- Shin’s Lab -

Python for Data Visualization

Python for Data Visualization

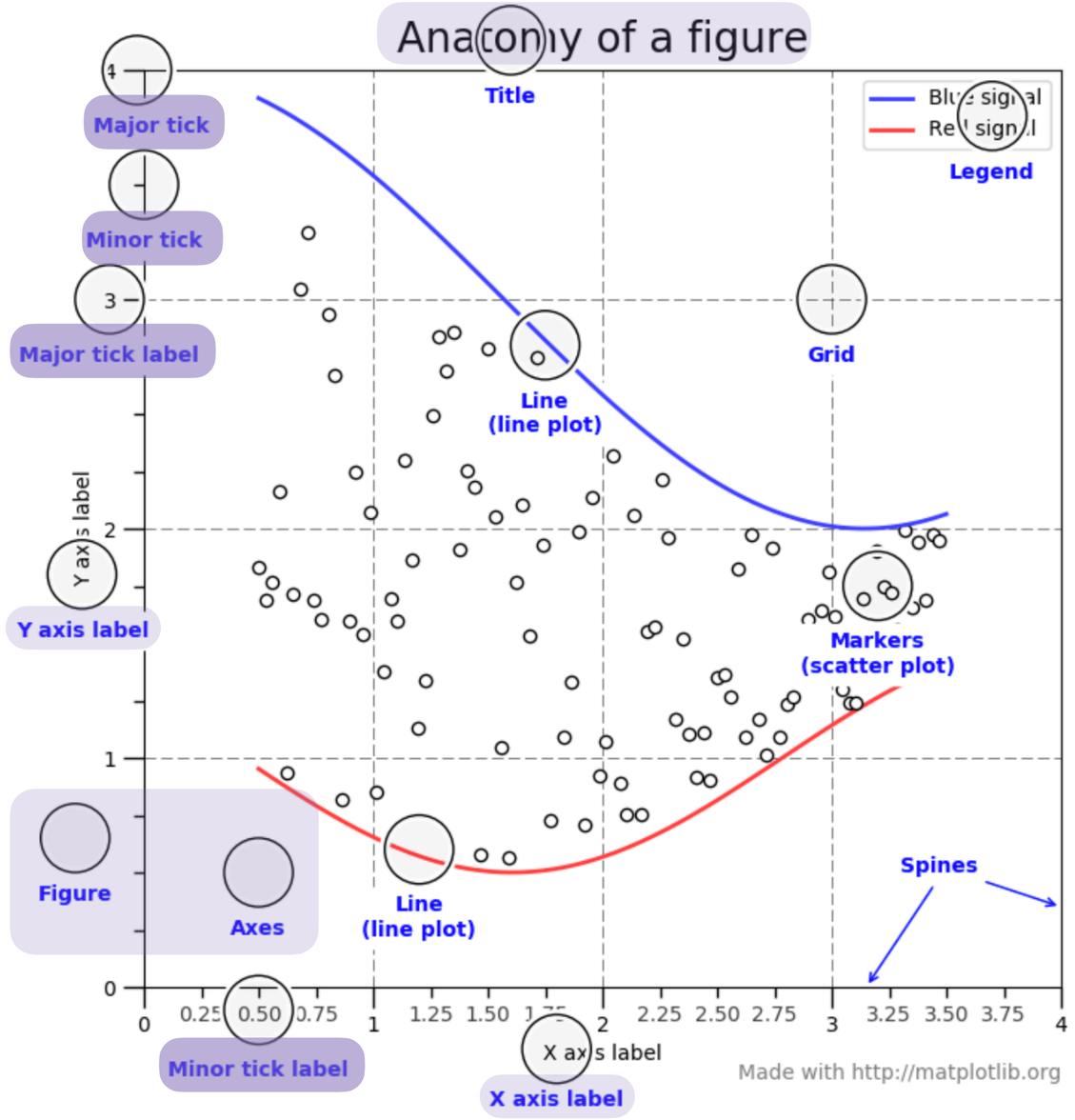
-Chapter.1 Matplotlib Anatomy -

Python for Data Visualization

-Chapter.1 Matplotlib Anatomy -

1-04. Ticks and Ticklabels

1. Tick and Ticklabels APIs
2. ax.tick_params
3. ax.set_xticks
4. ax.set_xticklabels
5. Ticks and Ticklabels Practice


Anatomy of a figure
Title
Major tick
Minor tick
Major tick label
Minor tick label
Y axis label
X axis label
Legend
Grid
Line
(line plot)
Markers
(scatter plot)
Figure
Axes
Spines
Made with http://matplotlib.org

1. Tick and Ticklabels APIs

Ticks and tick labels	
Axes.set_xticks	Set the xaxis' tick locations.
Axes.get_xticks	Return the xaxis' tick locations in data coordinates.
Axes.set_xticklabels	Set the xaxis' labels with list of string labels.
Axes.get_xticklabels	Get the xaxis' tick labels.
Axes.get_xmajorticklabels	Return the xaxis' major tick labels, as a list of Text.
Axes.get_xminorticklabels	Return the xaxis' minor tick labels, as a list of Text.
Axes.get_xgridlines	Return the xaxis' grid lines as a list of Line2Ds.
Axes.get_xticklines	Return the xaxis' tick lines as a list of Line2Ds.
Axes.xaxis_date	Sets up axis ticks and labels to treat data along the xaxis as dates.
Axes.set_yticks	Set the yaxis' tick locations.
Axes.get_yticks	Return the yaxis' tick locations in data coordinates.
Axes.set_yticklabels	Set the yaxis' labels with list of string labels.
Axes.get_yticklabels	Get the yaxis' tick labels.
Axes.get_ymajorticklabels	Return the yaxis' major tick labels, as a list of Text.
Axes.get_yminorticklabels	Return the yaxis' minor tick labels, as a list of Text.
Axes.get_ygridlines	Return the yaxis' grid lines as a list of Line2Ds.
Axes.get_yticklines	Return the yaxis' tick lines as a list of Line2Ds.
Axes.yaxis_date	Sets up axis ticks and labels to treat data along the yaxis as dates.
Axes.minorticks_off	Remove minor ticks from the axes.
Axes.minorticks_on	Display minor ticks on the axes.
Axes.ticklabel_format	Configure the ScalarFormatter used by default for linear axes.
Axes.tick_params	Change the appearance of ticks, tick labels, and gridlines.
Axes.locator_params	Control behavior of major tick locators.

2. ax.tick_params

matplotlib.axes.Axes.tick_params

```
Axes.tick_params(self, axis='both', **kwargs)
```

Change the appearance of ticks, tick labels, and gridlines.

Tick properties that are not explicitly set using the keyword arguments remain unchanged unless *reset* is True.

Parameters:

axis : {'x', 'y', 'both'}, default: 'both'
The axis to which the parameters are applied.

which : {'major', 'minor', 'both'}, default: 'major'
The group of ticks to which the parameters are applied.

reset : bool, default: False
Whether to reset the ticks to defaults before updating them.

Other Parameters:

direction : {'in', 'out', 'inout'}
Puts ticks inside the axes, outside the axes, or both.

length : float
Tick length in points.

width : float
Tick width in points.

color : color
Tick color.

pad : float
Distance in points between tick and label.

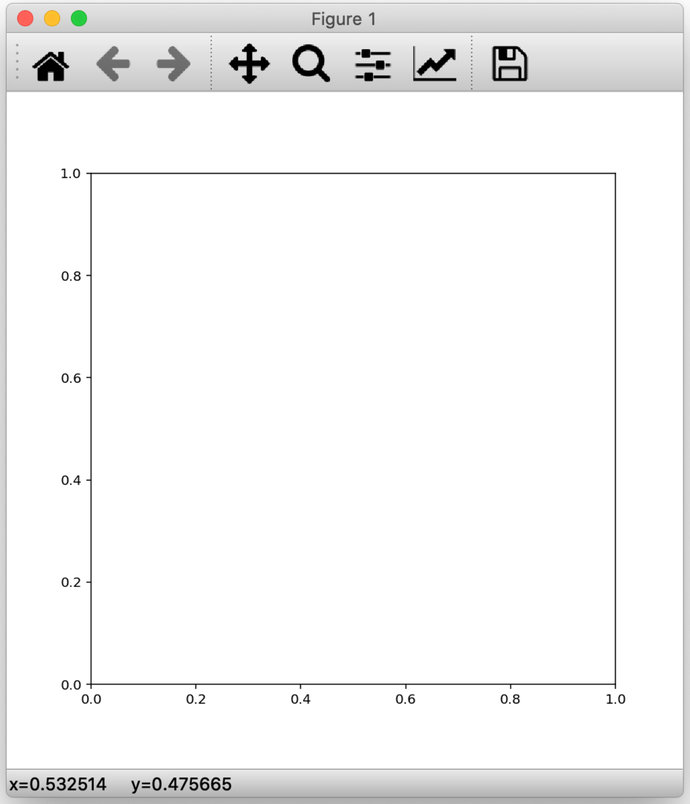
labelsize : float or str
Tick label font size in points or as a string (e.g., 'large').

labelcolor : color
Tick label color.

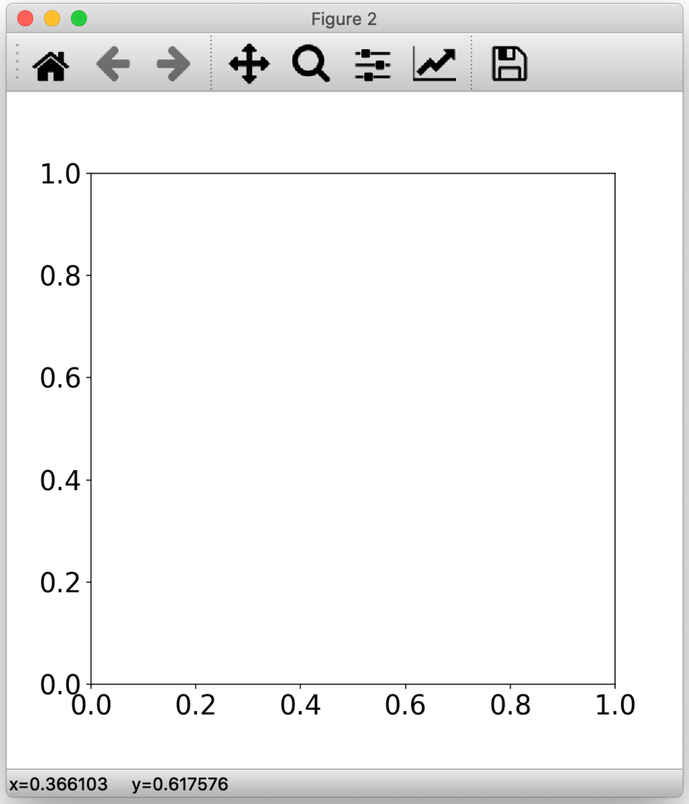
colors : color
Tick color and label color.

2. ax.tick_params(labelsize Argument)

```
fig, ax = plt.subplots(figsize=(7, 7))
```

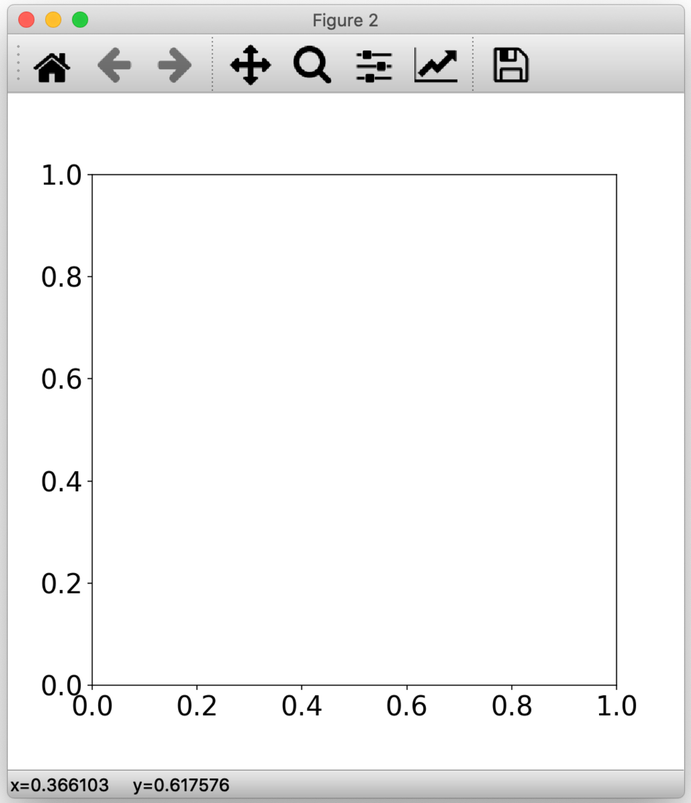



```
fig, ax = plt.subplots(figsize=(7, 7))
ax.tick_params(labelsize=20)
```

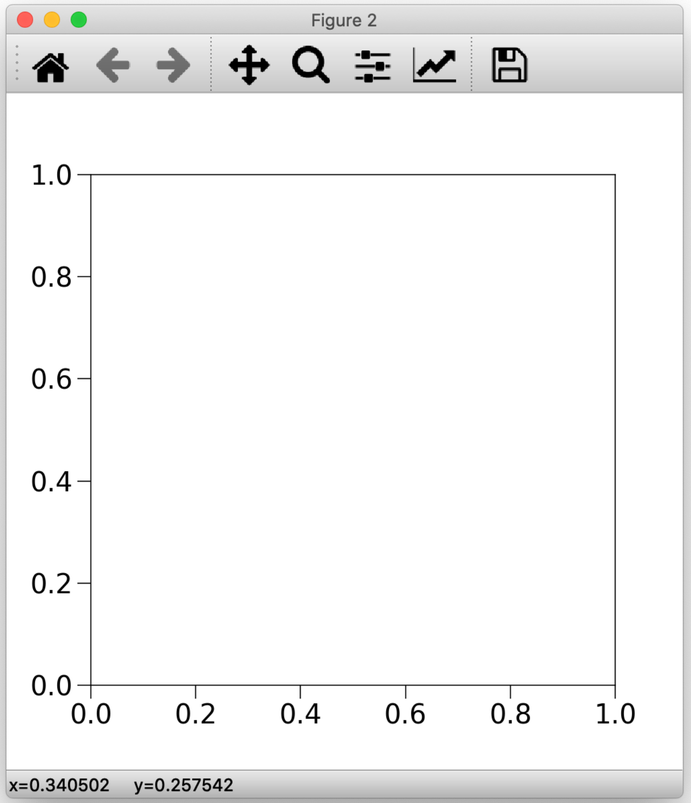


2. ax.tick_params(length and width Arguments)

