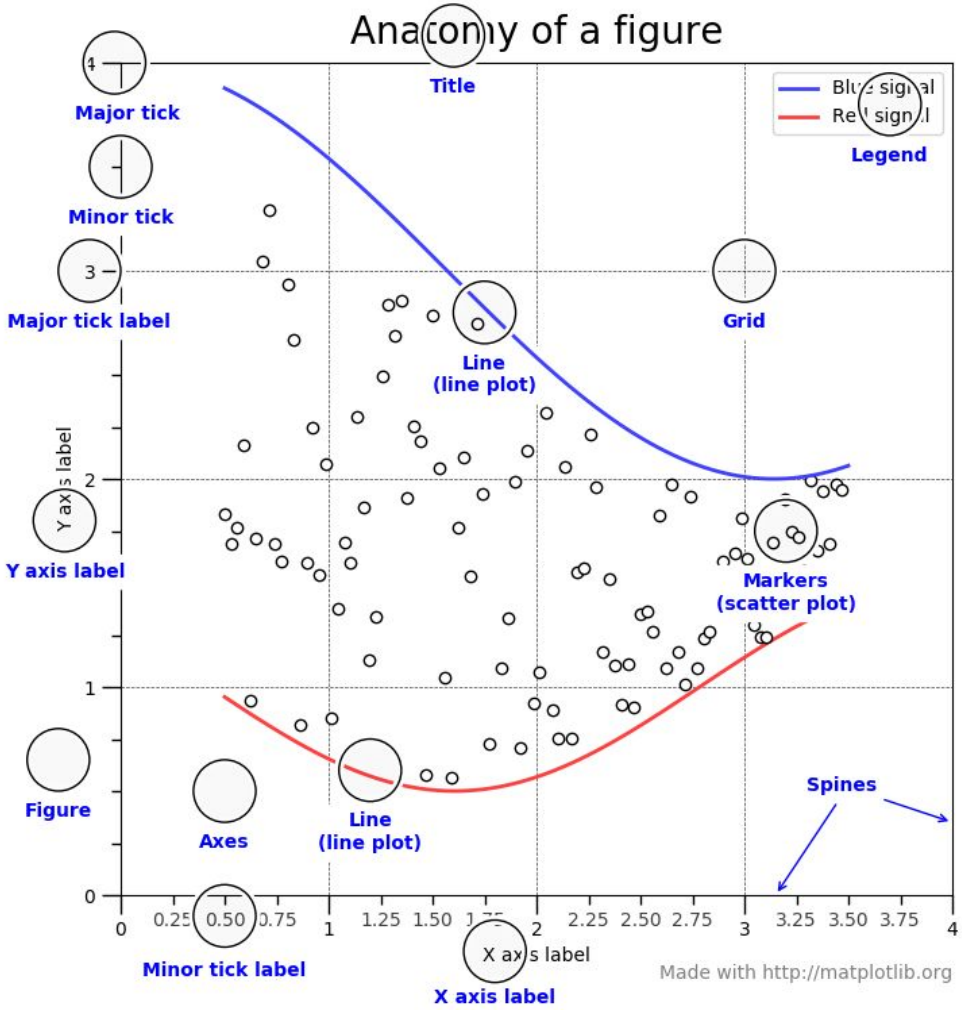
Matplotlib

시각화 라이브러리

- **matplotlib** - 가장 대표적인 시각화 패키지. 다소 복잡.
- seaborn - matplotlib 기반으로 동작. matplotlib 보다 인터페이스가 쉬움. 색상이 예쁨.
- plotnine - 파이썬 버전 ggplot2.
- interactive한 시각화 제공하는 패키지
  - Plotly, bokeh, mpld3, pygal, Bokeh, HoloViews

  interacitive 예시 링크

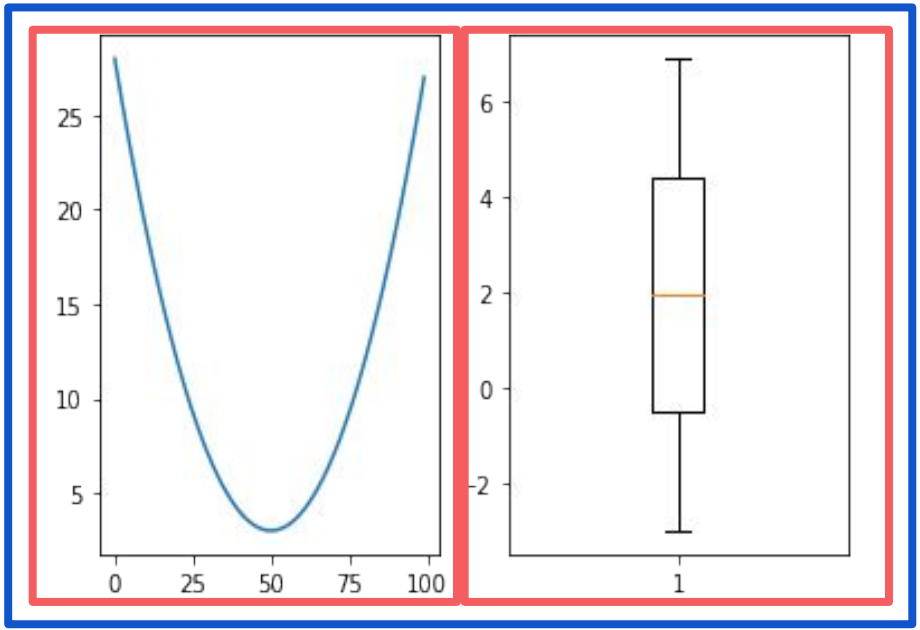

Anatomy of a figure
Major tick
Minor tick
Major tick label
Title
Legend
Grid
Line
(line plot)
Markers
(scatter plot)
Y axis label
Figure
Axes
Line
(line plot)
Spines
Minor tick label
X axis label
Made with http://matplotlib.org

