pyplot 개요

14주차_01_02

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학습목표

- Pyplot
  - plot의 종류
  - image 함수
  - axis 함수
  - figure 함수
  - Plot
  - Pylab

Pyplot

- Matplotlib가 작동하도록 하는 command style 함수의 모음
- 그래프 생성
- import 방법

```
import matplotlib.pyplot as plt
```

Types of Plots

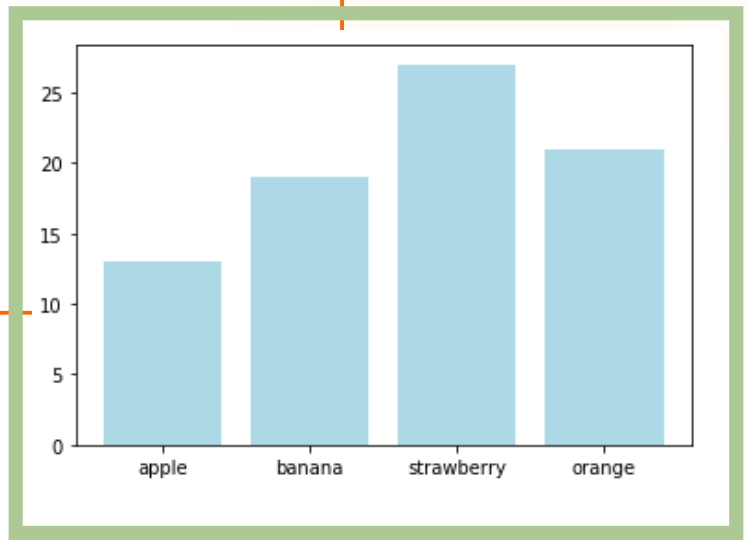
Function	Description
Bar	bar plot 생성
Barh	horizontal bar plot 생성
Boxplot	box와 whisker plot 생성
Hist	Histogram 생성
hist2d	2D histogram 생성
Pie	pie chart를 생성

Bar 예제


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

x = np.array(["apple", "banana", "strawberry", "orange"])
y = np.array([13, 19, 27, 21])

plt.bar(x, y, color = 'lightblue')
plt.show()
```

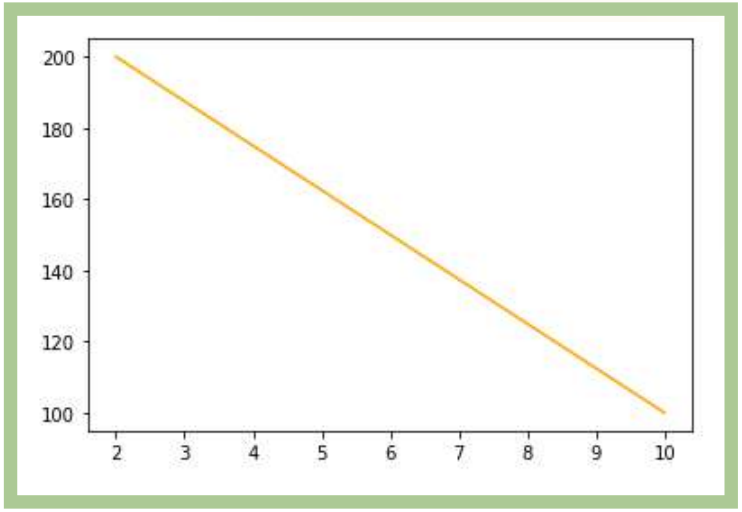


Plot 예제


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

x = np.array([2, 10])
y = np.array([200, 100])

plt.plot(x, y, color="orange")
plt.show()
```



Scatter 예제


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

x = np.array([13,20,18,10,2,17,6,9,14,11])
y = np.array([85,67,90,88,111,89,70,87,95,78])

colors =
np.array(["red","green","blue","yellow","pink","black","orange","purple","beige","brown"])

plt.scatter(x, y, c=colors)