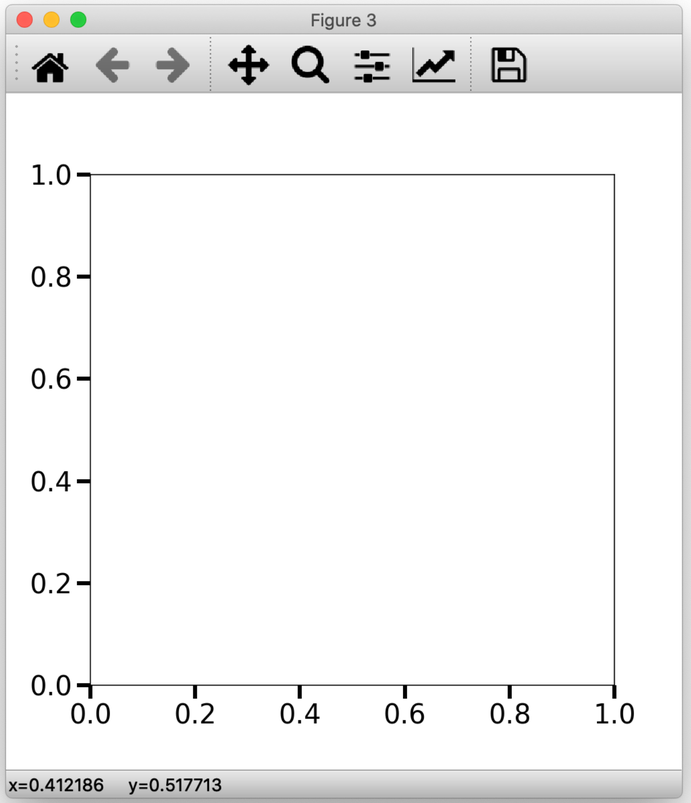
```
ax.tick_params(labelsize=20)
```




```
ax.tick_params(labelsize=20,
               length=10)
```

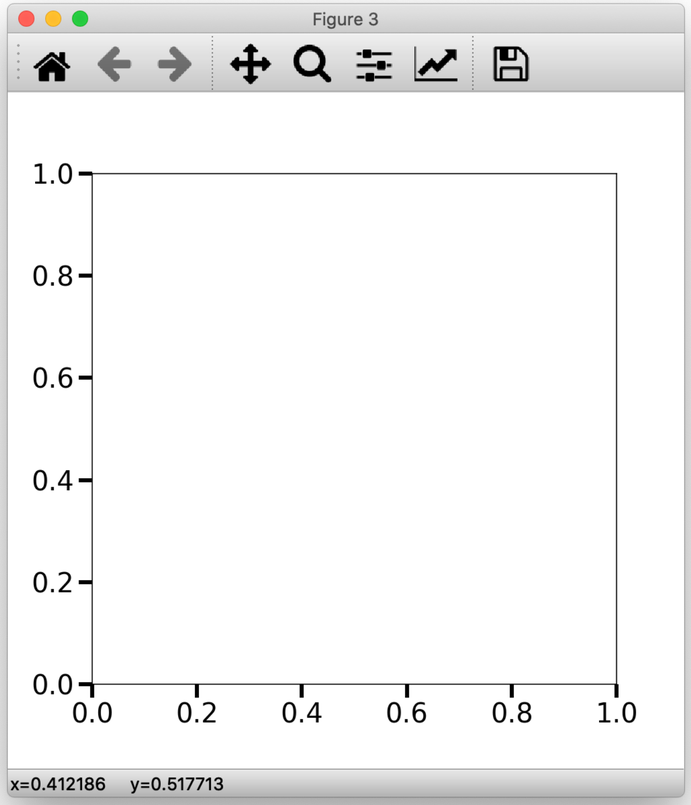



```
ax.tick_params(labelsize=20,
               length=10,
               width=3)
```

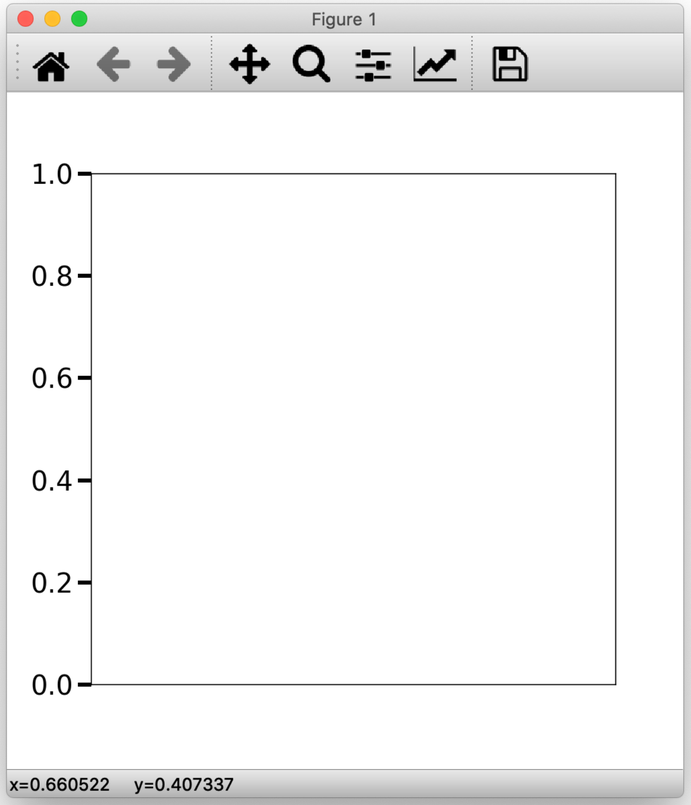


2. ax.tick_params(Tick Locations)

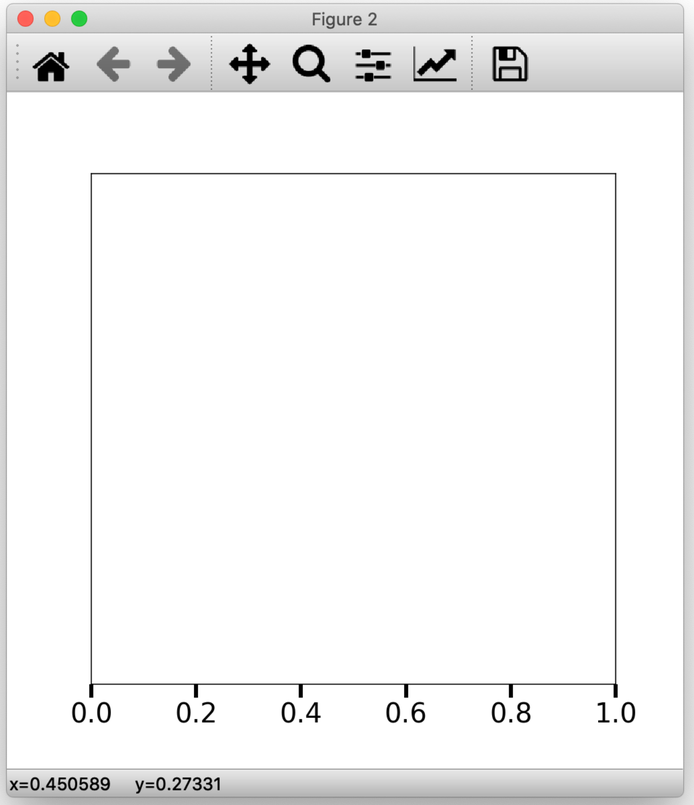
```
ax.tick_params(labelsize=20,
               length=10,
               width=3)
```




```
ax.tick_params(labelsize=20,
               length=10,
               width=3,
               bottom=False,
               labelbottom=False)
```

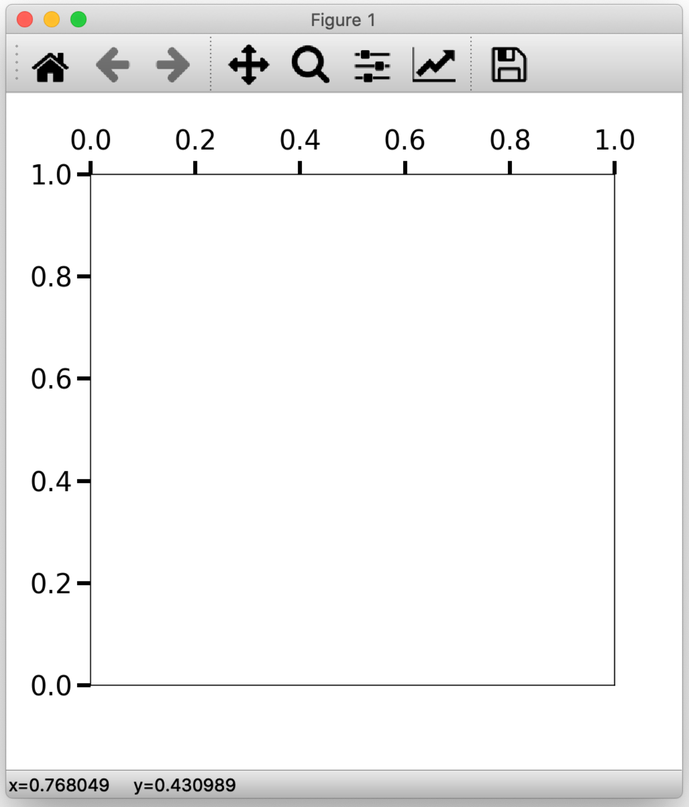



```
ax.tick_params(labelsize=20,
               length=10,
               width=3,
               left=False,
               labelleft=False)
```

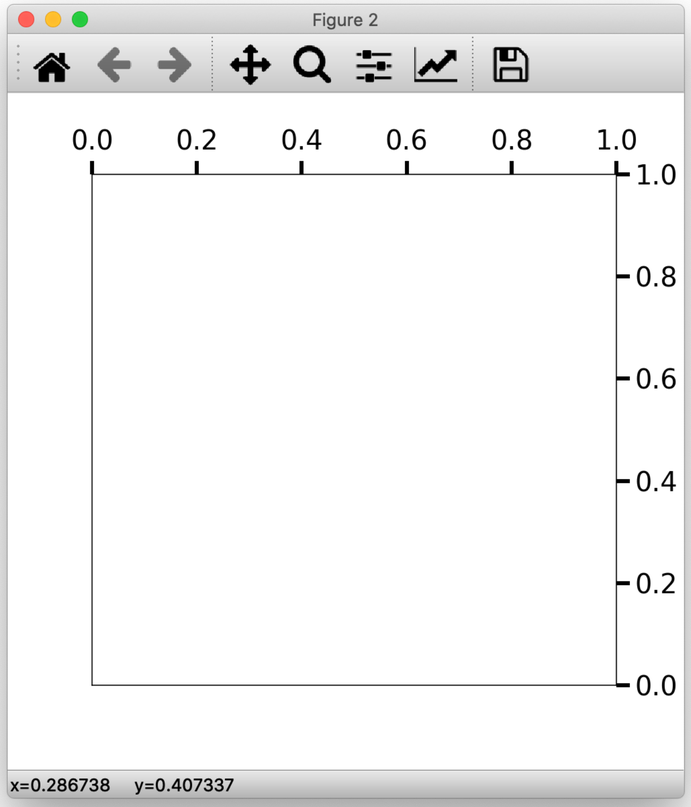


2. ax.tick_params(Tick Locations)

```
ax.tick_params(labelsize=20,
               length=10,
               width=3,
               bottom=False, labelbottom=False,
               top=True, labeltop=True)
```

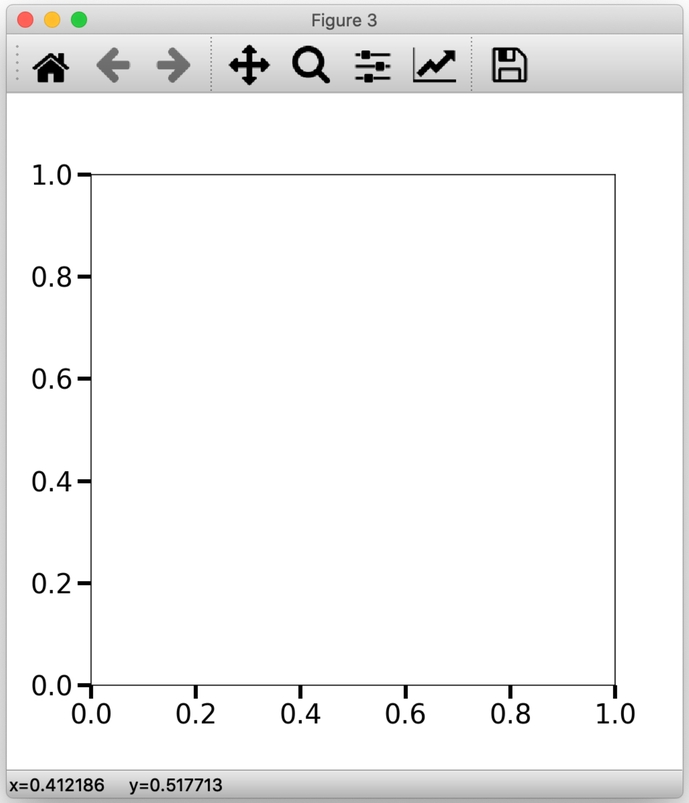



```
ax.tick_params(labelsize=20,
               length=10,
               width=3,
               bottom=False, labelbottom=False,
               left=False, labelleft=False,
               top=True, labeltop=True,
               right=True, labelright=True)
```

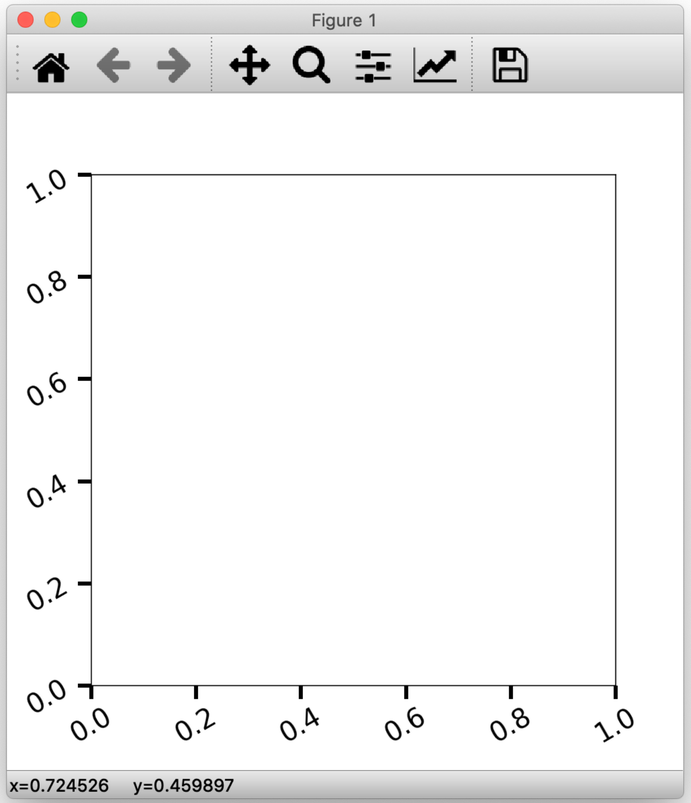


2. ax.tick_params(rotation Argument)