더보기

Figure, Axes

figure

axes

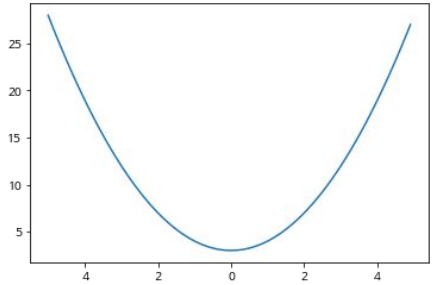


axes

Figure, Axes

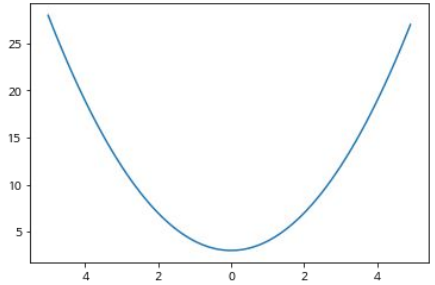
- The pyplot API

```
plt.plot(x, y1)
```

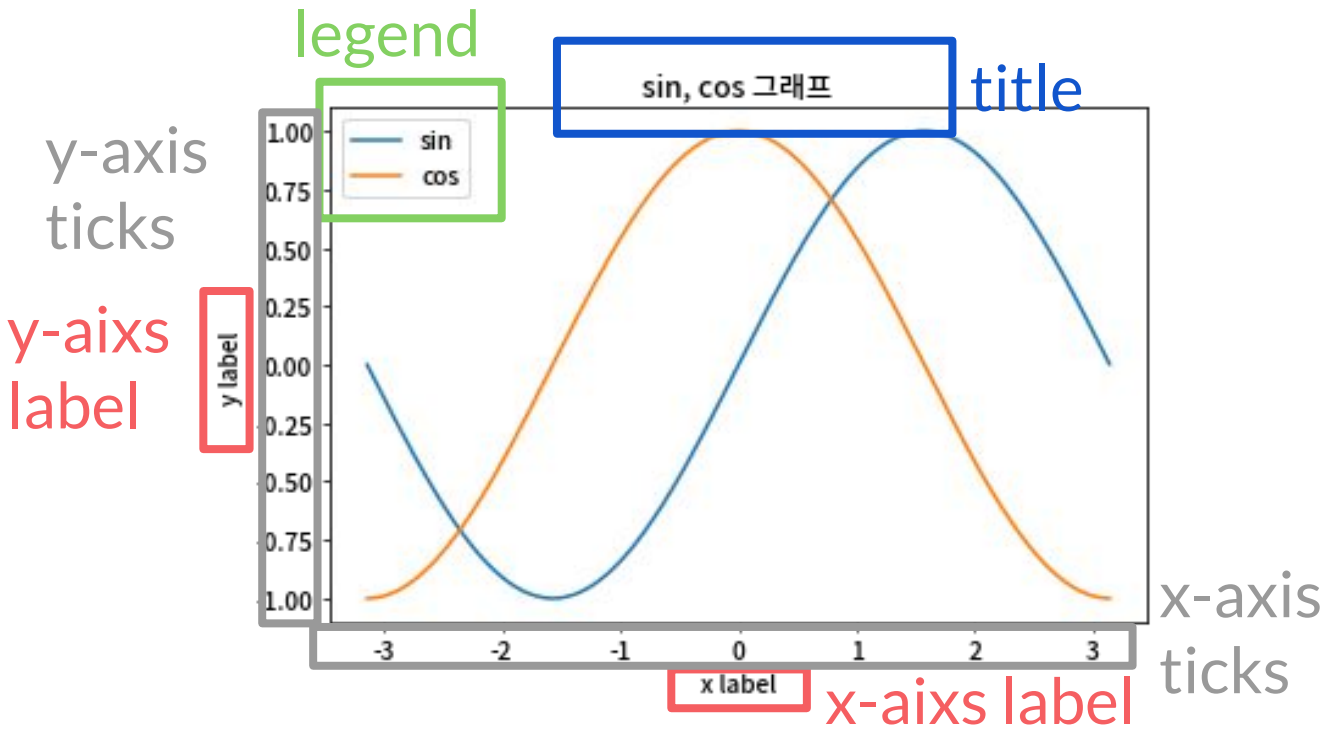


- The object-oriented API

```
fig, ax = plt.subplots()
ax.plot(x, y1)
```



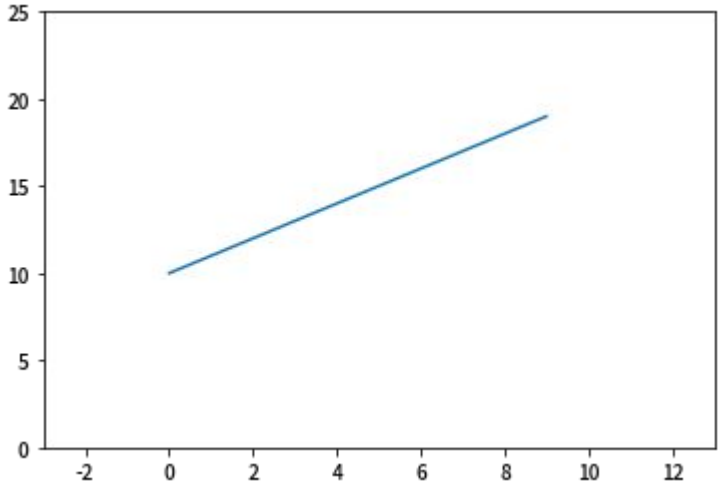
Title, Label, Legend, Ticks



Aixs - xlim, ylim

참고링크(axes - xlim, ylim)

```
x = np.arange(10)
y = x+10
ax.plot(x, y)
ax.set_xlim([-3, 13])
ax.set_ylim([0, 25])
```

