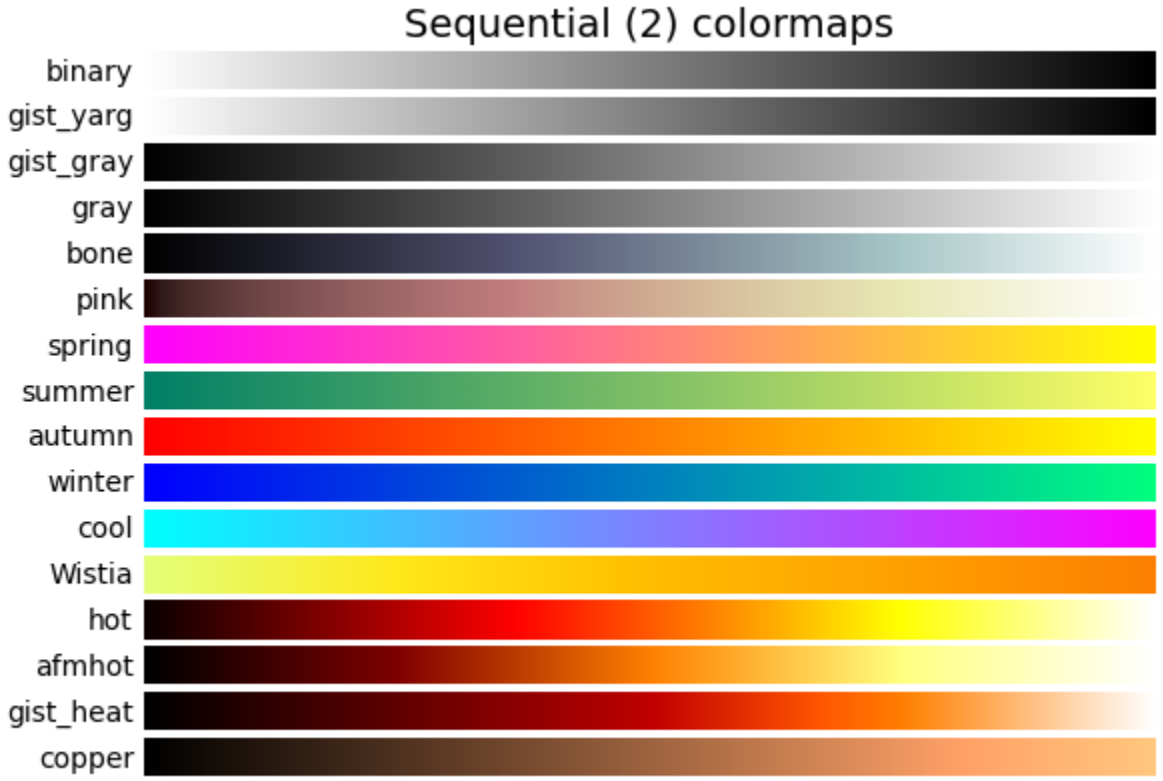
s : float or array-like, shape (n,), optional The marker size

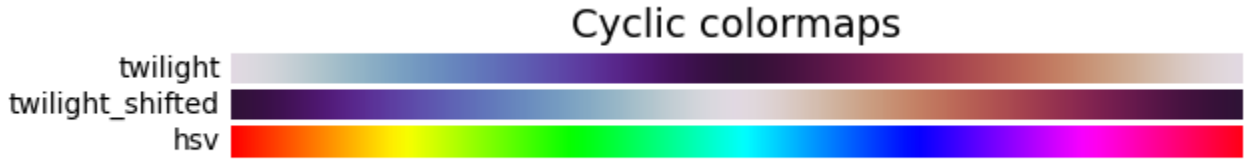
c : array-like or list of colors or color