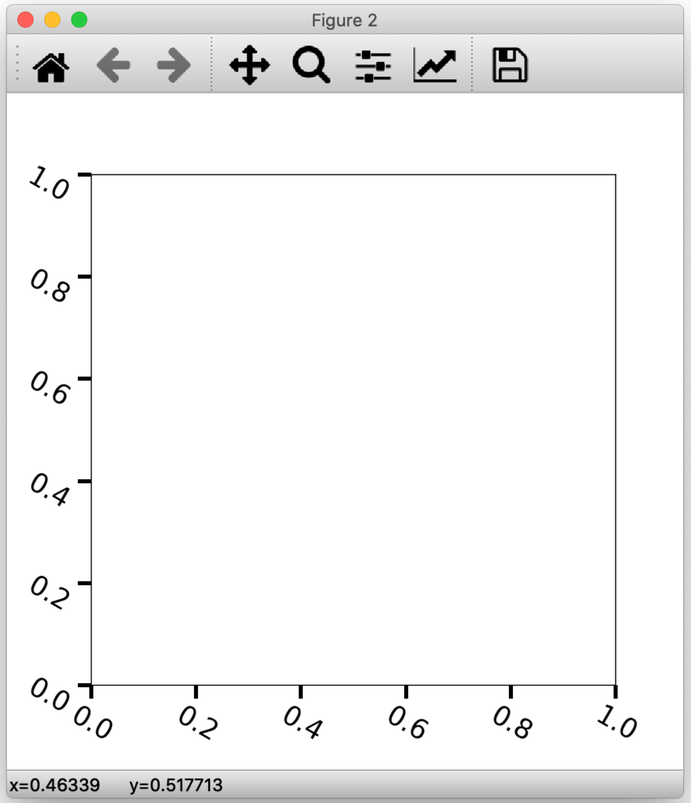
```
ax.tick_params(labelsize=20,
               length=10,
               width=3)
```




```
ax.tick_params(labelsize=20,
               length=10,
               width=3,
               rotation=30)
```




```
ax.tick_params(labelsize=20,
               length=10,
               width=3,
               rotation=-30)
```



2. ax.tick_params(axis and which Arguments)

matplotlib.axes.Axes.tick_params

```
Axes.tick_params(self, axis='both', **kwargs)
```

Change the appearance of ticks, tick labels, and gridlines.

Tick properties that are not explicitly set using the keyword arguments remain unchanged unless *reset* is True.

Parameters:

axis : {'x', 'y', 'both'}, default: 'both'
The axis to which the parameters are applied.

which : {'major', 'minor', 'both'}, default: 'major'
The group of ticks to which the parameters are applied.

reset : bool, default: False
Whether to reset the ticks to defaults before updating them.

Other Parameters:

direction : {'in', 'out', 'inout'}
Puts ticks inside the axes, outside the axes, or both.

length : float
Tick length in points.

width : float
Tick width in points.

color : color
Tick color.

pad : float
Distance in points between tick and label.

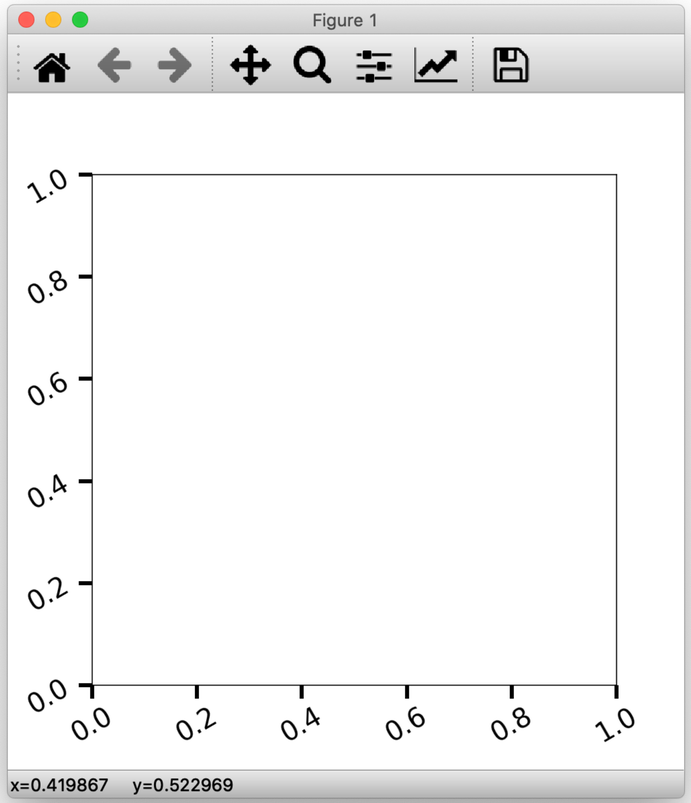
labelsize : float or str
Tick label font size in points or as a string (e.g., 'large').

labelcolor : color
Tick label color.

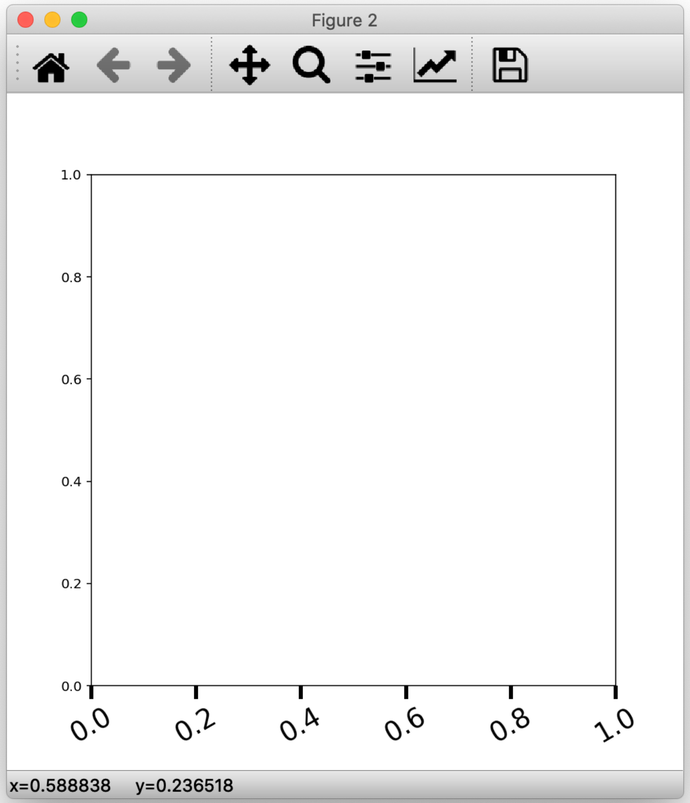
colors : color
Tick color and label color.

2. ax.tick_params(x, y Axis Ticks)

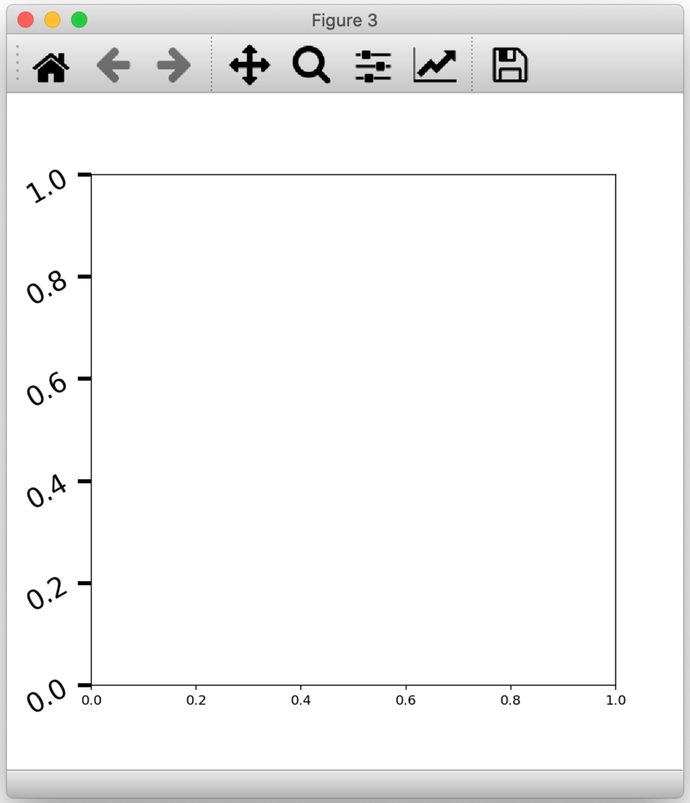
```
ax.tick_params(labelsize=20,
               length=10,
               width=3,
               rotation=30)
```




```
ax.tick_params(axis='x',
               labelsize=20,
               length=10,
               width=3,
               rotation=30)
```



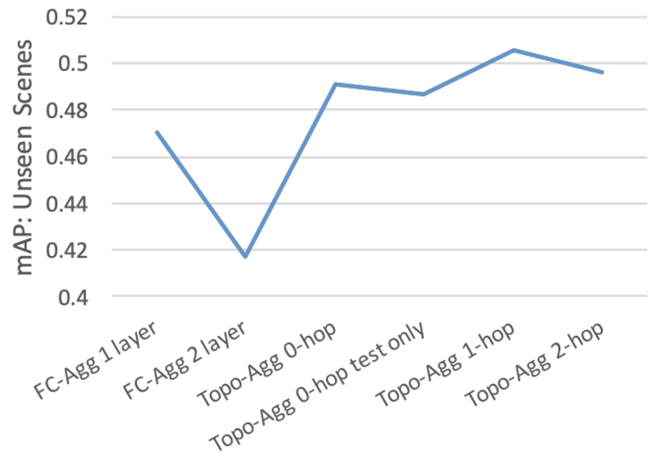

```
ax.tick_params(axis='y',
               labelsize=20,
               length=10,
               width=3,
               rotation=30)
```



2. ax.tick_params(Exercise)

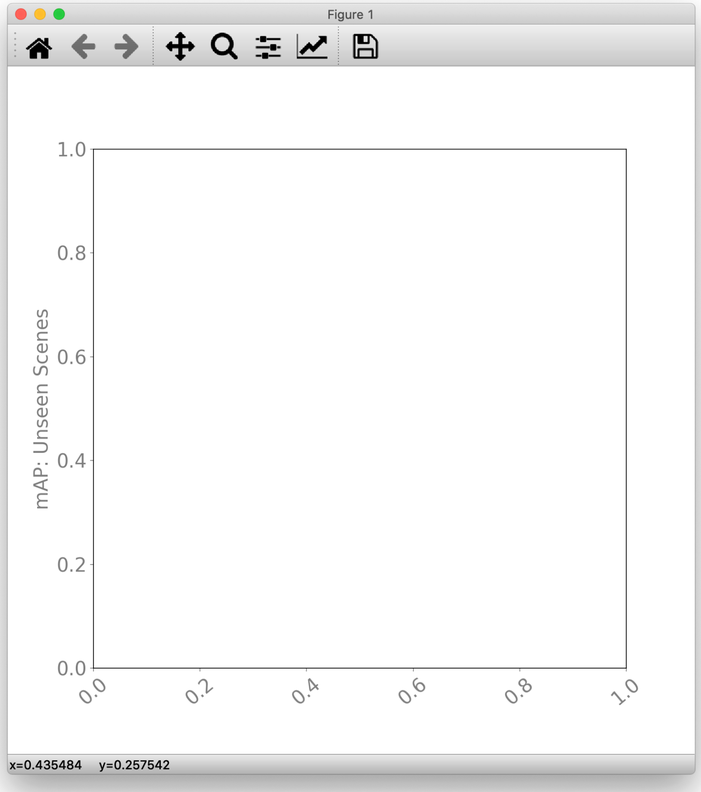
Layout-induced Video Representation for Recognizing Agent-in-Place Actions

Ruichi Yu[1,2*] Hongcheng Wang[2]
Ang Li[1] Jingxiao Zheng[1] Vlad I. Morariu[3†] Larry S. Davis[1]
[1]University of Maryland, College Park [2]Comcast Applied AI Research [3]Adobe Research
[1]{yrcbsg, angli, jxzheng, lsd}@umiacs.umd.edu,
[2]hongcheng_wang@comcast.com, [3]morariu@adobe.com

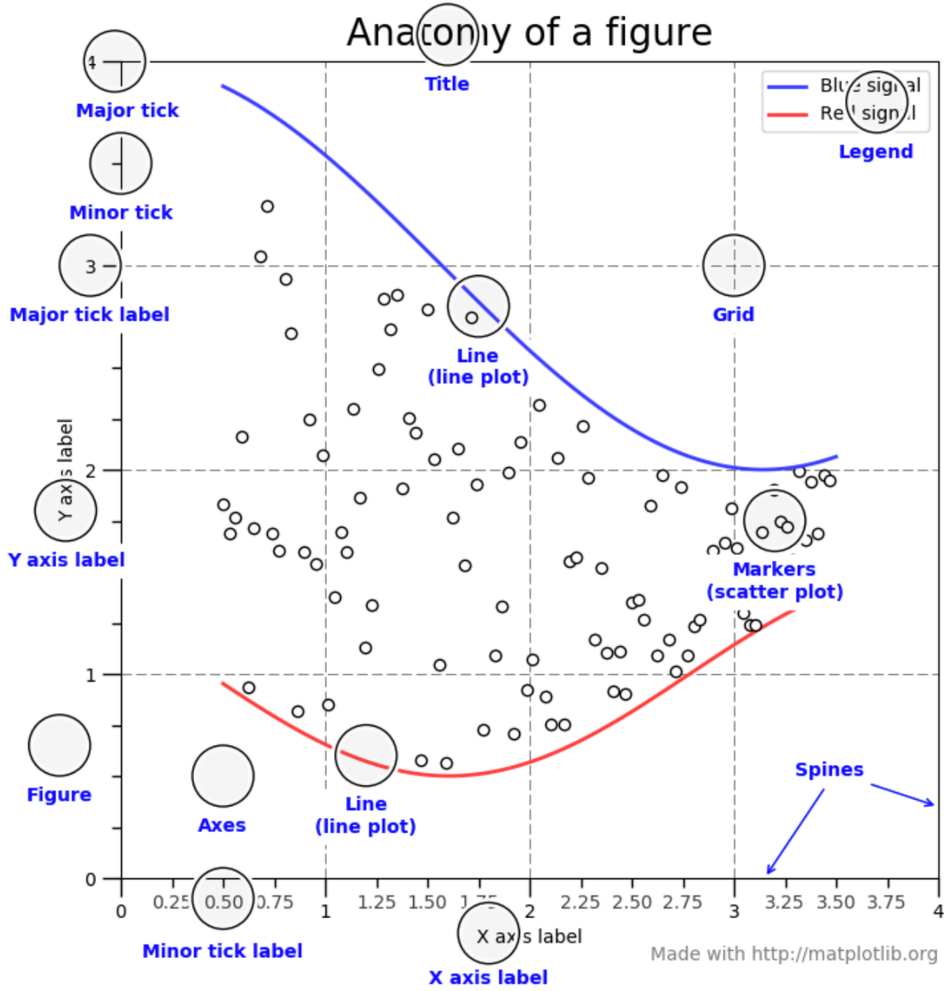


(c) Topological Aggregation

```
fig, ax = plt.subplots(figsize=(10, 10))

ax.tick_params(axis='y',
               labelsize=20,
               colors='gray')

ax.tick_params(axis='x',
               labelsize=20,
               rotation=40,
               colors='gray')

ax.set_ylabel("mAP: Unseen Scenes",
              fontsize=20,
              color='gray')
```



3. ax.set_xticks



matplotlib.axes.Axes.set_xticks

`Axes.set_xticks(self, ticks, *, minor=False)`

Set the xaxis' tick locations.