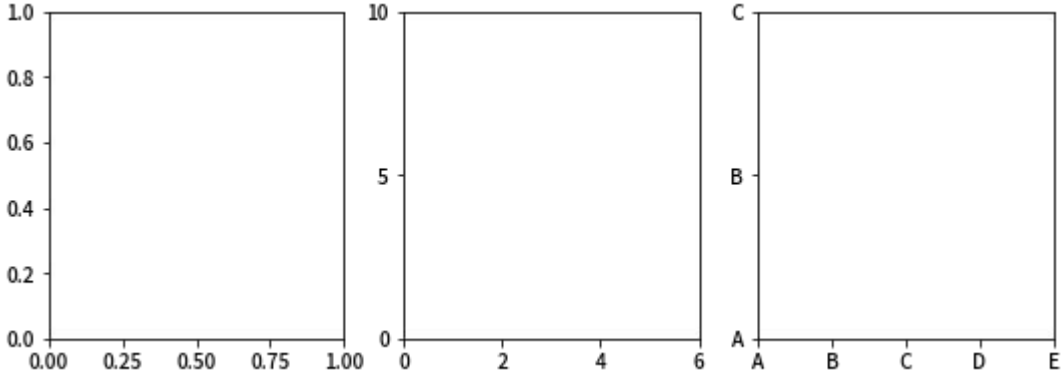


Aixs - ticks, tick labels

참고링크(axes - ticks, ticklabels)

참고링크(ticks - ticks, ticklabels)

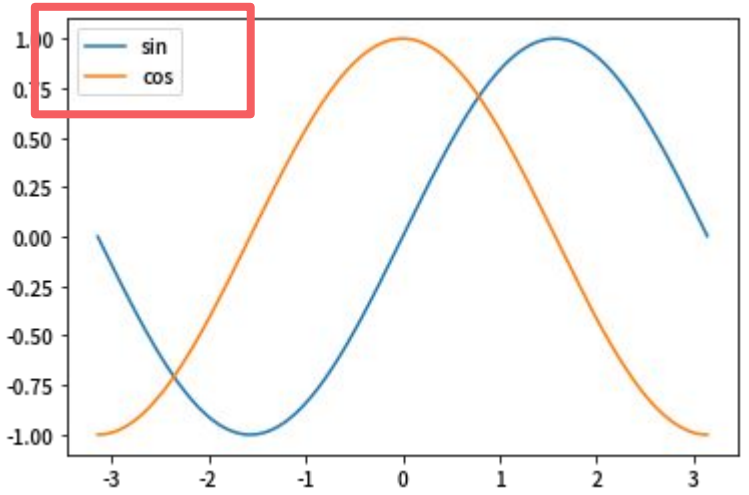
```
axs[1].set_xticks([0,2,4,6])
axs[1].set_yticks([0,5,10])

axs[2].set_xticklabels('ABCDE')
axs[2].set_yticks([0,1,2])
axs[2].set_yticklabels('ABC')
```



Legend

참고링크(axes - legend)

```
ax.plot(x, y1, label = 'sin')
ax.plot(x, y2, label = 'cos')
ax.legend()
```



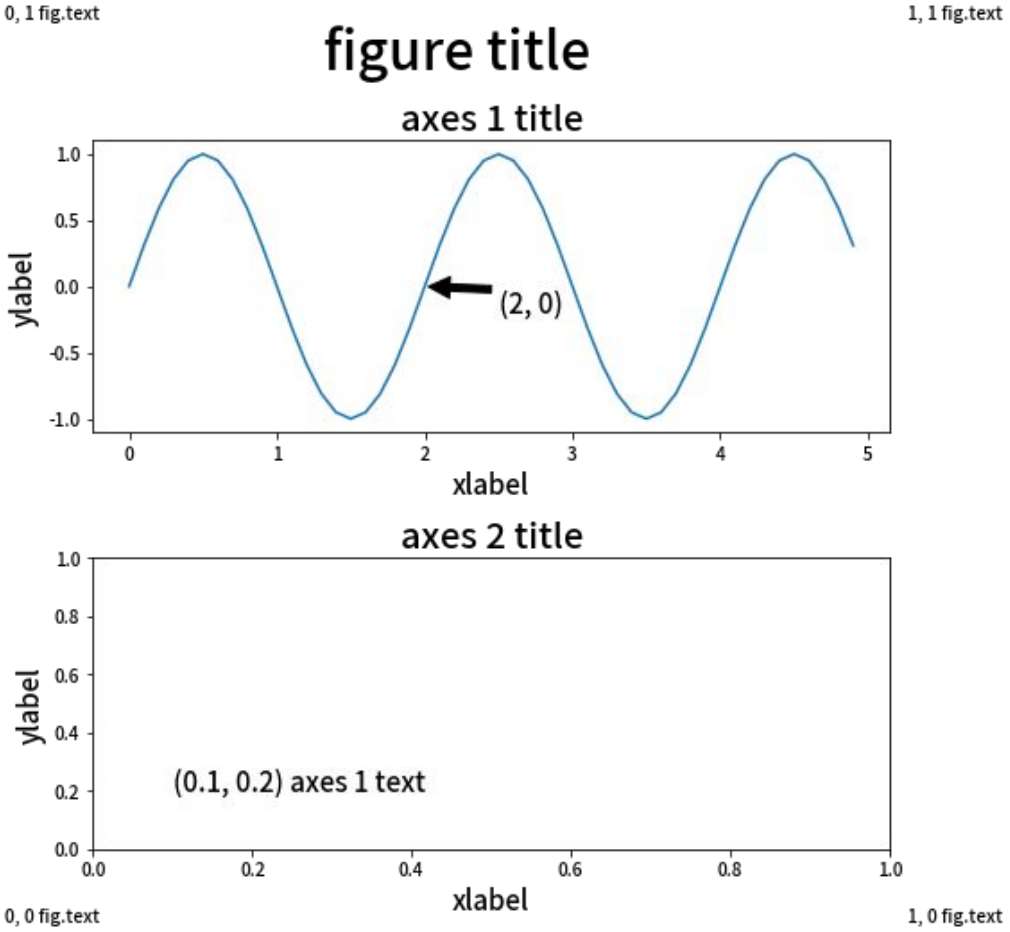
Text 종류

참고링크(text 종류)

