2022년 IoT기반 스마트 솔루션 개발자 양성과정

Programming : Python

11-OpenCV

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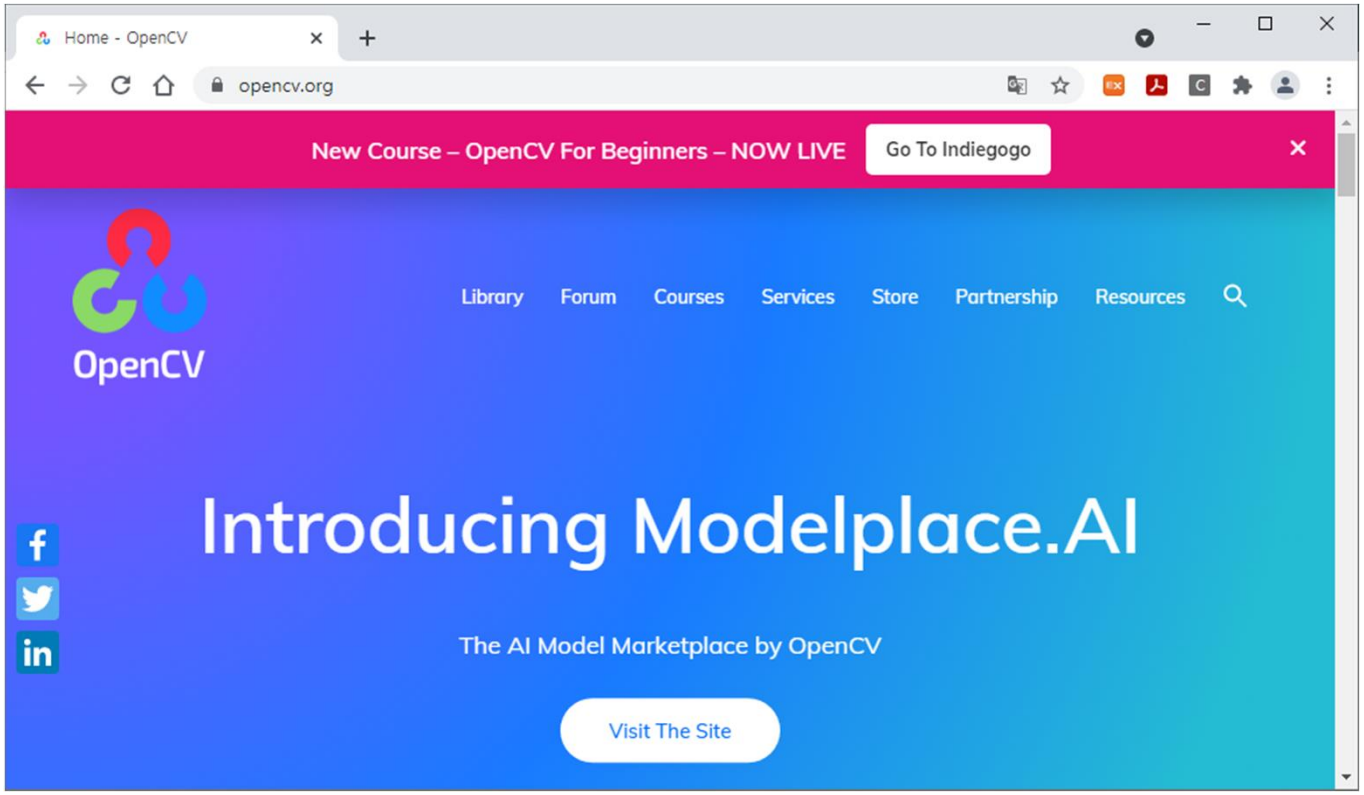
Open Source Computer Vision Library