Parameters:

ticks : list of floats

List of tick locations.

minor : bool, default: False

If `False`, set the major ticks; if `True`, the minor ticks.

matplotlib.axes.Axes.set_yticks

`Axes.set_yticks(self, ticks, *, minor=False)`

Set the yaxis' tick locations.

Parameters:

ticks : list of floats

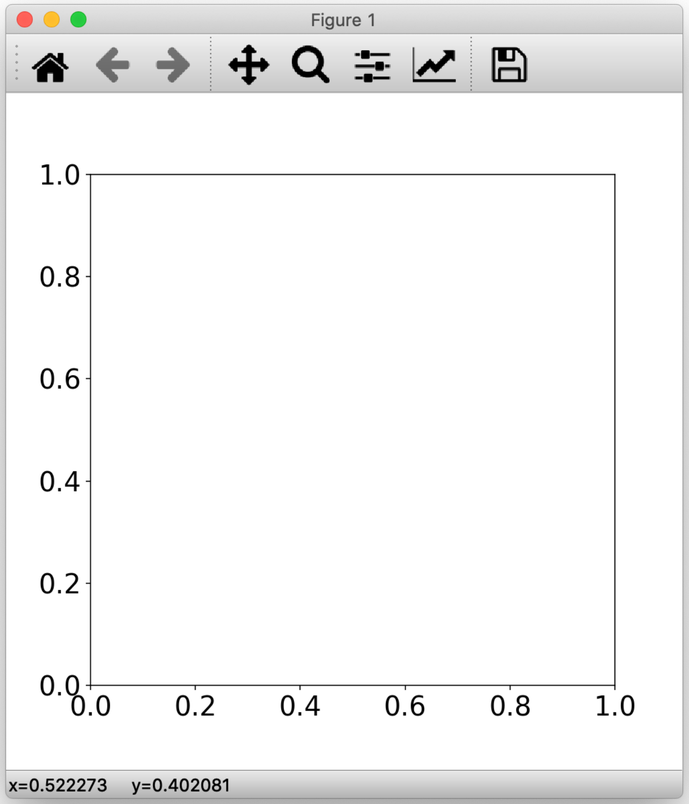
List of tick locations.

minor : bool, default: False

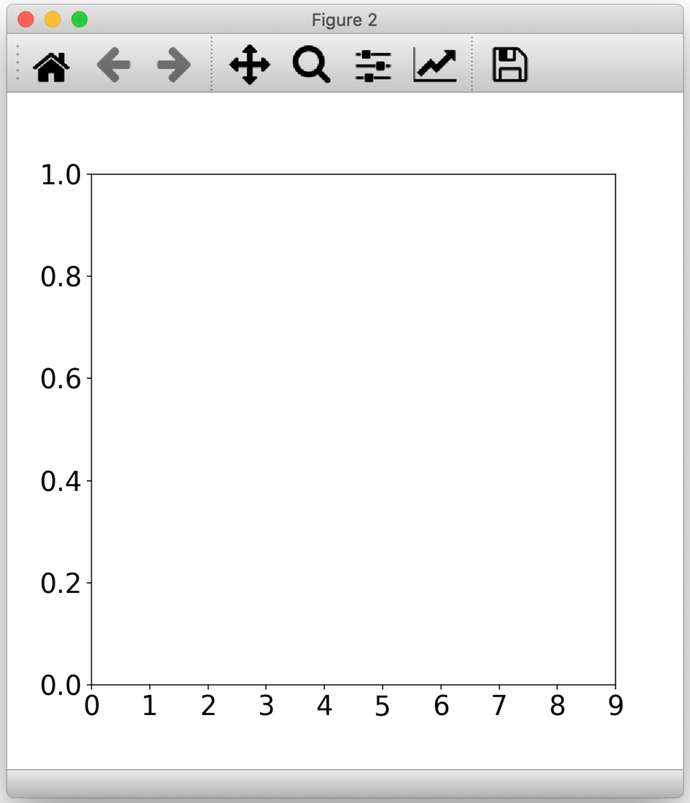
If `False`, set the major ticks; if `True`, the minor ticks.

3. ax.set_xticks(labelsize Argument)

```
fig, ax = plt.subplots(figsize=(7, 7))
ax.tick_params(labelsize=20)
```

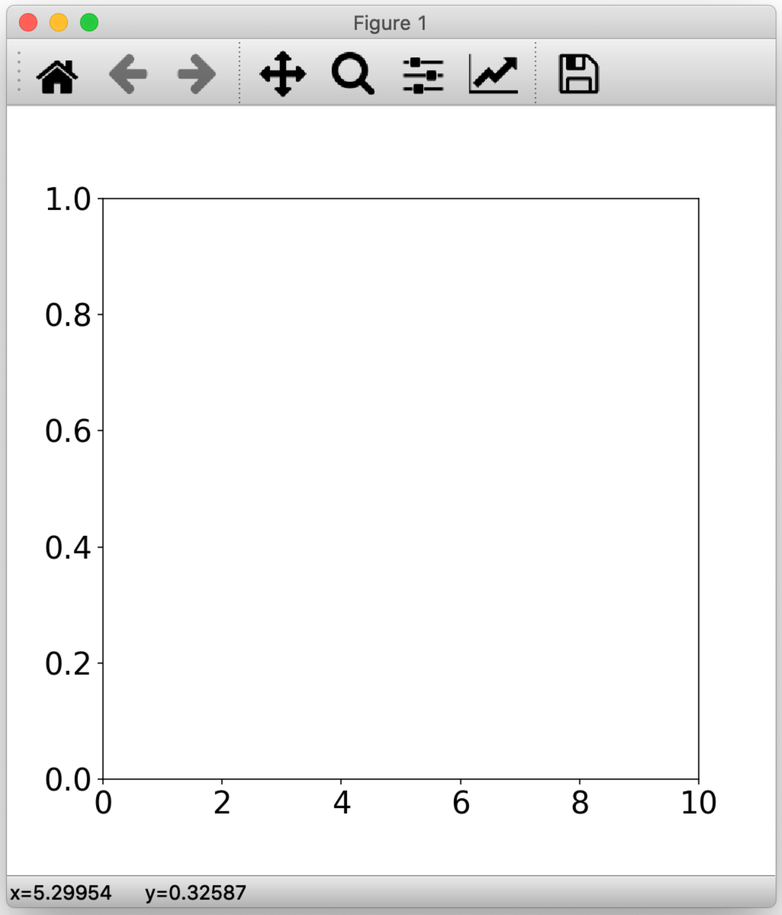



```
xticks = [i for i in range(10)]

ax.set_xticks(xticks)
ax.tick_params(labelsize=20)
```

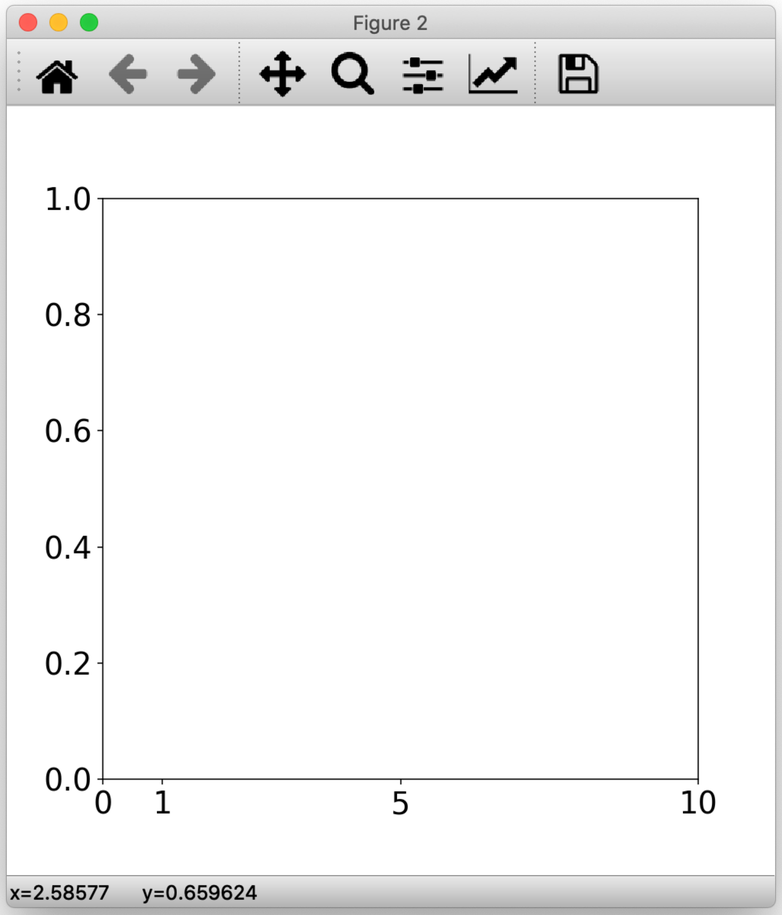


3. ax.set_xticks(Arbitrary Locations)

```
ax.set_xlim([0, 10])
```

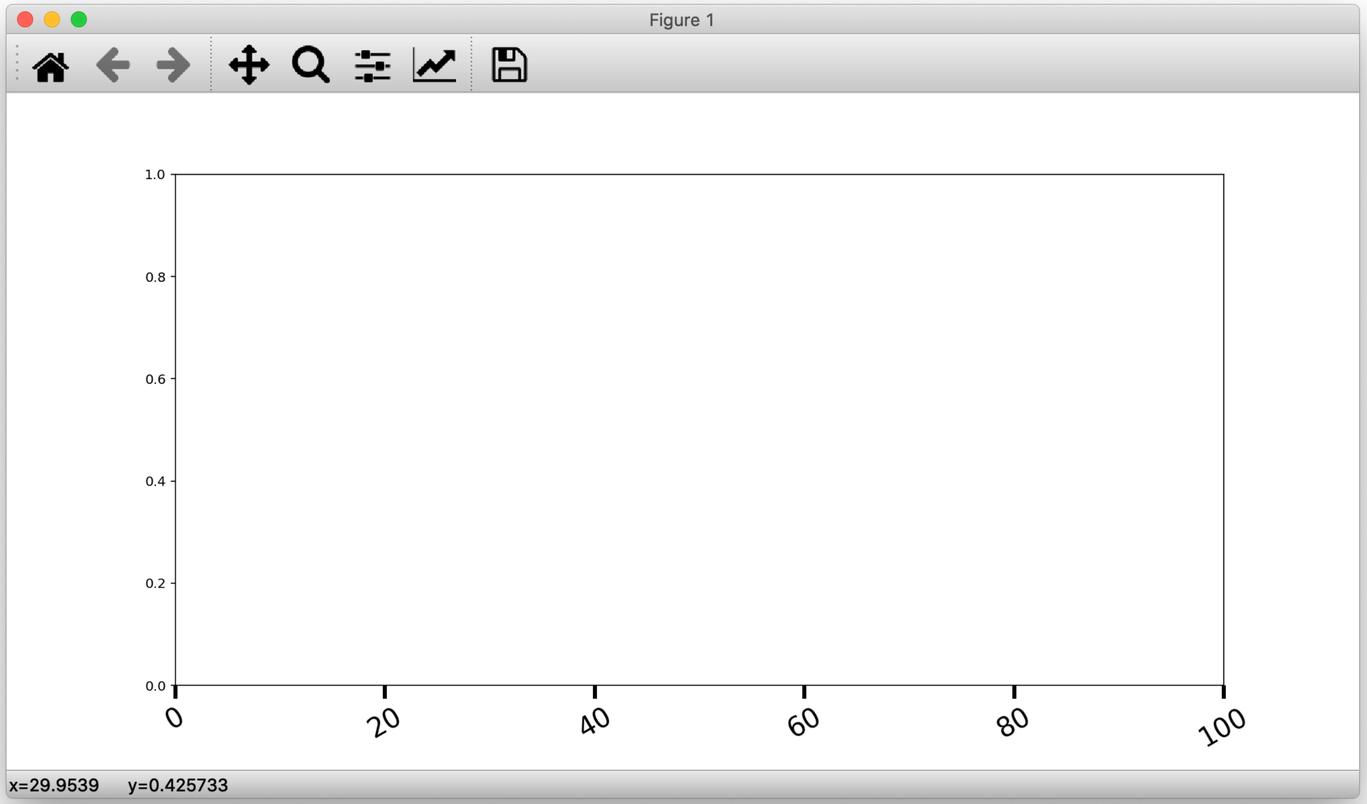



```
ax.set_xticks([0, 1, 5, 10])
```



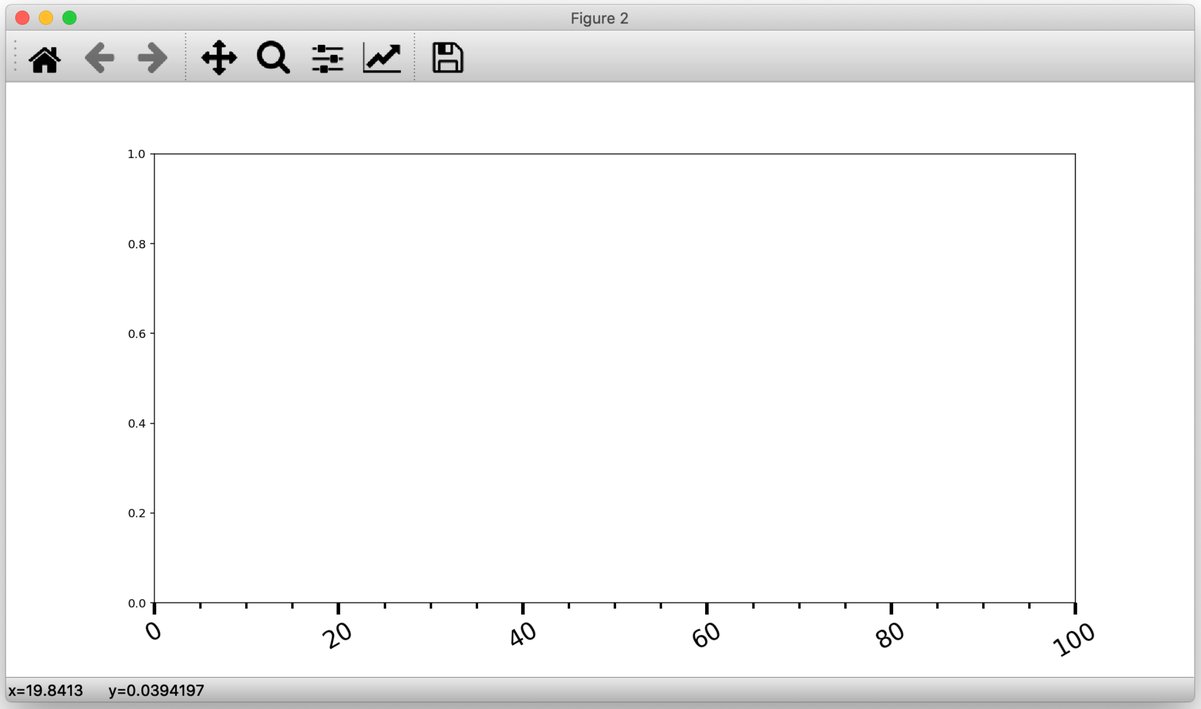
3. ax.set_xticks(Regular Intervals)

```
fig, ax = plt.subplots(figsize=(14, 7))

xticks = [i for i in range(0, 101, 20)]
ax.set_xticks(xticks)

ax.tick_params(axis='x',
               labelsize=20,
               length=10,
               width=3,
               rotation=30)
```