- figure title
- axes title

- x-axis label
- y-axis label

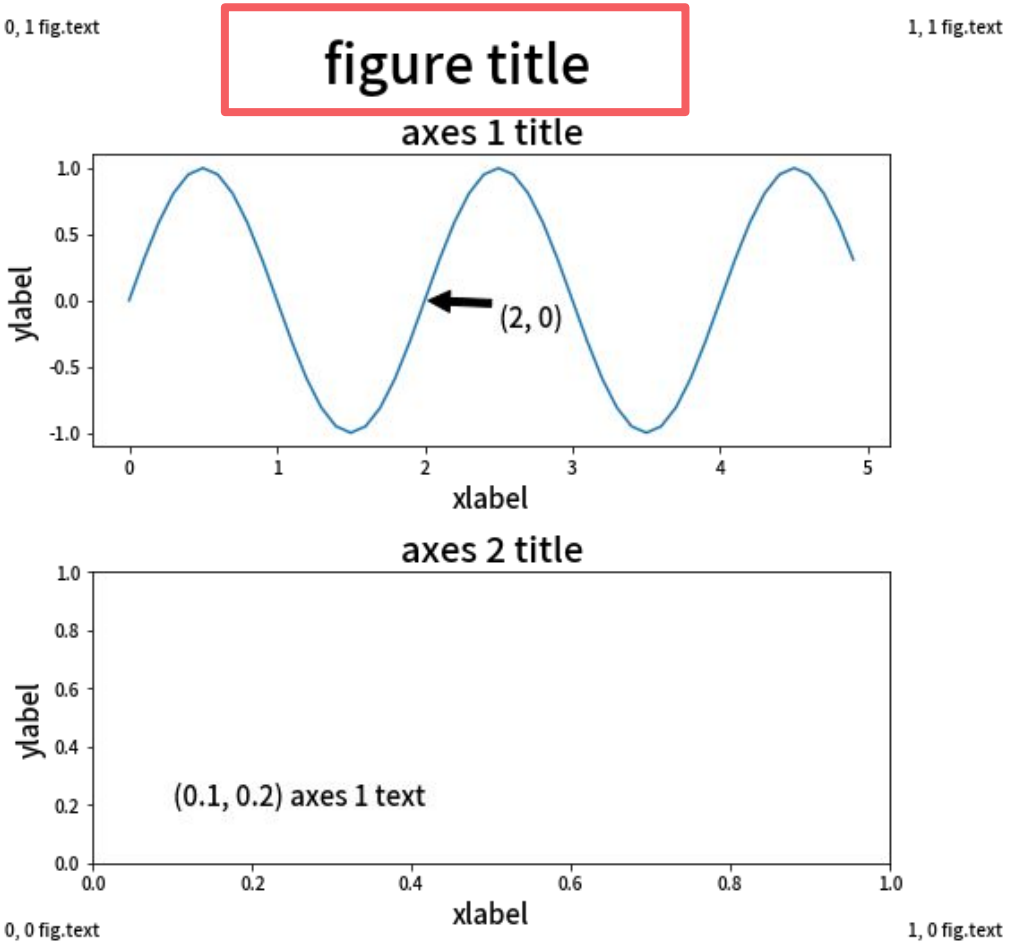
- figure text
- axes text
- annotate



Text 종류

- figure title

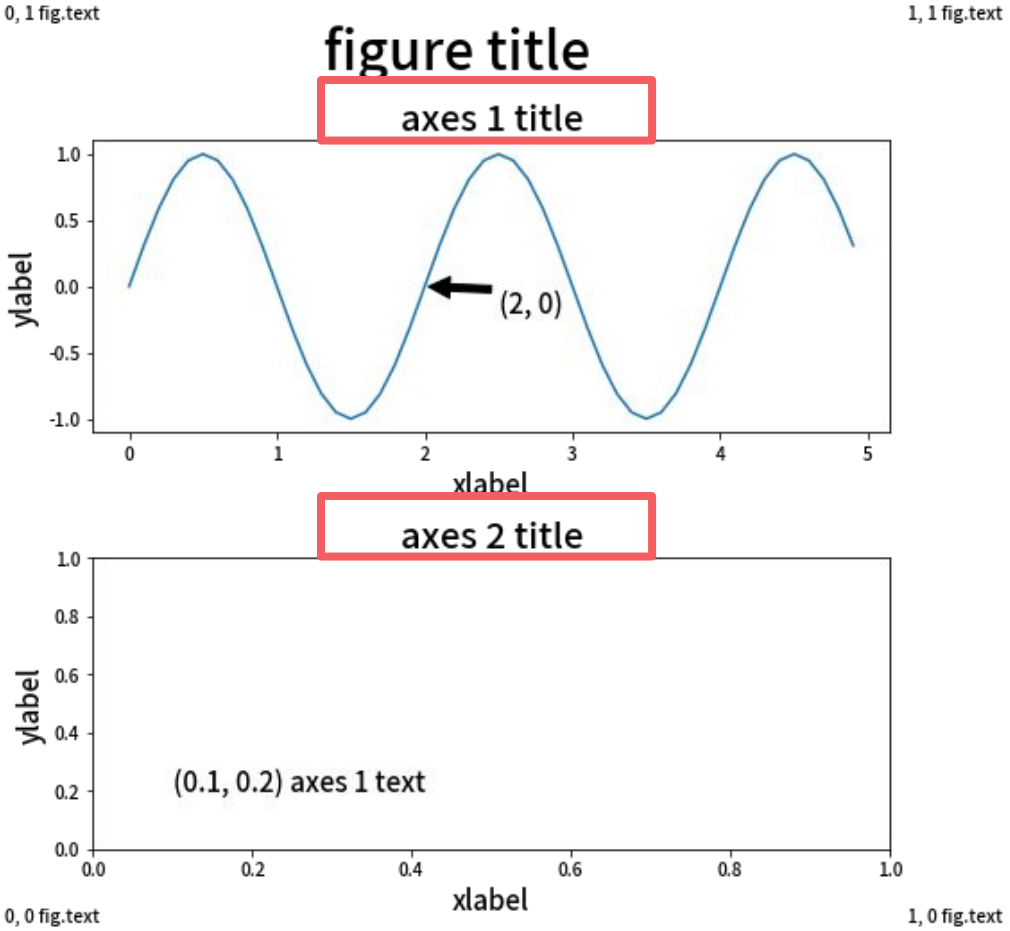
