2022년 IoT기반 스마트 솔루션 개발자 양성과정

Programming : Python

13-Image Filter

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Image Filter

- Blurring, Smoothing
  - Noise 또는 외부영향을 감소시키기 위함, 이미지가 흐려짐
  - cv2.blur(img, ksize)
    - ksize : kernel size
  - cv2.GaussianBlur(img, ksize, sigmaX , sigmaY=None, borderType=None)
    - ksize : kernel size, sigmaX : x축 표준편차
  - cv2.medianBlur(img, ksize)
    - ksize : kernel size
  - cv2.bilateralFilter(src, dst, d, sigmaColor, sigmaSpace)
    - D: Pixel Diameter, sigmaColor: color space ,sigmaSpace: coordinate space
- Sharpening
  - 경계를 선명하게 함

Convolution

- kernel
- mask
- filter
- window

(0,0) (0,0)	(0,1) (0,1)	(0,2) (0,2)	(0,3)	(0,4)	(0,5)	(0,6)	(0,7)
(1,0) (1,0)	(1,1) (1,1)	(1,2) (1,2)	(1,3)	(1,4)	(1,5)	(1,6)	(1,7)
(2,0) (2,0)	(2,1) (2,1)	(2,2) (2,2)	(2,3)	(2,4)	(2,5)	(2,6)	(2,7)
(3,0)	(3,1)	(3,2)	(3,3)	(3,4)	(3,5)	(3,6)	(3,7)
(4,0)	(4,1)	(4,2)	(4,3)	(4,4)	(4,5)	(4,6)	(4,7)
(5,0)	(5,1)	(5,2)	(5,3)	(5,4)	(5,5)	(5,6)	(5,7)
(6,0)	(6,1)	(6,2)	(6,3)	(6,4)	(6,5)	(6,6)	(6,7)
(7,0)	(7,1)	(7,2)	(7,3)	(7,4)	(7,5)	(7,6)	(7,7)
(8,0)	(8,1)	(8,2)	(8,3)	(8,4)	(8,5)	(8,6)	(8,7)

cv2.blur( )

cv2-blur.py

```python
import cv2

img=cv2.imread('Fresh.jpg')
filteredImg=cv2.blur(img,(5,5))

cv2.imshow('Image',filteredImg)
cv2.waitKey(0)
cv2.destroyAllWindows()

```

$$\frac{1}{25}\begin{bmatrix}1 & 1 & 1 & 1 & 1\\ 1 & 1 & 1 & 1 & 1\\ 1 & 1 & 1 & 1 & 1\\ 1 & 1 & 1 & 1 & 1\\ 1 & 1 & 1 & 1 & 1\end{bmatrix}$$

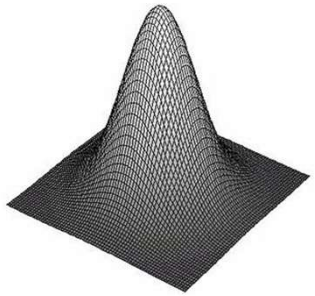
cv2.blur(img,(x,y)

cv2.GaussianBlur( )

cv2-blur.py | cv2-GaussianBlure.py

```
1  import cv2
2
3  img=cv2.imread('Fresh.jpg')
4  filteredImg=cv2.GaussianBlur(img,(5,5),0)
5
6  cv2.imshow('Image',filteredImg)
7  cv2.waitKey(0)
8  cv2.destroyAllWindows()
```

$$\frac{1}{273}\begin{bmatrix} 1 & 4 & 7 & 4 & 1 \\ 4 & 16 & 26 & 16 & 4 \\ 7 & 26 & 41 & 26 & 7 \\ 4 & 16 & 26 & 16 & 4 \\ 1 & 4 & 7 & 4 & 1 \end{bmatrix}$$



cv2.medianBlur( )

cv2-medianBlur.py

```
1  import cv2
2
3  img=cv2.imread('Fresh.jpg')
4  filteredImg=cv2.medianBlur(img,5)
5
6  cv2.imshow('Image',filteredImg)
7  cv2.waitKey(0)
8  cv2.destroyAllWindows()
```

cv2.bilateralFilter( )

bilateralFilter(src, dst, d, sigmaColor, sigmaSpace)

cv2-medianBlur.py | cv2-bilateralFilter.py

```
1  import cv2
2
3  img=cv2.imread('Fresh.jpg')
4  filteredImg=cv2.bilateralFilter(img,5,75,75)
5
6  cv2.imshow('Image',filteredImg)
7  cv2.waitKey(0)
8  cv2.destroyAllWindows()
```