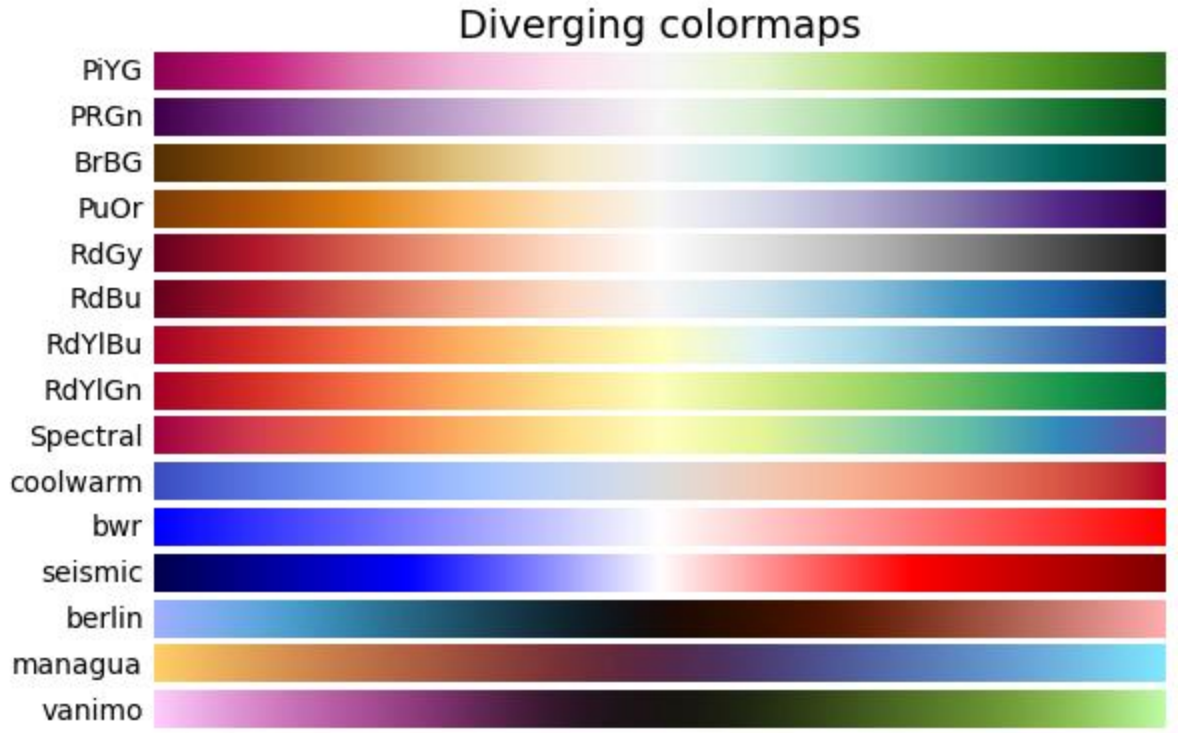
cmap -The Colormap instance or registered colormap name used to map scalar data to colors