```
fig.suptitle('figure title')
```



Text 종류

- axes title

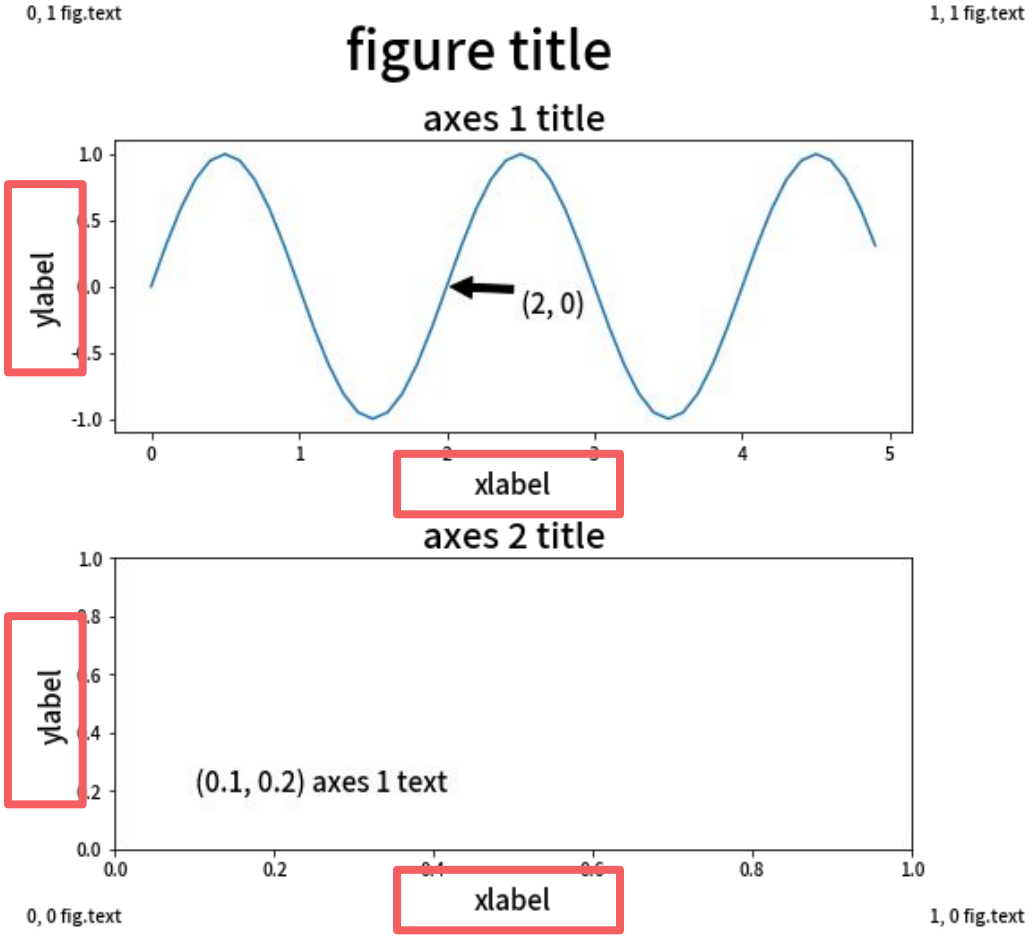
```
axs[0].set_title('axes 1 title')
axs[1].set_title('axes 2 title')
```