- 실시간 컴퓨터 비전을 목적으로 한 프로그래밍 라이브러리
- C/C++ 프로그래밍 언어로 개발 되었으며 Python , Java 및 Matlab / Octave에 바인딩 되어 프로그래머에게 개발 환경을 지원
- 주요 기능
  - 이진화(binarization)
  - 노이즈 제거
  - 외곽선 검출(edge detection)
  - 패턴인식
  - 기계학습(machine learning)
  - ROI(Region Of Interest) 설정
  - 이미지 변환(image warping)
  - 하드웨어 가속

opencv.org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The AI Model Marketplace by OpenCV
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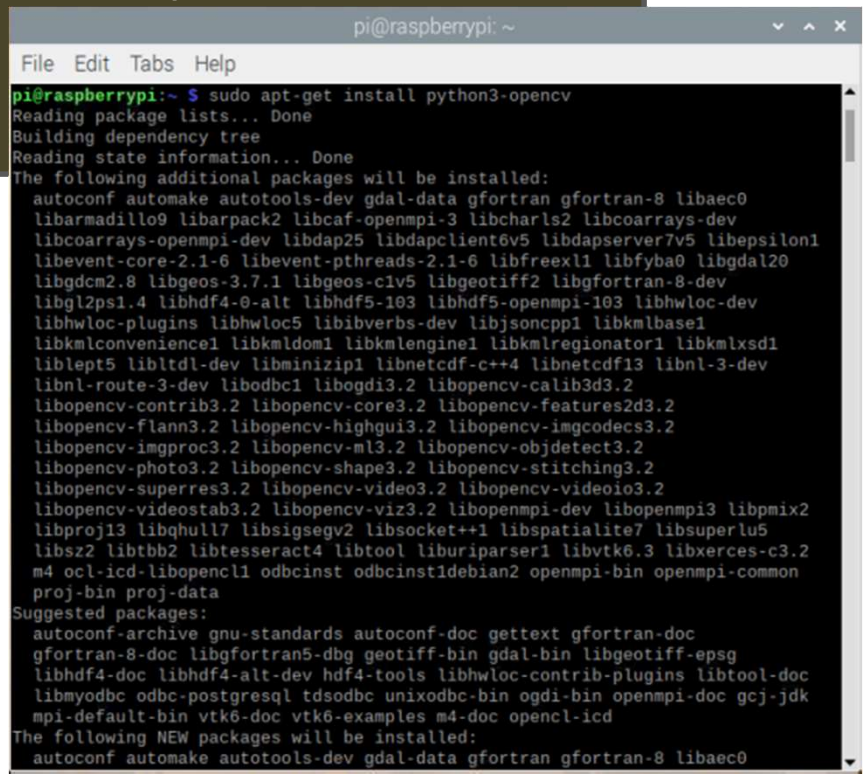
Install python3-opencv

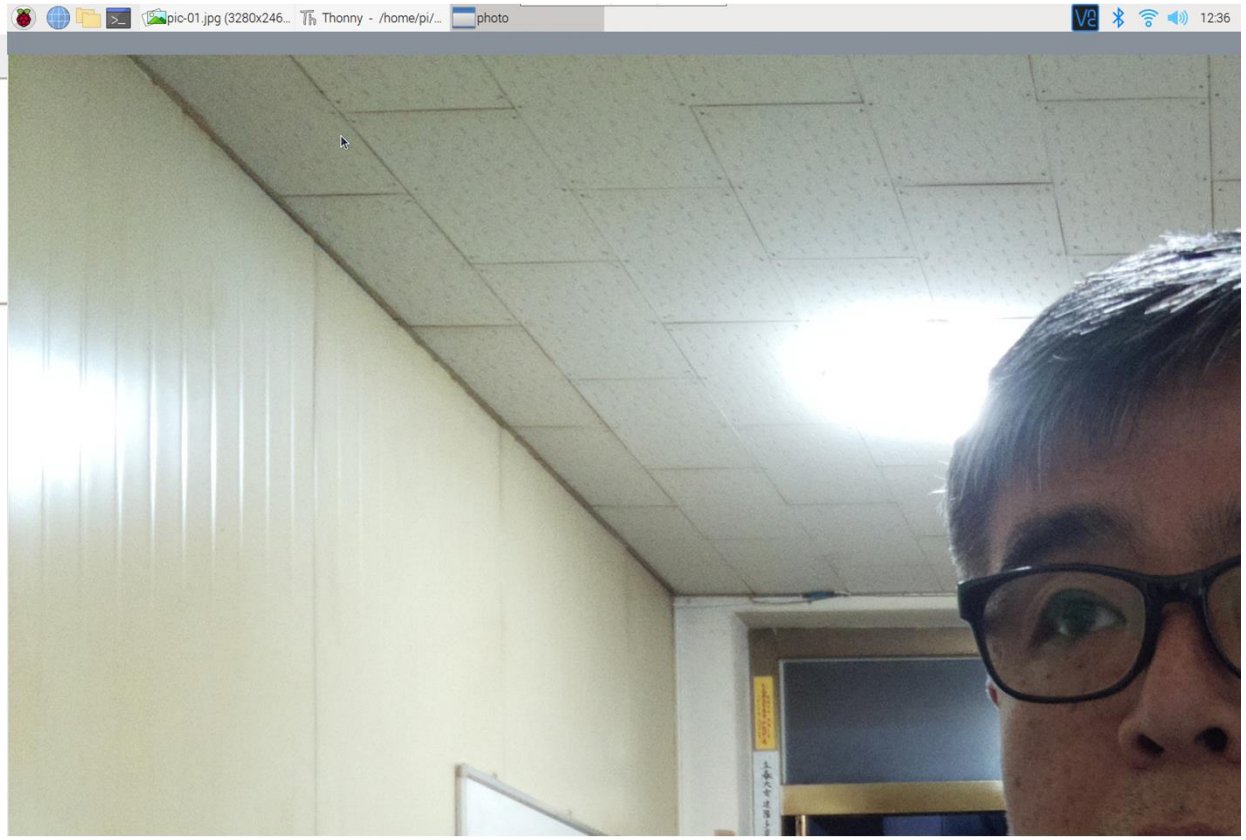
```
$ sudo apt install python3-opencv
```