Cmap options

- https://matplotlib.org/stable/users/explain/colors/colormaps.html





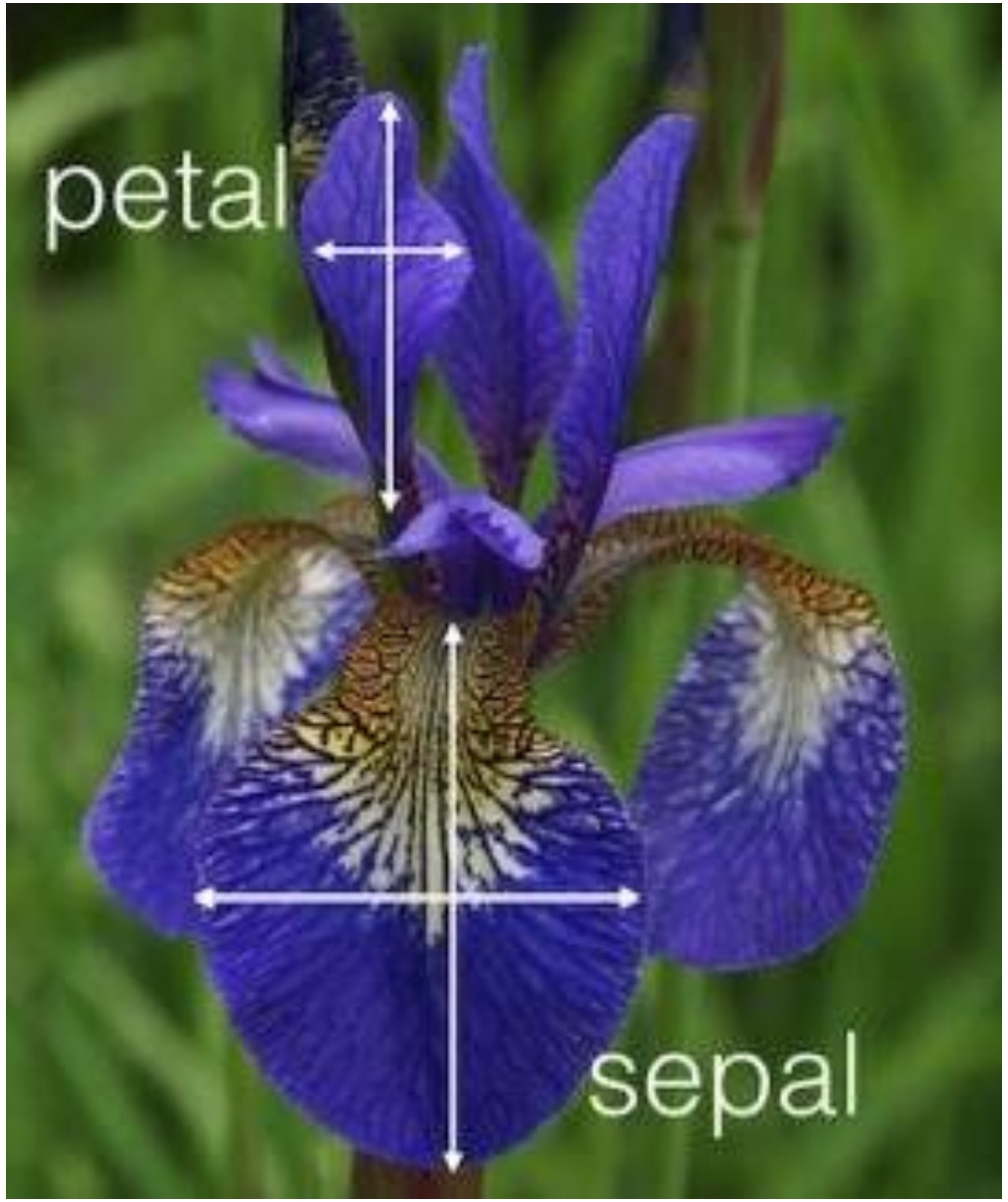


Practice - Iris data set:

```
iris.info()
```

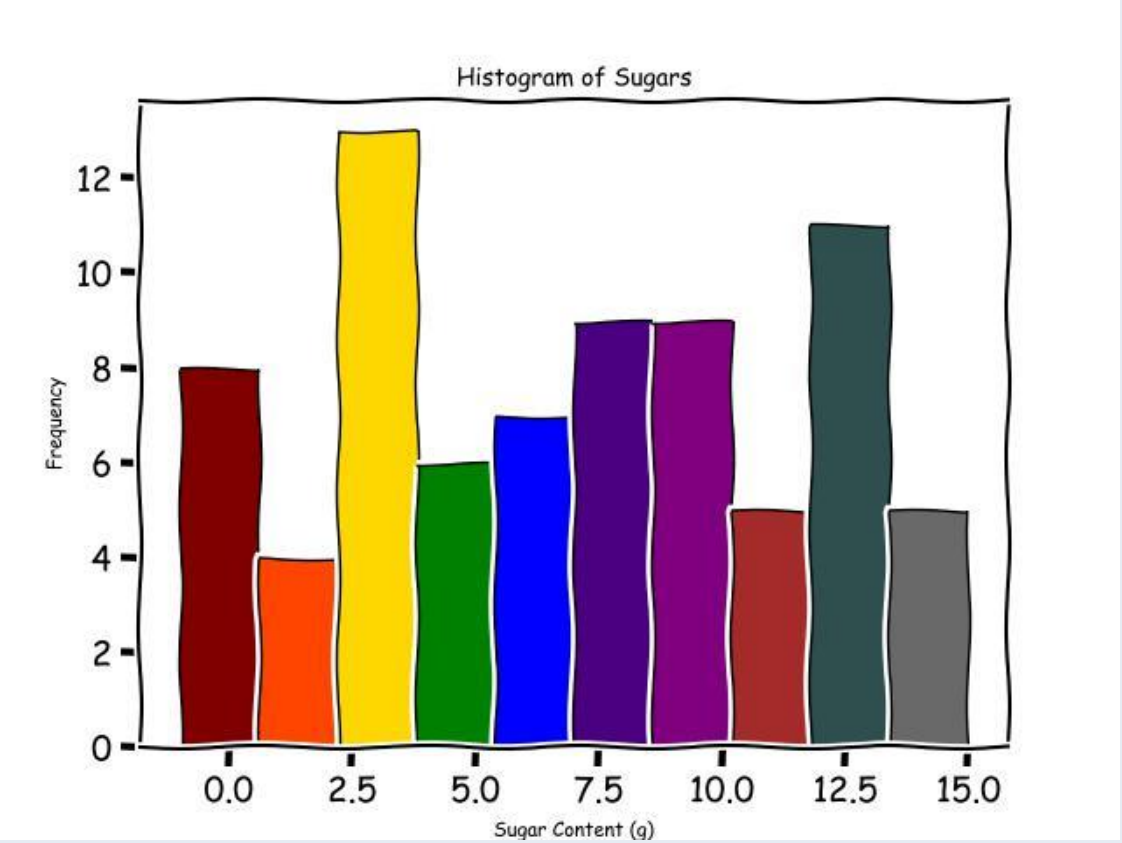
```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 150 entries, 0 to 149
Data columns (total 6 columns):
 #   Column         Non-Null Count  Dtype
---  ------         --------------  -----
 0   Id             150 non-null    int64
 1   SepalLengthCm  150 non-null    float64
 2   SepalWidthCm   150 non-null    float64
 3   PetalLengthCm  150 non-null    float64
 4   PetalWidthCm   150 non-null    float64
 5   Species        150 non-null    object
dtypes: float64(4), int64(1), object(1)
memory usage: 7.2+ KB
```

	Id	SepalLengthCm	SepalWidthCm	PetalLengthCm	PetalWidthCm	Species
60	61	5.0	2.0	3.5	1.0	Iris-versicolor
62	63	6.0	2.2	4.0	1.0	Iris-versicolor
119	120	6.0	2.2	5.0	1.5	Iris-virginica
68	69	6.2	2.2	4.5	1.5	Iris-versicolor
41	42	4.5	2.3	1.3	0.3	Iris-setosa



Histogram

- Useful for showing the distribution of a dataset.
- Example: Display the frequency of age ranges in a population.