Text 종류

- x-axis label
- y-axis label

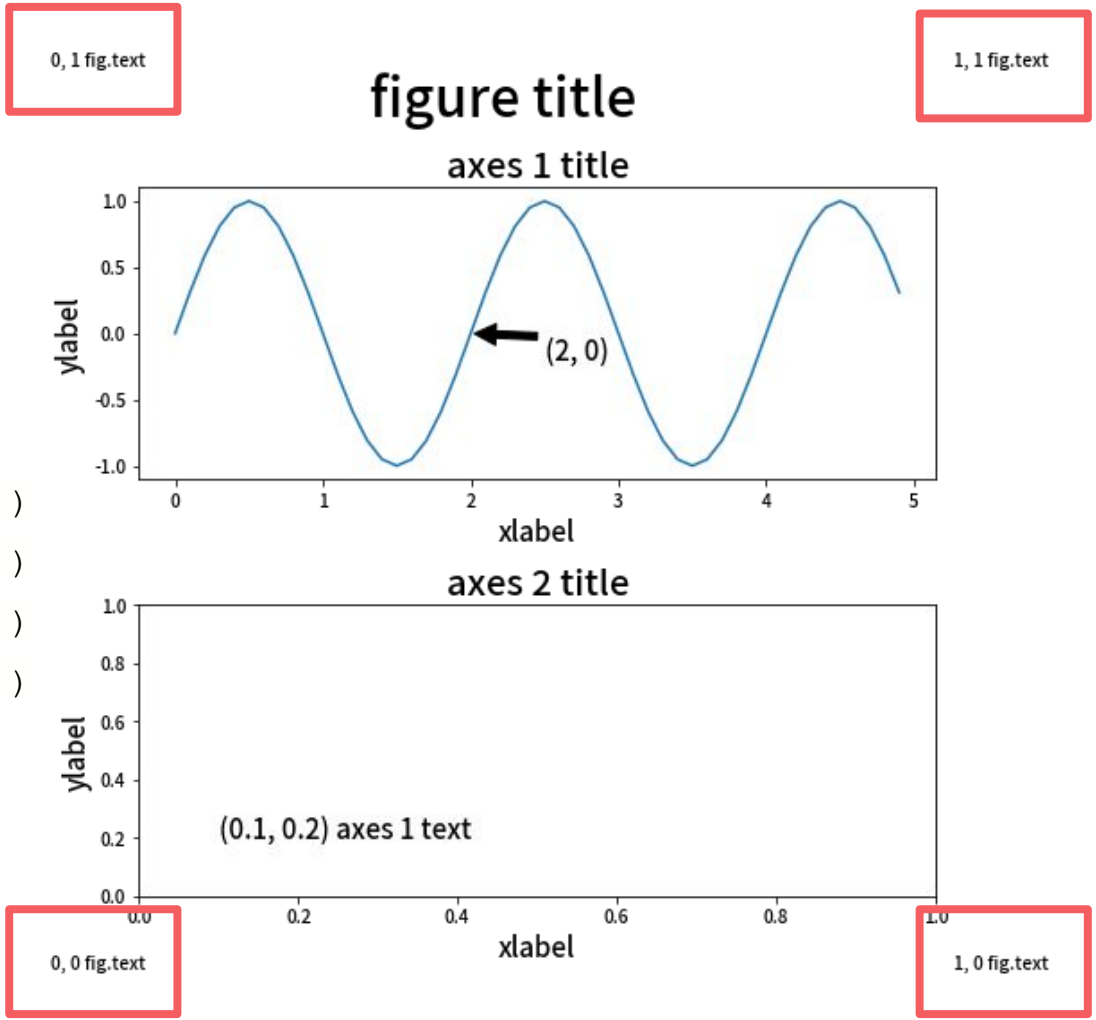
```
axs[0].set_xlabel('xlabel')
axs[0].set_ylabel('ylabel')
axs[1].set_xlabel('xlabel')
axs[1].set_ylabel('ylabel')
```



Text 종류

- figure text

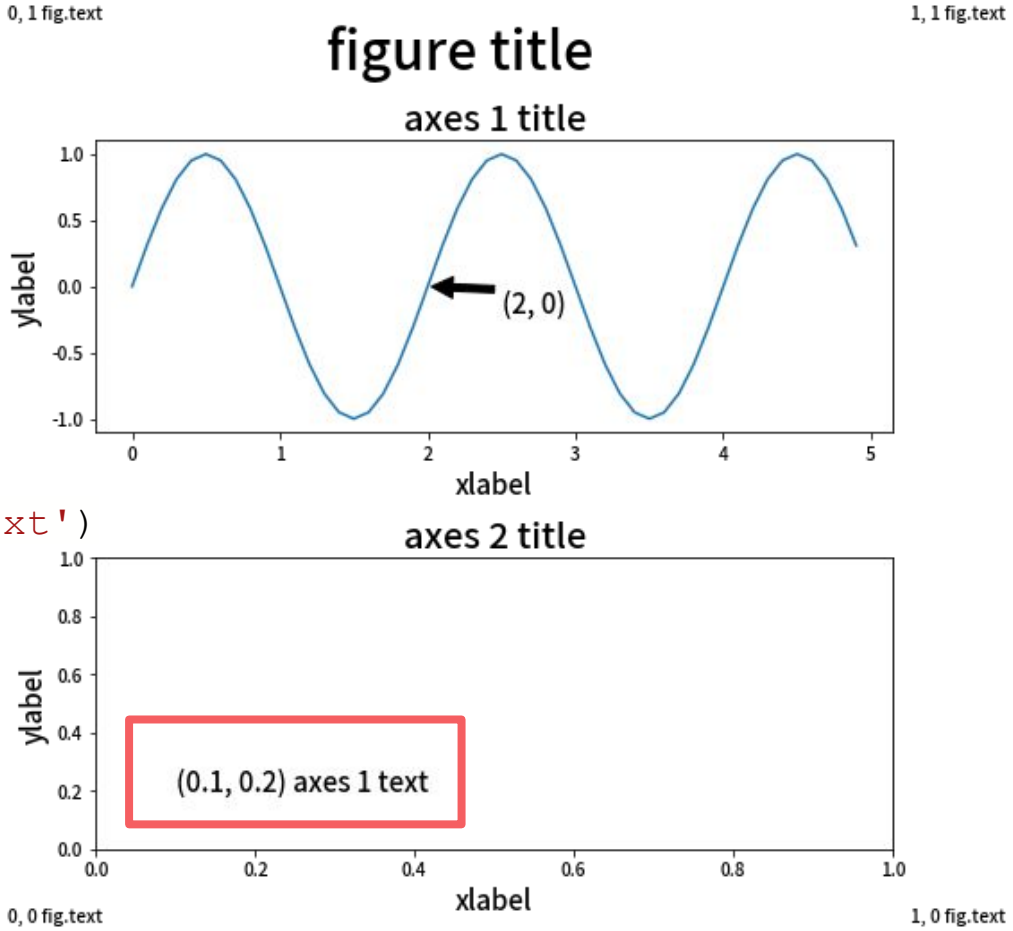
```
fig.text(0, 0, '0, 0 fig.text')
fig.text(1, 0, '1, 0 fig.text')
fig.text(0, 1, '0, 1 fig.text')
fig.text(1, 1, '1, 1 fig.text')
```