plt.colorbar()
plt.show()
```

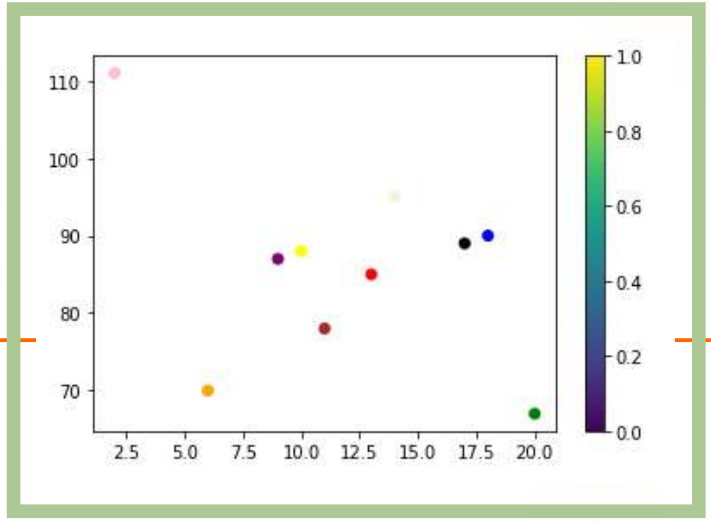


Image Functions

Function	Description
Imread	파일로부터 이미지를 배열로 읽어들임
Imsave	배열을 이미지 파일로 저장
Imshow	이미지를 축 상에서 보여줌

imread, imshow


```
import matplotlib.image as img
import matplotlib.pyplot as plt

fileName "c:\\kmkim\\7_VariousLang\\beach01.jpg"
ndarray = img.imread(fileName)

print(type(ndarray))
print(ndarray.ndim)
print(ndarray.shape)

plt.imshow(ndarray)
plt.show()
```

```
<class 'numpy.ndarray'>
3
(3072, 4621, 3)
Out[23]: <matplotlib.image.AxesImage at 0x1f41fce68c8>
```

Axis Functions I

Function	Description
Axes	figure에 축을 더함
Text	축에 text를 더함
Title	현재 축에 title을 붙임
Xlabel	현재 축의 x축 label을 설정
Xlim	현재 축의 x축 한계를 설정

Axis Functions 2

Function	Description
Xticks	현재 tick 위치와 label의 x축 한계를 설정
Ylabel	현재 축의 y축 label을 설정
Ylim	현재 축의 y축 한계를 설정
Yscale	y축 scaling을 설정
Yticks	현재 tick 위치와 label의 y축 한계를 설정

Figure Functions

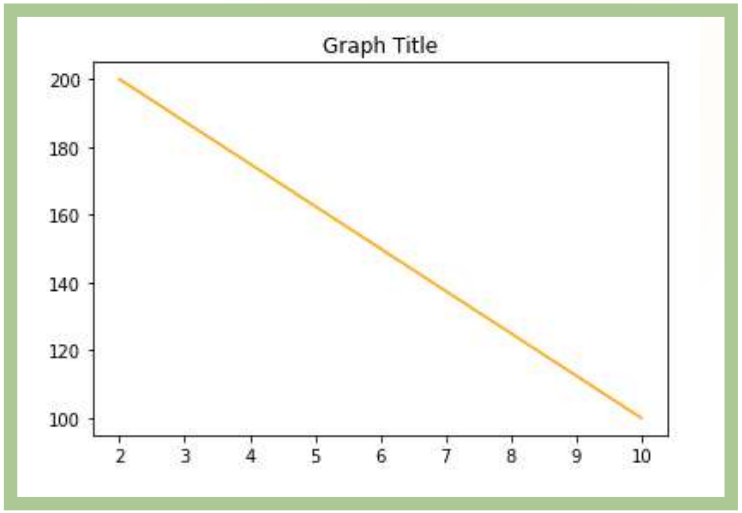
Function	Description
Figtext	figure에 text를 더함
Figure	새로운 figure 생성
Show	figure를 보여줌
Savefig	현재 figure를 저장
Close	figure window를 닫음

title


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

x = np.array([2, 10])
y = np.array([200, 100])

plt.plot(x, y, color="orange")
plt.title('Graph Title')
plt.show()
```