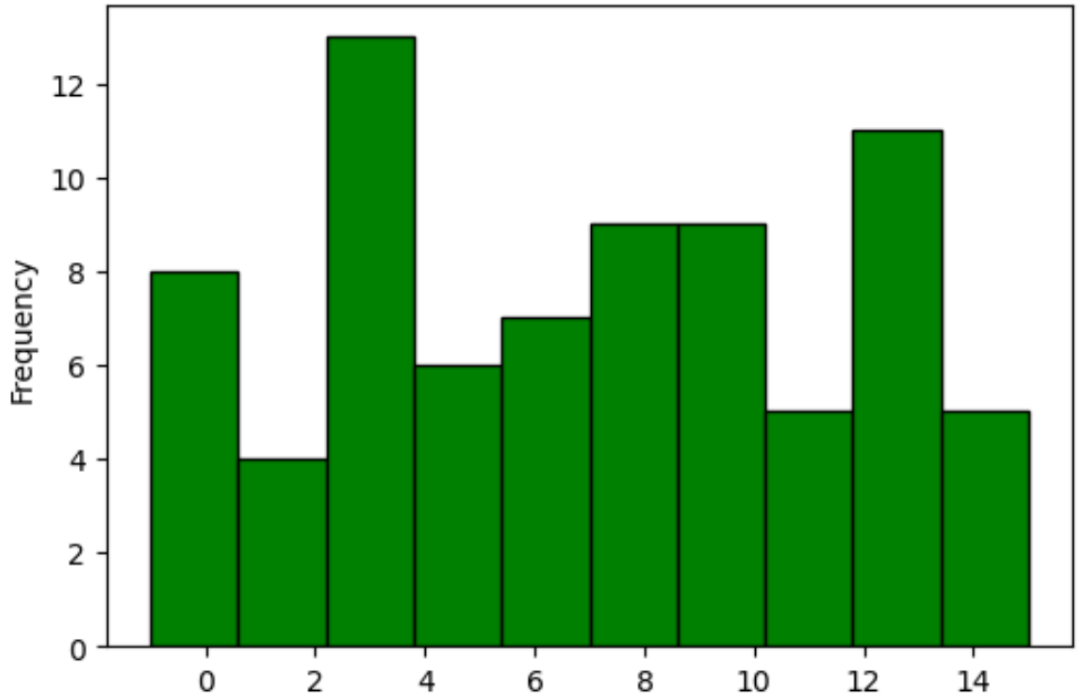
Histogram: both ways can give the same result

```
df['sugars'].hist()
```

```
df['sugars'].hist(bins = 10,
                  color = 'green',
                  edgecolor = 'black',
                  grid = False)
plt.show()
```

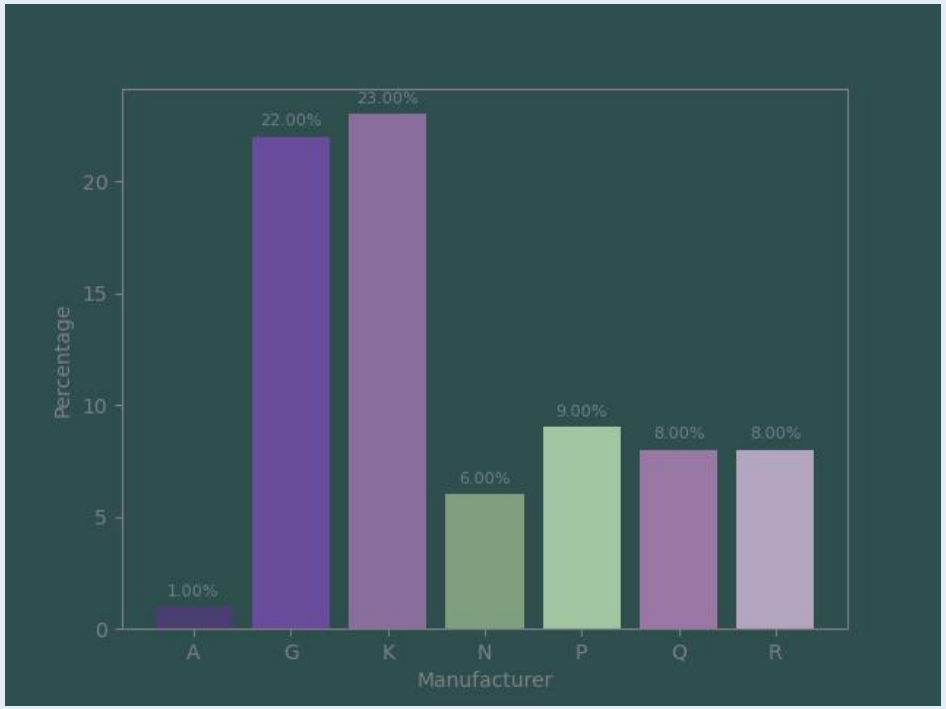
```
df['sugars'].plot(kind = 'hist')
```

```
df['sugars'].plot(kind = 'hist',
                  bins = 10,
                  color = 'green',
                  edgecolor = 'black',
                  )
plt.show()
```



Bar Chart

- Suitable for comparing categories or discrete variables.
- Example: Compare sales of different product categories.