Text 종류

- axes text

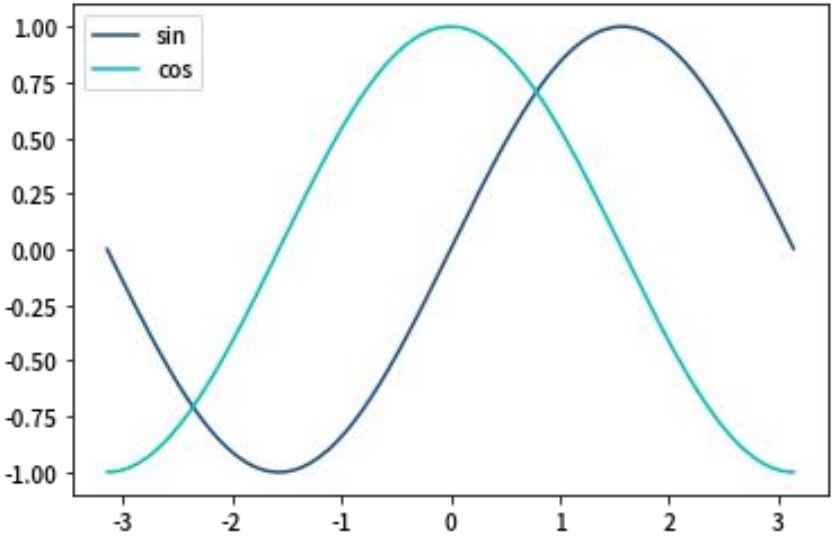
```
axs[1].text(0.1, 0.2,
            '(0.1, 0.2) axes 1 text')
```



Color

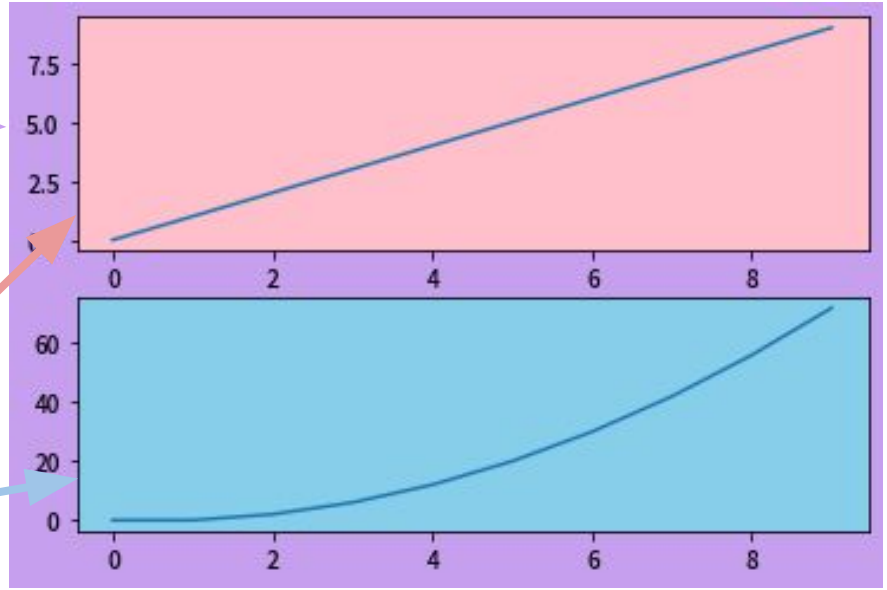
참고링크(color)

```
plt.plot(x, y1, label = 'sin',
        color= (0.1, 0.3, 0.5)) # RGB
plt.plot(x, y2, label = 'cos',
        color='c')
        # one of {'b', 'g', 'r', 'c',
                  'm', 'y', 'k', 'w'}
```



Facecolor

```
fig, axs = plt.subplots(2, 1)
fig.set_facecolor('#c79fef')

axs[0].plot(x, y1)
axs[1].plot(x, y2)

axs[0].set_facecolor('pink')
axs[1].set_facecolor('skyblue')
```