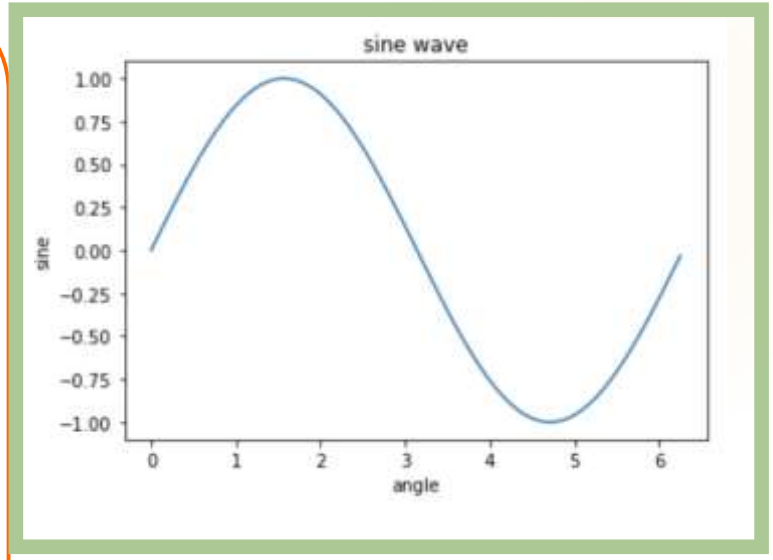
xlabel, ylabel


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

x = np.arange(0, math.pi*2, 0.05)
y = np.sin(x)

plt.plot(x,y)
plt.xlabel("angle")
plt.ylabel("sine")

plt.title('sine wave')
plt.show()
```



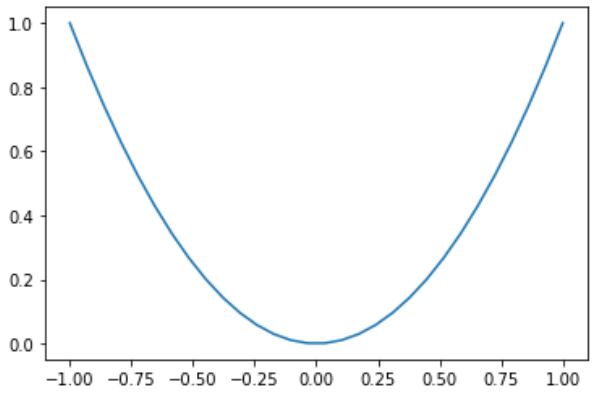
linspace, linearly spaced


```
import matplotlib.pyplot as plt
from numpy import *
from pylab import *

x = linspace(-1, 1, 30)
y = x**2
print(x)
print(y)

plt.plot(x, y)
plt.show()
```

```
[-1.         -0.93103448 -0.86206897 -0.79310345 -0.72413793 -0.65517241
 -0.5862069  -0.51724138 -0.44827586 -0.37931034 -0.31034483 -0.24137931
 -0.17241379 -0.10344828 -0.03448276  0.03448276  0.10344828  0.17241379
  0.24137931  0.31034483  0.37931034  0.44827586  0.51724138  0.5862069
  0.65517241  0.72413793  0.79310345  0.86206897  0.93103448  1.        ]
[1.         0.86682521 0.7431629  0.62901308 0.52437574 0.42925089
 0.34363853 0.26753864 0.20095125 0.14387634 0.09631391 0.05826397
 0.02972652 0.01070155 0.00118906 0.00118906 0.01070155 0.02972652
 0.05826397 0.09631391 0.14387634 0.20095125 0.26753864 0.34363853
 0.42925089 0.52437574 0.62901308 0.7431629  0.86682521 1.        ]
```

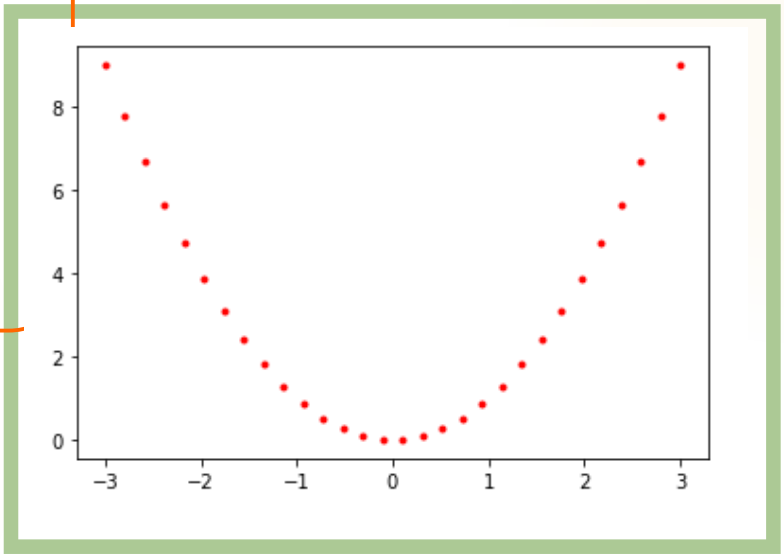


linspace, 'r.'