cv2.imead( )

cv2-imageRead.py

```
1  import cv2
2
3  img=cv2.imread('pic-01.jpg')
4
5  cv2.imshow('photo',img)
6  cv2.waitKey(0)
7  cv2.destroyAllWindows()
```



cv2.imead( )

cv2-imageRead.py *

```
1  import cv2
2
3  img=cv2.imread('pic-03.jpg')
4
5  cv2.imshow('photo',img)
6  cv2.waitKey(0)
7  cv2.destroyAllWindows()
8
```

cv2.resize( )

cv2-imageRead.py | cv2-gray.py | cv2-resize.py

```python
import cv2

img=cv2.imread('pic-01.jpg')
resizeImg=cv2.resize(img,(640,480))

cv2.imshow('photo',resizeImg)
cv2.waitKey(0)
cv2.destroyAllWindows()

```

cv2.cvtColor( )

cv2-imageRead.py cv2-gray.py

```
1  import cv2
2
3  img=cv2.imread('pic-03.jpg')
4  gray=cv2.cvtColor(img,cv2.COLOR_BGR2GRAY)
5
6  cv2.imshow('photo',gray)
7  cv2.waitKey(0)
8  cv2.destroyAllWindows()
9
```

cv2.IMREAD_GRAYSCALE

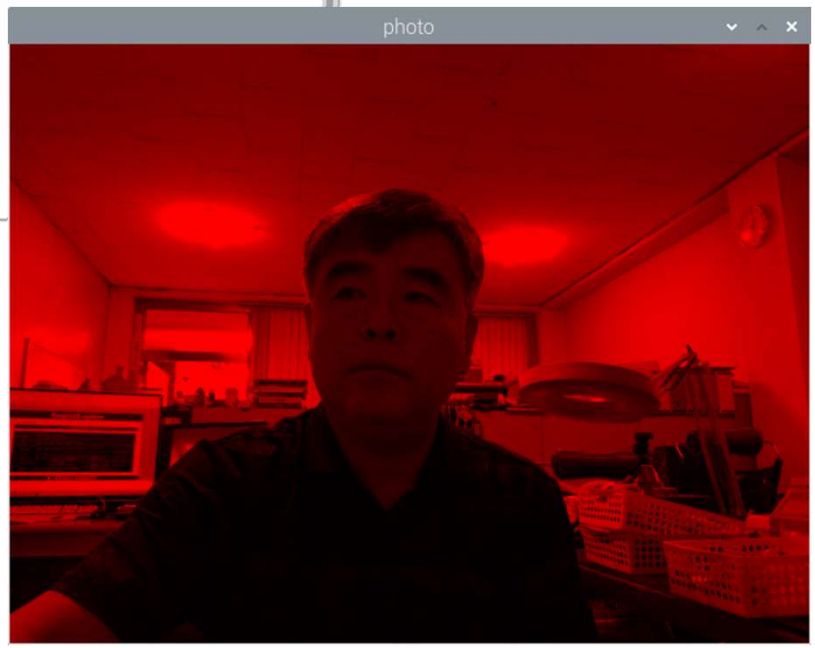
cv2-gray.py | cv2-gray2.py

```
1  import cv2
2
3  img=cv2.imread('pic-03.jpg',cv2.IMREAD_GRAYSCALE)
4
5  cv2.imshow('photo',img)
6  cv2.waitKey(0)
7  cv2.destroyAllWindows()
8
```