Matplotlib 기본 개념

pyplot

figure, axes

axis - xlim, ylim, tick, tickslabel

legend

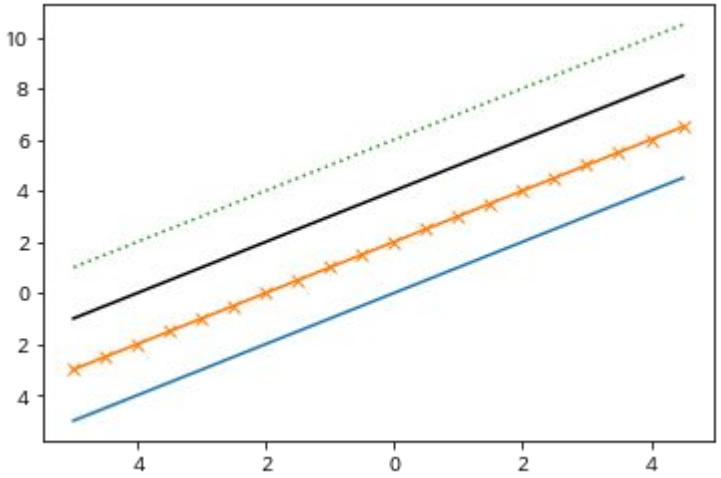
figure title, axes title

x-axis label, y-axis label

figure text , axes text

annotate

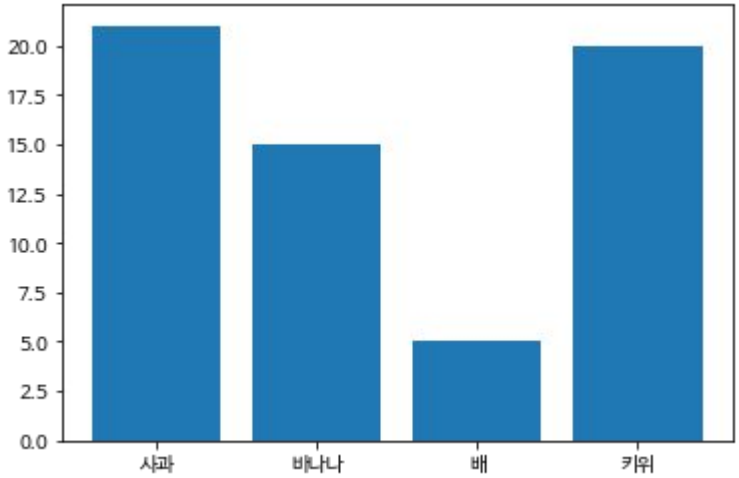
Line plot




```
fig, ax = plt.subplots()
ax.plot(x, y1)
ax.plot(x, y2, marker='x')
ax.plot(x, y3, color='k')
ax.plot(x, y4, linestyle='dotted')
```

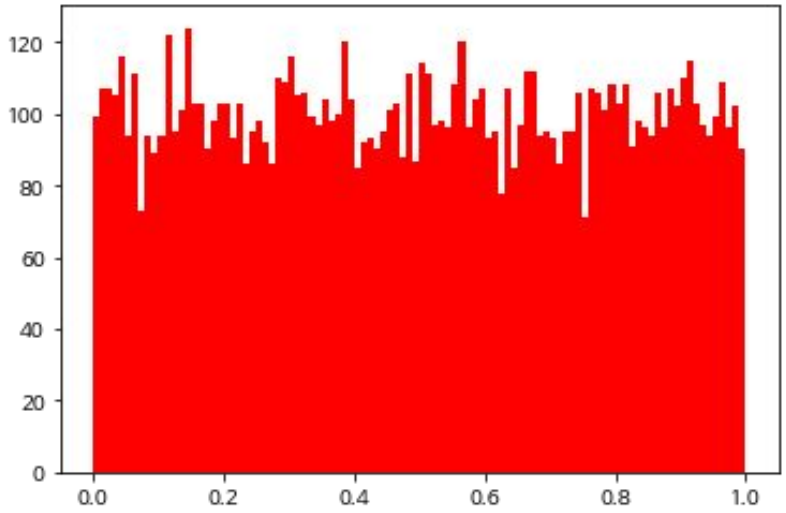
참고링크: markers, linestyles

Bar Plot



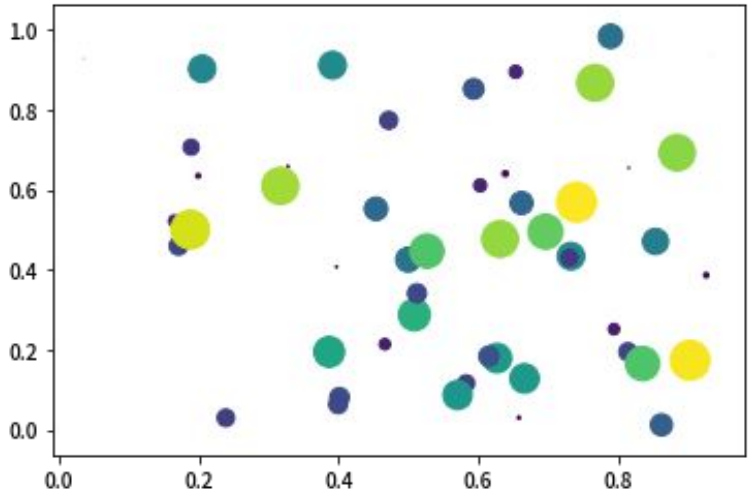

```
data = {'사과': 21, '바나나': 15,
        '배': 5, '키위': 20}
names = list(data.keys())
values = list(data.values())

fig, ax = plt.subplots()
ax.bar(names, values)
```

Histogram




```
data = np.random.rand(10000)

fig, ax = plt.subplots()
ax.hist(data,
        bins = 100,
        facecolor='r')
```

Scatter plot




```
N = 50
x = np.random.rand(N)
y = np.random.rand(N)
area =(20 * np.random.rand(N))**2

fig, ax = plt.subplots()
ax.scatter(x, y, s=area,
           marker='o', c=area)
```

Image

```
import matplotlib.image as mpimg


img = mpimg.imread('images/image_matplot.jpg')
plt.imshow(img)
```

Matplotlib
그래프 종류

Line plot

Box plot

Histogram

Scatter plot

Image

save

```
fig, ax = plt.subplots()
x = np.arange(10)
y1 = x**2
ax.plot(x, y1, label = 'sin')
fig.savefig('images/image_matplot_tmp.jpg')
```

Reference

matplotlib 공식문서

참고

- https://matplotlib.org/
- https://www.tensorflow.org/tutorials/load_data/images