sharpening-1

cv2-sharp_1.py *

```
1  import cv2
2  import numpy as np
3
4  img=cv2.imread('Fresh.jpg')
5  sharpeningFilter=np.array([[-1,-1,-1],[-1,9,-1],[-1,-1,-1]])
6  filteredImg=cv2.filter2D(img,-1,sharpeningFilter)
7
8  cv2.imshow('Image',filteredImg)
9  cv2.waitKey(0)
10 cv2.destroyAllWindows()
```

$$M = \begin{bmatrix} -1 & -1 & -1 \\ -1 & 9 & -1 \\ -1 & -1 & -1 \end{bmatrix}$$

cv2.filter2D(src, ddepth, kernel, dst=None, anchor=None, delta=None, borderType=None)

sharpening-2

cv2-sharp_2.py *

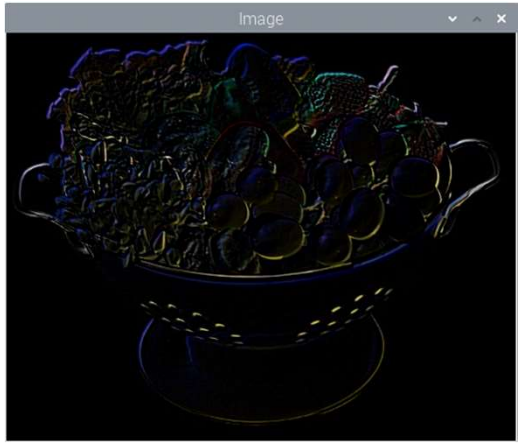
```
1  import cv2
2  import numpy as np
3
4  img=cv2.imread('Fresh.jpg')
5  sharpeningFilter=np.array([[-1,-1,-1,-1,-1],[-1,2,2,2,-1],[-1,2,9,2,-1],[-1,2,2,2,-1],[-1,-1,-1,-1,-1]]) / 9.0
6  filteredImg=cv2.filter2D(img,-1,sharpeningFilter)
7
8  cv2.imshow('Image',filteredImg)
9  cv2.waitKey(0)
10 cv2.destroyAllWindows()
```

cv2.filter2D(src, ddepth, kernel, dst=None, anchor=None, delta=None, borderType=None)

embossing

cv2-embossing.py

```
1  import cv2
2  import numpy as np
3
4  img=cv2.imread('Fresh.jpg')
5  Filter=np.array([[1,0,0],[0,0,0],[0,0,-1]])
6  filteredImg=cv2.filter2D(img,-1,Filter)
7
8  cv2.imshow('Image',filteredImg)
9  cv2.waitKey(0)
10 cv2.destroyAllWindows()
```

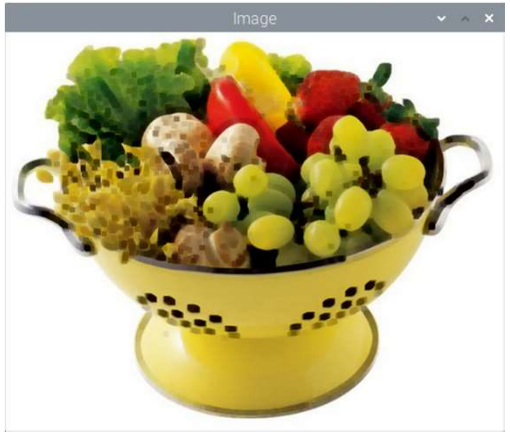


cv2.erode( )

cv2-erode.py

```
1  import cv2
2  import numpy as np
3
4  img=cv2.imread('Fresh.jpg')
5  kernel=np.ones((5,5),np.uint8)
6  filteredImg=cv2.erode(img,kernel,iterations=1)
7
8  cv2.imshow('Image',filteredImg)
9  cv2.waitKey(0)
10 cv2.destroyAllWindows()
11
```

cv2.erode(img,kernel,iterationa)
iterations:반복횟수



cv2.dilate( )

cv2-erode.py cv2-dilate.py

```
1  import cv2
2  import numpy as np
3
4  img=cv2.imread('Fresh.jpg')
5  kernel=np.ones((5,5),np.uint8)
6  filteredImg=cv2.dilate(img,kernel,iterations=1)
7
8  cv2.imshow('Image',filteredImg)
9  cv2.waitKey(0)
10 cv2.destroyAllWindows()
```

cv2.dilate(img,kernel,iterationa)
iterations:반복횟수