3. ax.set_xticks(Major and Minor Ticks)

```
fig, ax = plt.subplots(figsize=(14, 7))

major_xticks = [i for i in range(0, 101, 20)]
minor_xticks = [i for i in range(0, 101, 5)]

ax.set_xticks(major_xticks)
ax.set_xticks(minor_xticks,
              minor=True)

ax.tick_params(axis='x',
               labelsize=20,
               length=10,
               width=3,
               rotation=30)

ax.tick_params(axis='x',
               which='minor',
               length=5,
               width=2)
```



3. ax.set_xticks(x, y Ticks)

```
major_xticks = [i for i in range(0, 101, 20)]
minor_xticks = [i for i in range(0, 101, 5)]
major_yticks = [i for i in range(0, 11, 2)]
minor_yticks = [i for i in range(0, 11, 1)]
```

```
ax.set_xticks(major_xticks)
ax.set_xticks(minor_xticks,
              minor=True)
```

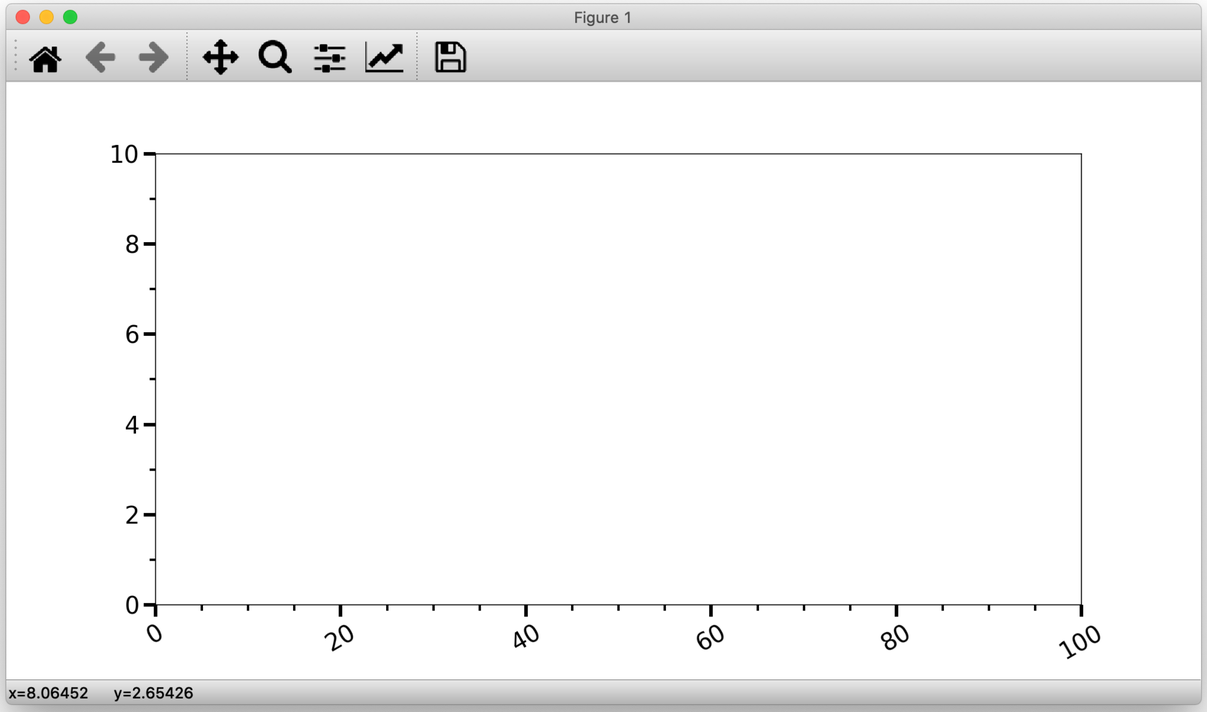
```
ax.set_yticks(major_yticks)
ax.set_yticks(minor_yticks,
              minor=True)
```

```
ax.tick_params(axis='x',
               labelsize=20,
               length=10,
               width=3,
               rotation=30)
```

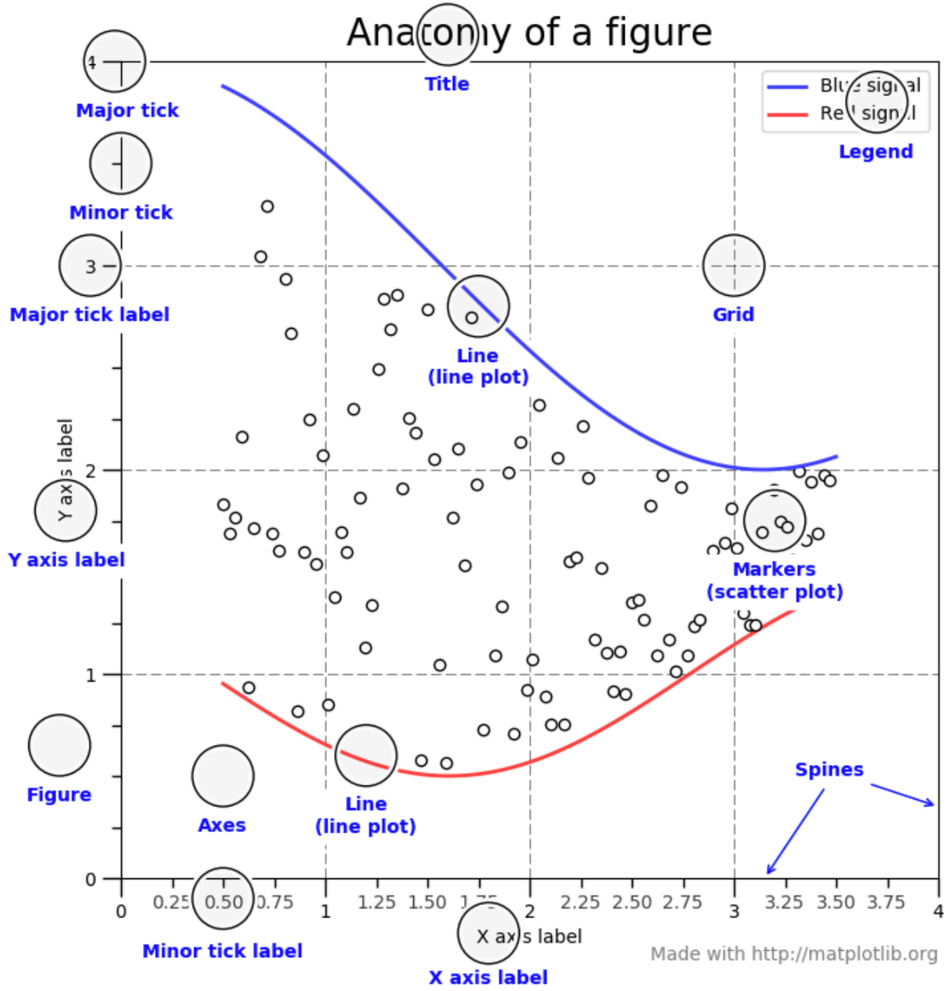
```
ax.tick_params(axis='y',
               labelsize=20,
               length=10,
               width=3)
```

```
ax.tick_params(axis='x',
               which='minor',
               length=5,
               width=2)
```

```
ax.tick_params(axis='y',
               which='minor',
               length=5,
               width=2)
```



4. ax.set_xticklabels



matplotlib.axes.Axes.set_xticklabels

`Axes.set_xticklabels(self, labels, *, fontdict=None, minor=False, **kwargs)`

Set the xaxis' labels with list of string labels.

Warning

This method should only be used after fixing the tick positions using `Axes.set_xticks`. Otherwise, the labels may end up in unexpected positions.

Parameters:

labels : list of str

The label texts.

fontdict : dict, optional

A dictionary controlling the appearance of the ticklabels. The default *fontdict* is:

```
{'fontsize': rcParams['axes.titlesize'],
 'fontweight': rcParams['axes.titleweight'],
 'verticalalignment': 'baseline',
 'horizontalalignment': loc}
```

minor : bool, default: False

Whether to set the minor ticklabels rather than the major ones.

Returns:

list of `Text`

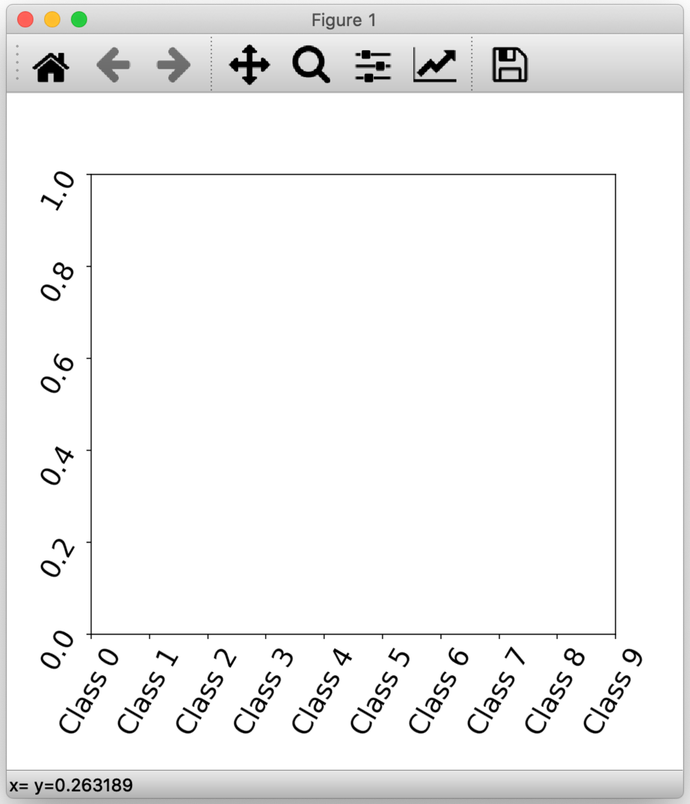
The labels.

Other Parameters:

****kwargs** : `Text` properties.

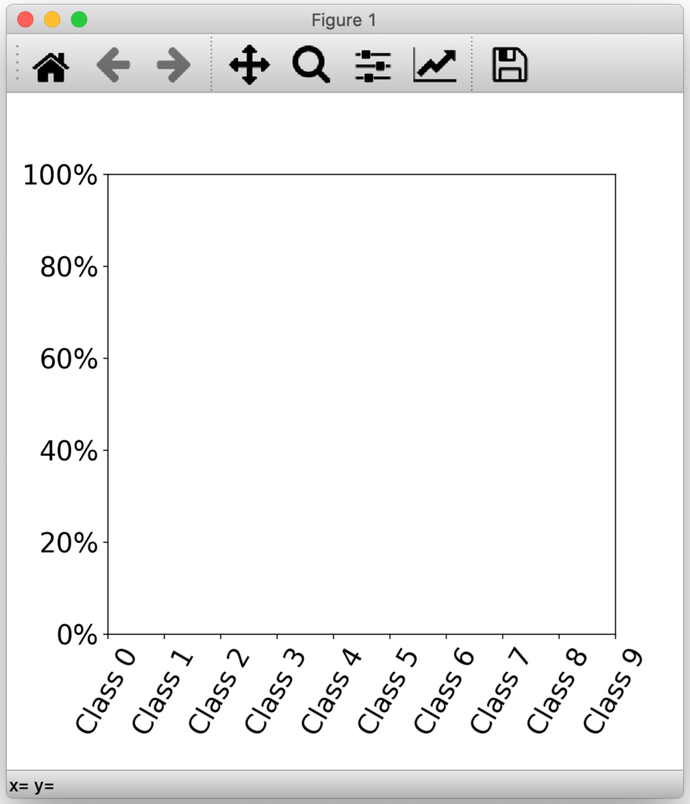
4. ax.set_xticklabels(Basic Usage)

```
import matplotlib.pyplot as plt

xticks = [i for i in range(10)]
xtick_labels = ['Class ' + str(i) for i in xticks]

fig, ax = plt.subplots(figsize=(7, 7))
ax.set_xticks(xticks)
ax.set_xticklabels(xtick_labels)
ax.tick_params(labelsize=20,
               rotation=60)

fig.subplots_adjust(bottom=0.2)
```



