

اهداف:

- آشنایی با انواع عملگرهای ریخت‌شناسی تصویر

## عملگرهای سایش و اتساع:

```
## Erosion and Dilation morphological transformation ##
import cv2
import numpy as np
from matplotlib import pyplot as plt # or use: import matplotlib.pyplot as plt
img=cv2.imread('E:/UOK/UOK_ Presentations/UOK_Digital Image Processing/Python/Images/Fruits.jpeg')
gray_img = cv2.cvtColor(img, cv2.COLOR_BGR2GRAY) #Convert BGR image to grayscale
ret,thr = cv2.threshold(gray_img,127,255,cv2.THRESH_BINARY) #Simple thresholding
kernel1=np.array([[0,1,0], [1,1,1], [0,1,0]],np.uint8) #Cross-shape structural element (3*3)
kernel2=cv2.getStructuringElement(cv2.MORPH_CROSS,(3,3)) #Cross-shape shape structural element (3*3)
kernel3=np.ones((3,3),np.uint8) #Full ones (rectangle shape) structural element (3*3)
kernel4=cv2.getStructuringElement(cv2.MORPH_RECT,(3,3)) #Rectangle shape structural element (3*3)
kernel5=cv2.getStructuringElement(cv2.MORPH_ELLIPSE,(3,3)) #Elliptical shape structural element (3*3)
erosion=cv2.erode(thr,kernel1,iterations=1) #Erosion operation
dilation=cv2.dilate(thr,kernel1,iterations=1) #Dilation operation
titles = ['Grayscale image','BINARY','Erosion','Dilation']
images = [gray_img, thr, erosion, dilation]
for i in range(4):
    plt.subplot(2,2,i+1),plt.imshow(images[i],'gray',vmin=0,vmax=255)
    plt.title(titles[i])
    plt.xticks([],plt.yticks([]))
plt.show()
###
```

## عملگرهای باز کردن و بستن:

```
## Opening and closing morphological transformation ##
import cv2
import numpy as np
from matplotlib import pyplot as plt # or use: import matplotlib.pyplot as plt
img=cv2.imread('E:/UOK/UOK_ Presentations/UOK_Digital Image Processing/Python/Images/Fruits.jpeg')
gray_img = cv2.cvtColor(img, cv2.COLOR_BGR2GRAY) #Convert BGR image to grayscale
ret,thr = cv2.threshold(gray_img,127,255,cv2.THRESH_BINARY) #Simple thresholding
kernel=np.array([[0,1,0], [1,1,1], [0,1,0]],np.uint8) #Cross-shape
```

```
structural element (3*3)
opening=cv2.morphologyEx(thr,cv2.MORPH_OPEN, kernel) #Opening operation
closing=cv2.morphologyEx(thr,cv2.MORPH_CLOSE, kernel) #Closing operation
titles = ['Grayscale image', 'BINARY', 'Opening', 'Closing']
images = [gray_img, thr, opening, closing]
for i in range(4):
    plt.subplot(2,2,i+1),plt.imshow(images[i], 'gray', vmin=0, vmax=255)
    plt.title(titles[i])
    plt.xticks([],plt.yticks([]))
plt.show()
###
```