```
import matplotlib.pyplot as plt
from numpy import *
from pylab import *

x = linspace(-3, 3, 30)
y = x**2
plt.plot(x, y, 'r.')

plt.show()
```

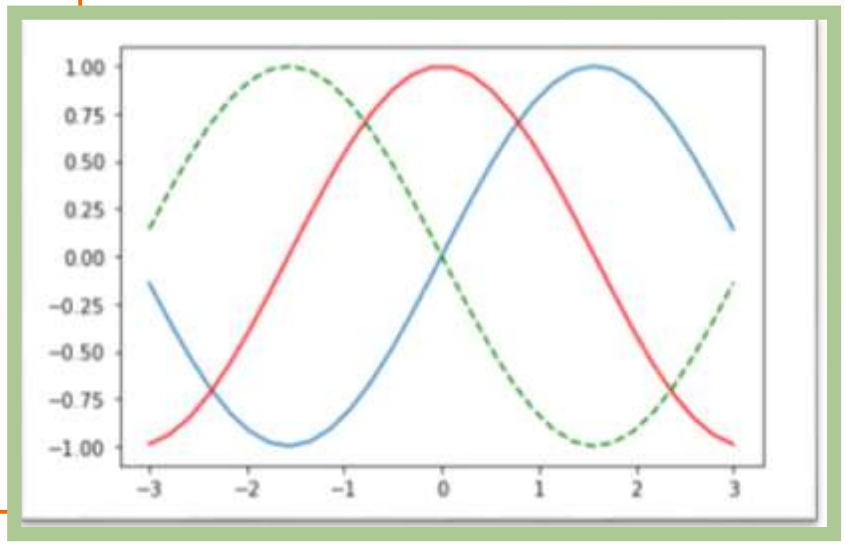


linspace, ‘r-‘ 'g--'


```
import matplotlib.pyplot as plt
from numpy import *
from pylab import *

plt.plot(x, sin(x))
plt.plot(x, cos(x), 'r-')
plt.plot(x, -sin(x), 'g--')

plt.show()
```



연습문제 I

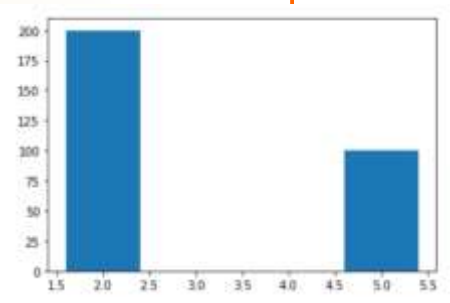
- 다음 코드에서 아래 사진처럼 나오기 위한 표현은?

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

x = np.array([2, 5])
y = np.array([200, 100])

[                                ]

plt.show()
```



1. plt.scatter(x,y)
2. plt.plot(x,y)
3. plt.colorbar()
4. plt.bar(x,y)

연습문제 I 답안

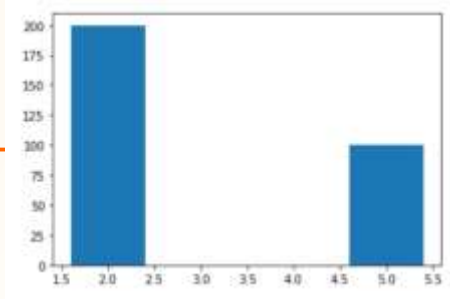
- 다음 코드에서 아래 사진처럼 나오기 위한 표현은?

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

x = np.array([2, 5])
y = np.array([200, 100])

[          ]

plt.show()
```



1. plt.scatter(x,y)
2. plt.plot(x,y)
3. plt.colorbar()
4. plt.bar(x,y)

Reference

- https://www.tutorialspoint.com/matplotlib/matplotlib_jupyter_notebook.htm
- https://www.w3schools.com/python/matplotlib_intro.asp
- https://matplotlib.org/stable/index.html
- https://realpython.com/python-matplotlib-guide/
- https://datascienceschool.net/01%20python/05.02%20%EB%A7%B7%ED%94%8C%EB%A1%AF%EB%A6%AC%EB%B8%8C%EC%9D%98%20%EC%97%AC%EB%9F%AC%EA%B0%80%EC%A7%80%20%ED%94%8C%EB%A1%AF.html

강의 요약

- Pyplot 이해하기
  - plot의 종류
  - bar
  - plot
  - scatter
  - Image Functions
  - Axis Functions
  - Figure Functions

목표 달성 질문

- 다음 pyplot 함수의 기능을 설명하시오
  - barh()
  - Hist()
  - pie()

감사합니다