4. ax.set_xticklabels

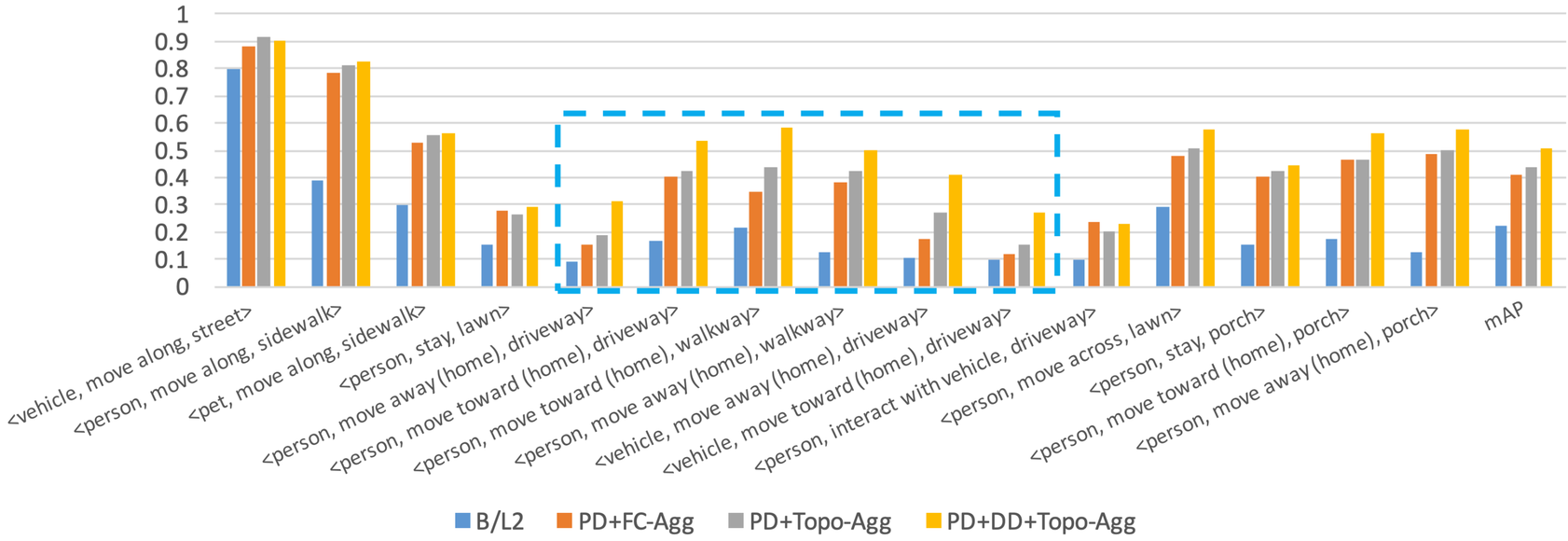
```
import matplotlib.pyplot as plt

xticks = [i for i in range(10)]
xtick_labels = ['Class ' + str(i) for i in xticks]

yticks = [i for i in range(0, 101, 20)]
ytick_labels = [str(i)+'%' for i in yticks]

fig, ax = plt.subplots(figsize=(7, 7))

ax.set_xticks(xticks)
ax.set_xticklabels(xtick_labels)

ax.set_yticks(yticks)
ax.set_yticklabels(ytick_labels)

ax.tick_params(axis='x',
               labelsize=20,
               rotation=60)
ax.tick_params(axis='y',
               labelsize=20)

fig.subplots_adjust(bottom=0.2,
                    left=0.15)
```



5. Ticks and Ticklabels(Practice 1)

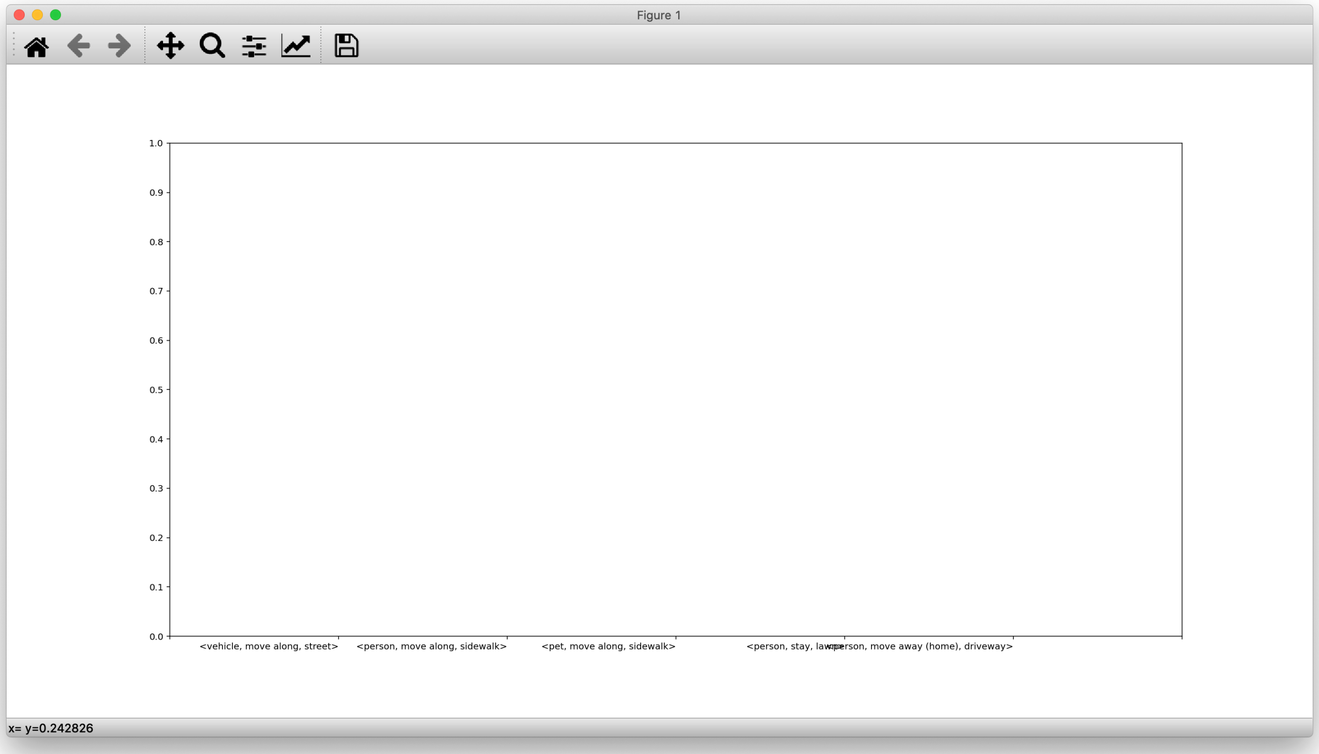
Layout-induced Video Representation for Recognizing Agent-in-Place Actions

Ruichi Yu[1,2*] Hongcheng Wang[2]
Ang Li[1] Jingxiao Zheng[1] Vlad I. Morariu[3†] Larry S. Davis[1]
[1]University of Maryland, College Park [2]Comcast Applied AI Research [3]Adobe Research
[1]{yrcbsg, angli, jxzheng, lsd}@umiacs.umd.edu,
[2]hongcheng_wang@comcast.com, [3]morariu@adobe.com



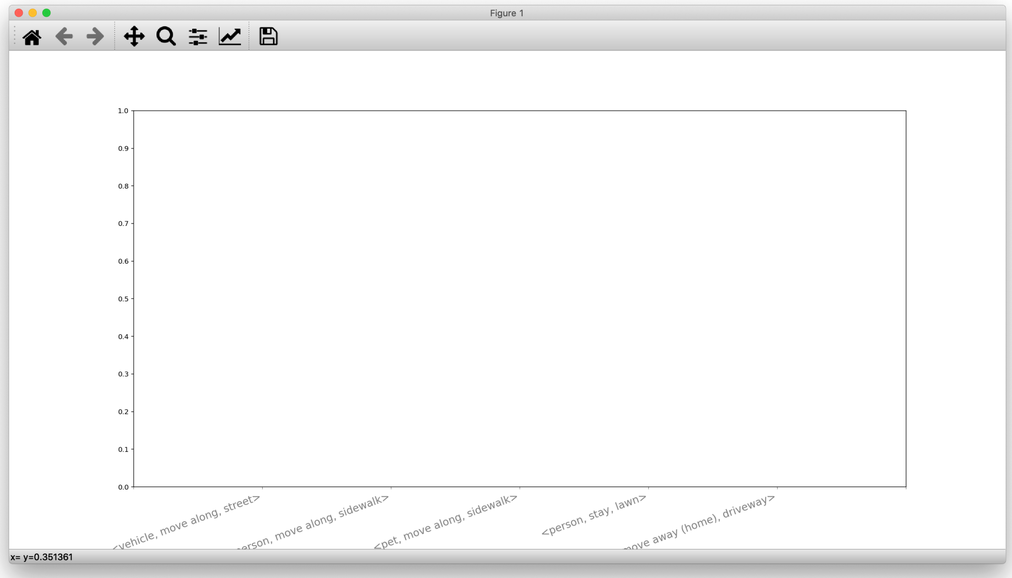
5. Ticks and Ticklabels(Practice 1)

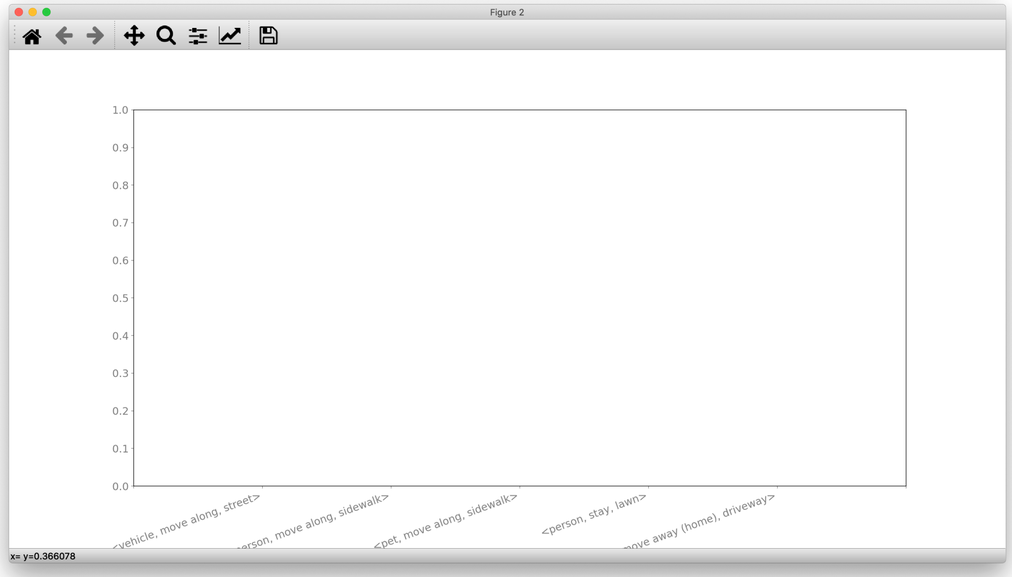
```
xticks = [i for i in range(7)]
xtick_labels = [" ",
                "<vehicle, move along, street>",
                "<person, move along, sidewalk>",
                "<pet, move along, sidewalk>",
                "<person, stay, lawn>",
                "<person, move away (home), driveway>",
                " "]

yticks = [i/10 for i in range(11)]

fig, ax = plt.subplots(figsize=(20,10))
ax.set_xticks(xticks)
ax.set_xticklabels(xtick_labels,
                   ha='right')
ax.set_yticks(yticks)
```



5. Ticks and Ticklabels(Practice 1)

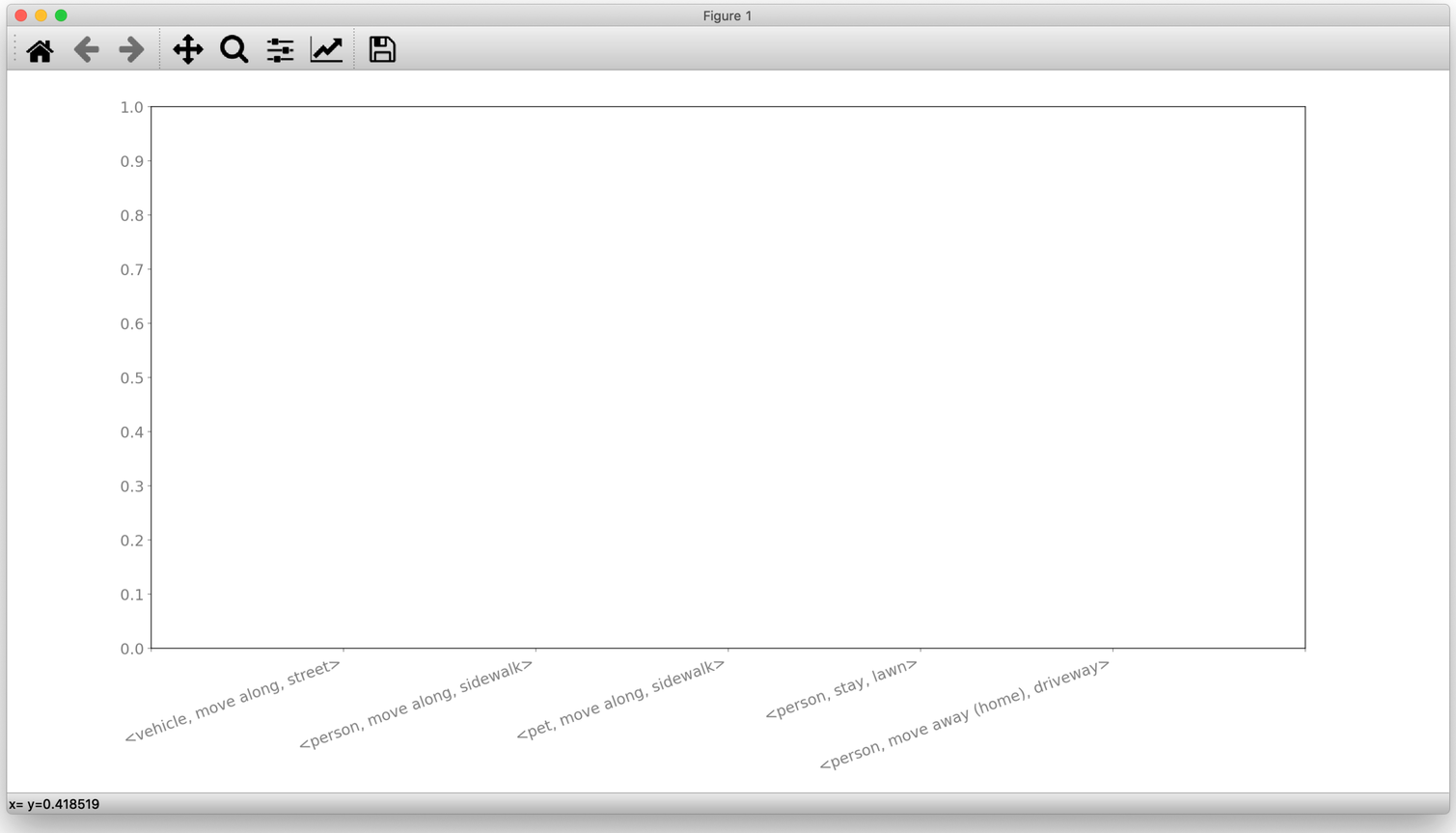
```
xticks = [i for i in range(7)]
xtick_labels = [" ",
                "<vehicle, move along, street>",
                "<person, move along, sidewalk>",
                "<pet, move along, sidewalk>",
                "<person, stay, lawn>",
                "<person, move away (home), driveway>",
                " "]

yticks = [i/10 for i in range(11)]

fig, ax = plt.subplots(figsize=(20,10))
ax.set_xticks(xticks)
ax.set_xticklabels(xtick_labels,
                   ha='right')
ax.set_yticks(yticks)

ax.tick_params(axis='x',
               rotation=20,
               labelsize=15,
               colors='gray')

ax.tick_params(axis='y',
               labelsize=15,
               colors='gray')
```