Bar Chart

```
mfrs = df.groupby('mfr')
mfr_ratings = mfrs['rating'].mean()
```

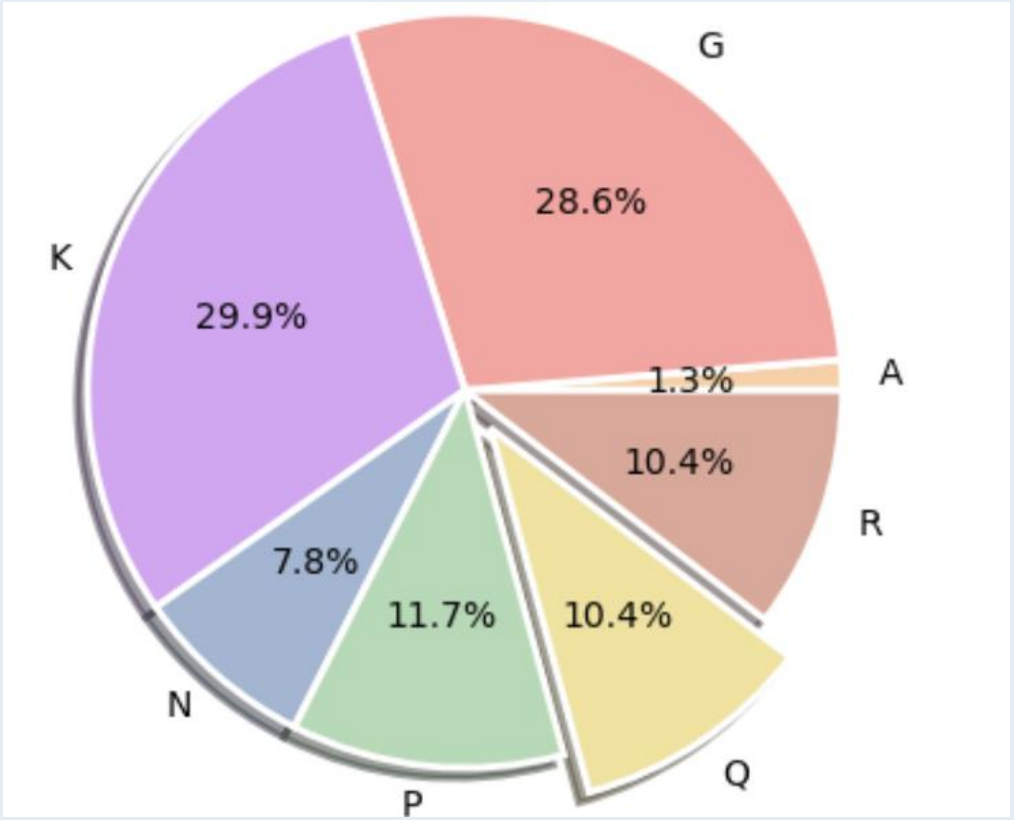
```
mfr_ratings.plot(kind = 'bar')
```

```
plt.bar(mfr_ratings.index, mfr_ratings)
```

Different sintax,
similar result

Pie Chart:

- Effective for visualizing proportions within a whole.
- Example: Show the market share of different companies in an industry.



Pie plot

```
percentage.plot( kind = 'pie')
```

```
plt.pie(percentage)
```

Different sintax,
similar result

```
percentage = mfrs.size()
plt.pie(percentage,labels = percentage.index ,
        wedgeprops = {'edgecolor':'k',
                      'linewidth' :0.5},
       explode = [0,0,0,0,0,0.1,0],
       shadow = True,
       colors = ['red','orange','yellow','green','blue','purple','pink'])
plt.show()
```

Color and width of separating line

Creates an effect of a slice coming out

Colors for the
slices of pies

matplotlib

seaborn