5. Ticks and Ticklabels(Practice 1)

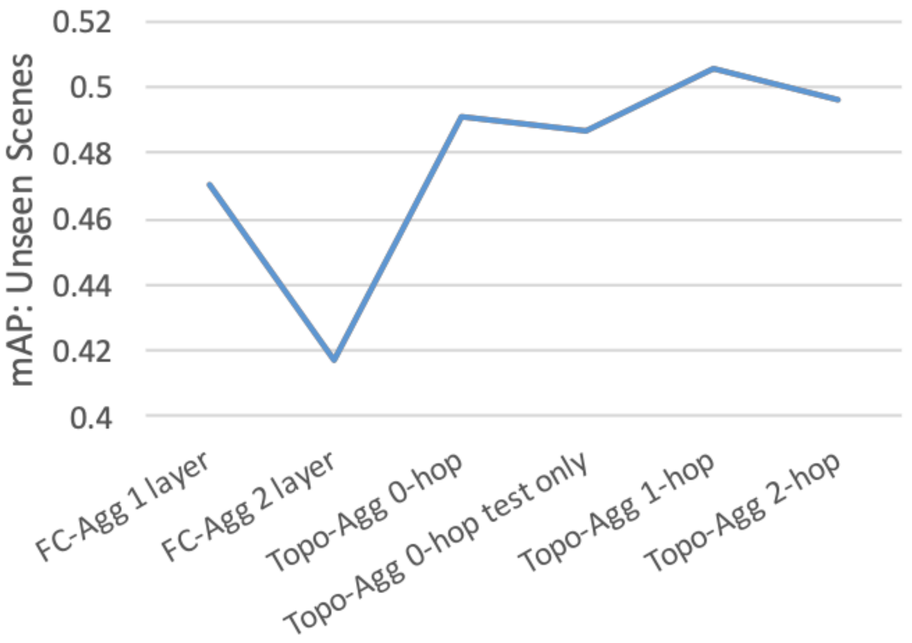
```
xticks = [i for i in range(7)]
xtick_labels = [" ",
                "<vehicle, move along, street>",
                "<person, move along, sidewalk>",
                "<pet, move along, sidewalk>",
                "<person, stay, lawn>",
                "<person, move away (home), driveway>",
                " "]

yticks = [i/10 for i in range(11)]

fig, ax = plt.subplots(figsize=(20,10))
ax.set_xticks(xticks)
ax.set_xticklabels(xtick_labels,
                   ha='right')
ax.set_yticks(yticks)

ax.tick_params(axis='x',
                   rotation=20,
                   labelsize=15,
                   colors='gray')

ax.tick_params(axis='y',
                   labelsize=15,
                   colors='gray')

fig.subplots_adjust(bottom=0.2, top=0.95,
                    left=0.1, right=0.9)
```



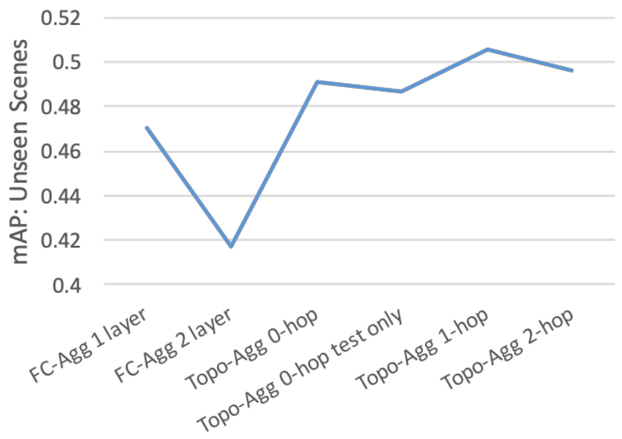
5. Ticks and Ticklabels(Practice 2)

Layout-induced Video Representation for Recognizing Agent-in-Place Actions

Ruichi Yu[1,2*] Hongcheng Wang[2]
Ang Li[1] Jingxiao Zheng[1] Vlad I. Morariu[3†] Larry S. Davis[1]
[1]University of Maryland, College Park [2]Comcast Applied AI Research [3]Adobe Research
[1]{yrcbsg, angli, jxzheng, lsd}@umiacs.umd.edu,
[2]hongcheng_wang@comcast.com, [3]morariu@adobe.com

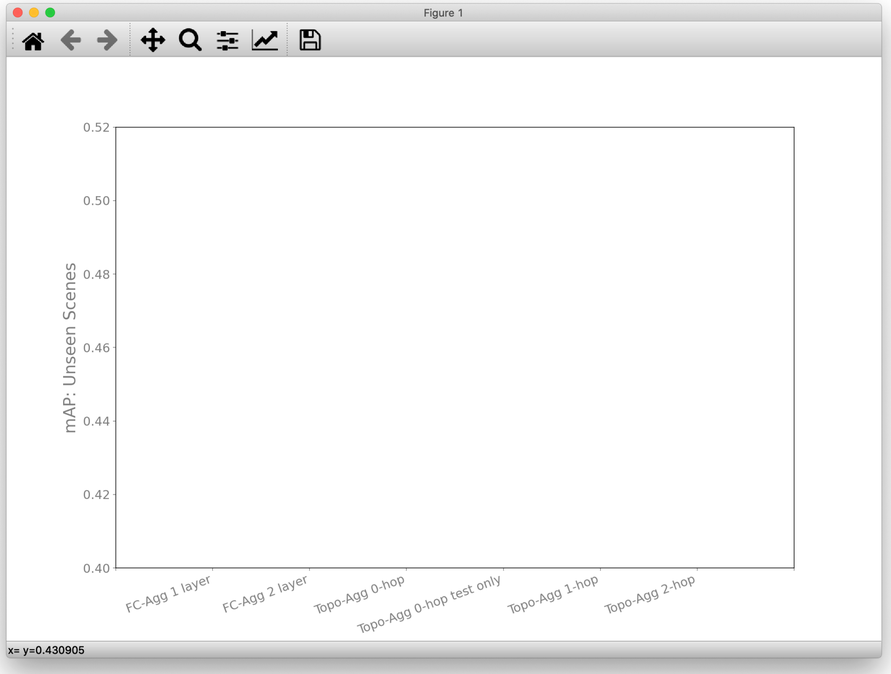


5. Ticks and Ticklabels(Practice 2)




```
import numpy  as np

yticks = np.arange(0.4, 0.54, 0.02)
xticks = [i for i in range(8)]
xtick_labels = [" ",
                "FC-Agg 1 layer",
                "FC-Agg 2 layer",
                "Topo-Agg 0-hop",
                "Topo-Agg 0-hop test only",
                "Topo-Agg 1-hop",
                "Topo-Agg 2-hop",
                " "]
```

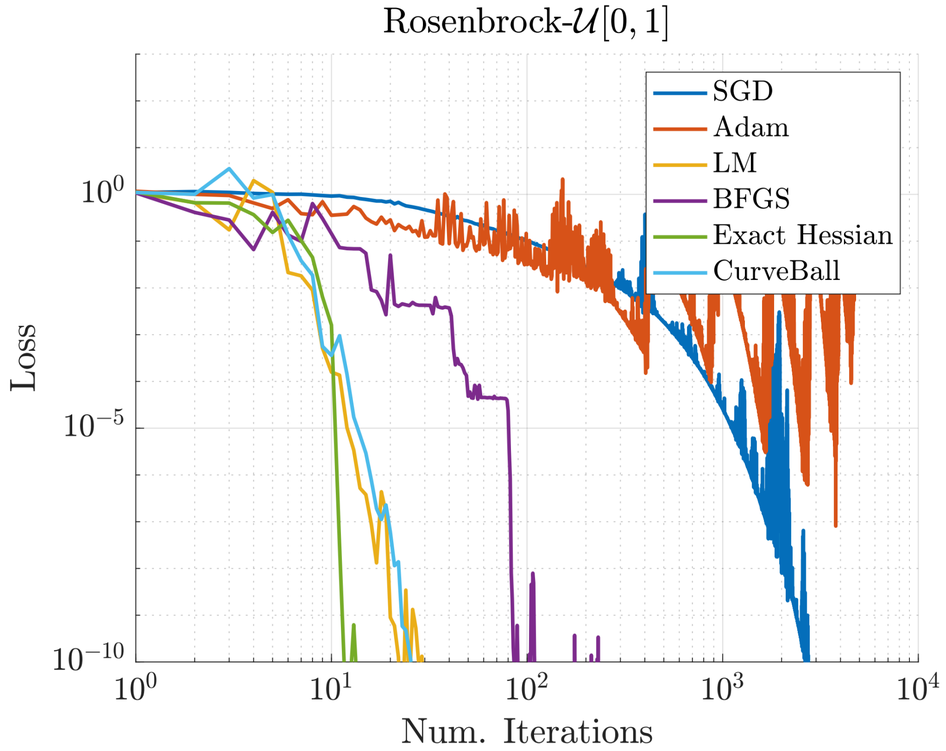
```
fig, ax = plt.subplots(figsize=(20, 10))

ax.set_yticks(yticks)
ax.set_ylim([0.4, 0.52])
ax.set_xticks(xticks)
ax.set_xticklabels(xtick_labels,
                   ha='right')

ax.tick_params(axis='x',
               rotation=20,
               labelsize=15,
               colors='gray')

ax.tick_params(axis='y',
               labelsize=15,
               colors='gray')

ax.set_ylabel("mAP: Unseen Scenes",
              fontsize=20,
              color='gray')
```



5. Ticks and Ticklabels(Practice 3)

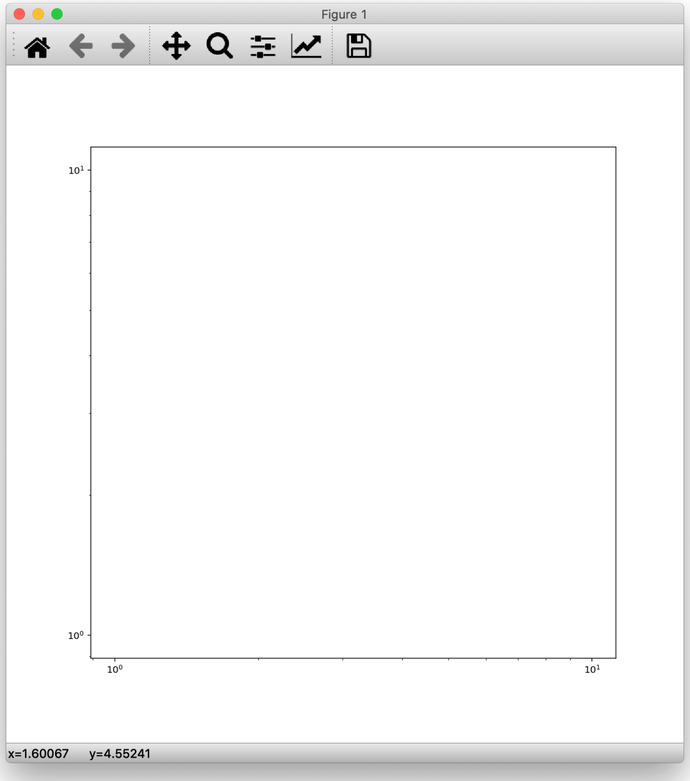
Small Steps and Giant Leaps: Minimal Newton Solvers for Deep Learning

João F. Henriques Sebastien Ehrhardt Samuel Albanie Andrea Vedaldi
Visual Geometry Group, University of Oxford
{joao,hyenal,albanie,vedaldi}@robots.ox.ac.uk

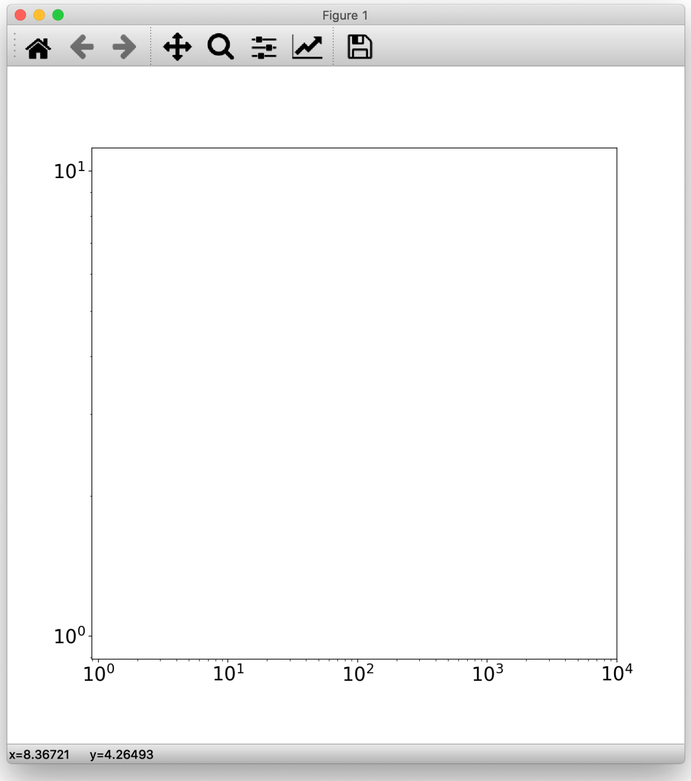


5. Ticks and Ticklabels(Practice 3)

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

fig, ax = plt.subplots(figsize=(10, 10))
ax.set_xscale('log')
ax.set_yscale('log')

ax.tick_params(labelsize=20)
```

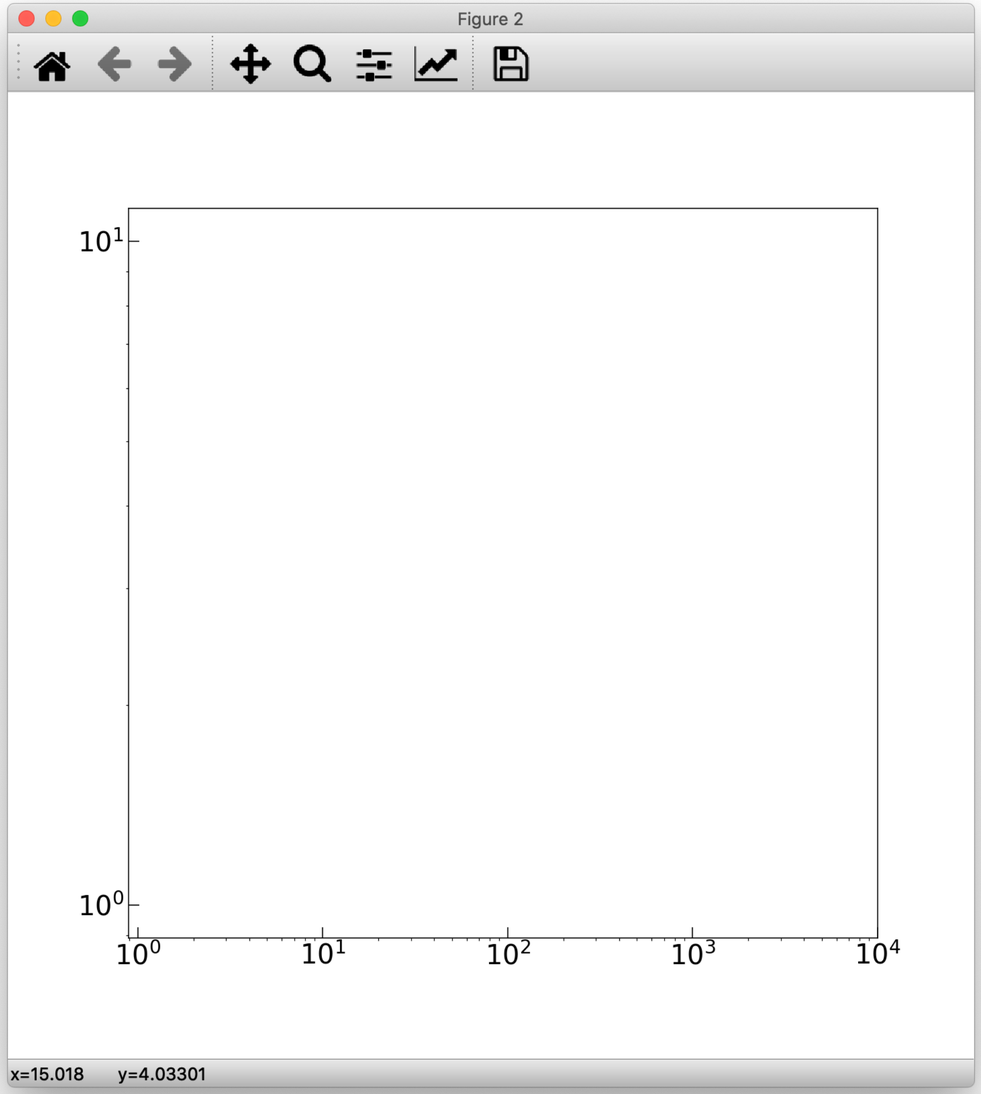



```
major_xticks = [10**i for i in range(5)]
ax.set_xticks(major_xticks)


ax.tick_params(labelsize=20)
```



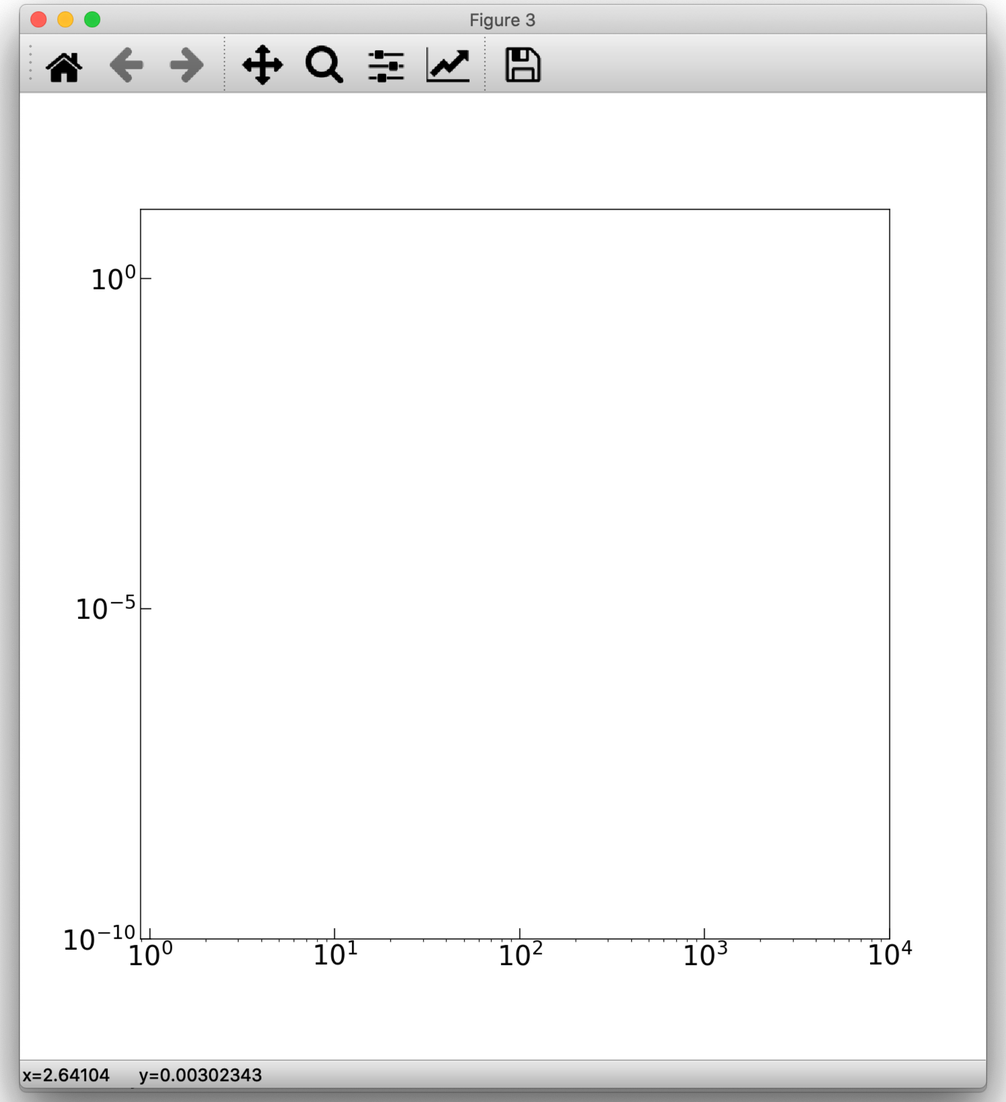
5. Ticks and Ticklabels(Practice 3)

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

fig, ax = plt.subplots(figsize=(10, 10))
ax.set_xscale('log')
ax.set_yscale('log')


major_xticks = [10**i for i in range(5)]
ax.set_xticks(major_xticks)

ax.tick_params(which='major',
               direction='in',
               length=8,
               labelsize=20)
```



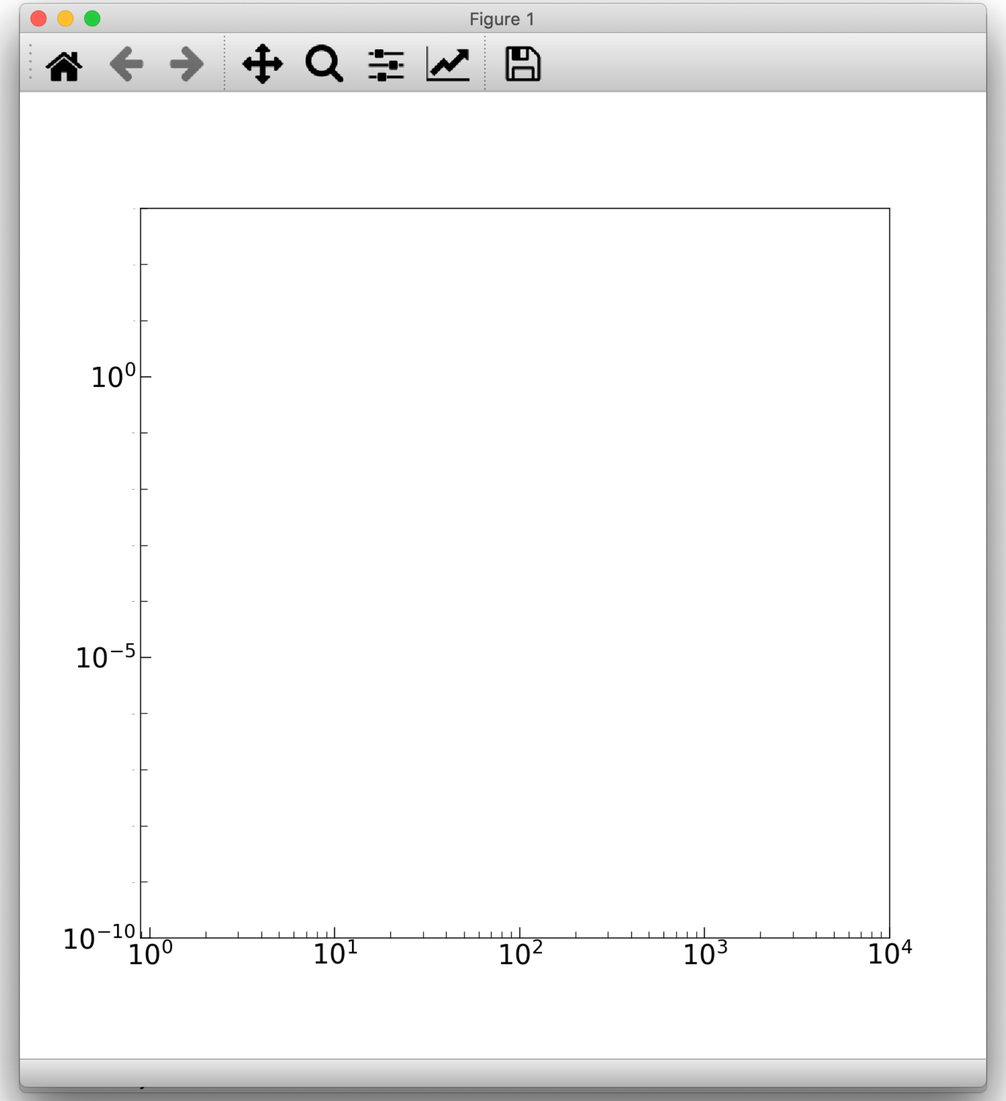
5. Ticks and Ticklabels(Practice 3)

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

fig, ax = plt.subplots(figsize=(10, 10))
ax.set_xscale('log')
ax.set_yscale('log')


major_xticks = [10**i for i in range(5)]
major_yticks = [1E-10, 1E-5, 1E0]

ax.set_xticks(major_xticks)
ax.set_yticks(major_yticks)

ax.tick_params(which='major',
               direction='in',
               length=8,
               labelsize=20)
```



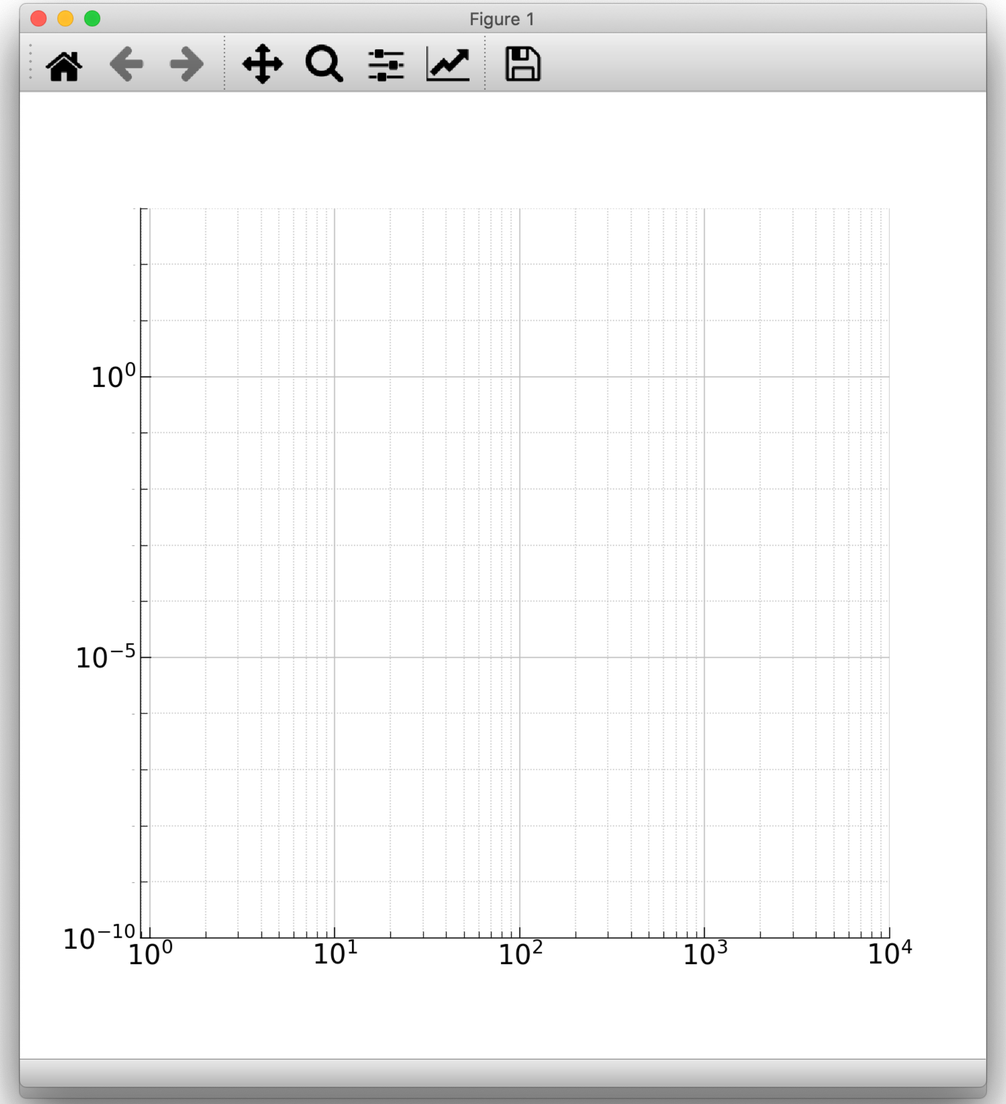
5. Ticks and Ticklabels(Practice 3)

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

fig, ax = plt.subplots(figsize=(10, 10))
ax.set_xscale('log')
ax.set_yscale('log')

major_xticks = [10**i for i in range(5)]
major_yticks = [1E-10, 1E-5, 1E0]
minor_yticks = [10**i for i in range(-10, 4)]

ax.set_xticks(major_xticks)
ax.set_yticks(major_yticks)
ax.set_yticks(minor_yticks,
              minor=True)

ax.tick_params(which='major',
               direction='in',
               length=8,
               labelsize=20)
ax.tick_params(which='minor',
               direction='in',
               length=5,
               labelsize=0)
```



5. Ticks and Ticklabels(Practice 3)

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

fig, ax = plt.subplots(figsize=(10, 10))
ax.set_xscale('log')
ax.set_yscale('log')
major_xticks = [10**i for i in range(5)]
major_yticks = [1E-10, 1E-5, 1E0]
minor_yticks = [10**i for i in range(-10, 4)]

ax.set_xticks(major_xticks)
ax.set_yticks(major_yticks)
ax.set_yticks(minor_yticks,
              minor=True)
ax.tick_params(which='major',
               direction='in',
               length=8,
               labelsize=20)
ax.tick_params(which='minor',
               direction='in',
               length=5,
               labelsize=0)

for spine_loc, spine in ax.spines.items():
    if spine_loc in ['right', 'top']:
        spine.set_visible(False)
ax.grid(which='major',
        color='silver')
ax.grid(which='minor',
        linestyle=':',
        color='silver')
```



Python for Data Visualization

-Chapter.1 Matplotlib Anatomy -

1-04. Ticks and Ticklabels

1. Tick and Ticklabels APIs
2. ax.tick_params
3. ax.set_xticks
4. ax.set_xticklabels
5. Ticks and Ticklabels Practice