cv2.split( ), merge( )

cv2_split.py *

```
1  import cv2
2  import numpy as np
3
4  img=cv2.imread('pic-03.jpg',cv2.IMREAD_COLOR)
5  B_img,G_img,R_img=cv2.split(img)
6  zeroImg=np.zeros((img.shape[0],img.shape[1]),dtype='uint8')
7  mergeImg=cv2.merge([zeroImg,zeroImg,R_img])
8
9  cv2.imshow('photo',mergeImg)
10 cv2.waitKey(0)
11 cv2.destroyAllWindows()
12
```



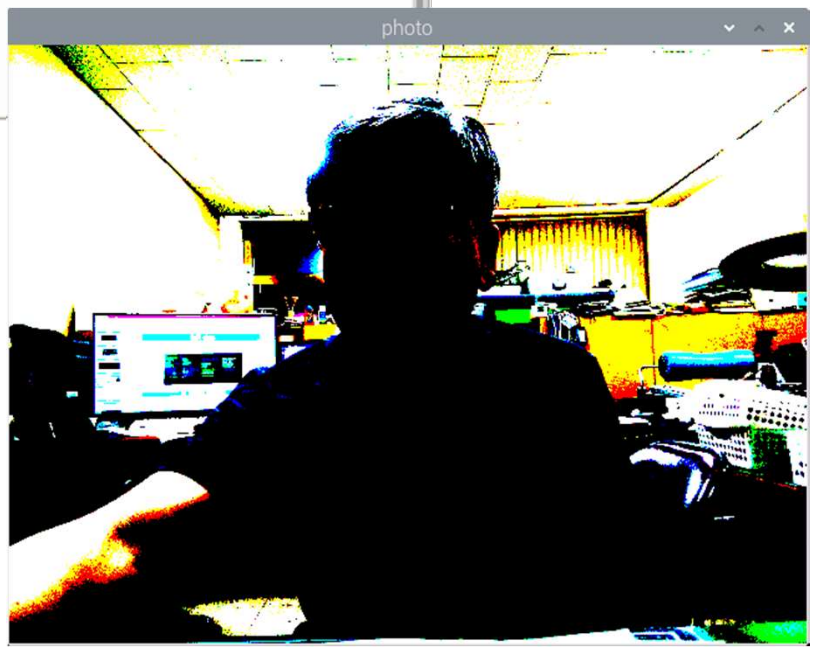
cv2.merge(B,G,R)

$ sudo apt-get install python3-numpy

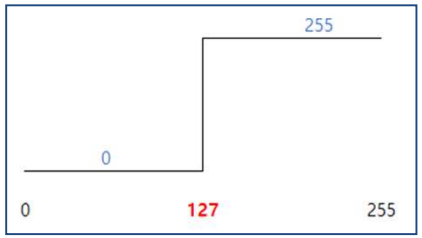
cv2.threshold( )

cv2-thresh_binary.py

```
1  import cv2
2
3  img=cv2.imread('pic-01.jpg')
4  resizeImg=cv2.resize(img,(640,480))
5  ret,threshHoldImage=cv2.threshold(resizeImg,127,255,cv2.THRESH_BINARY)
6
7  cv2.imshow('photo',threshHoldImage)
8  cv2.waitKey(0)
9  cv2.destroyAllWindows()
10
```



cv2.threshold(img,thr value,value,flag)



cv2.gray + thresh

cv2-resize-gray-thresh.py

```
1  import cv2
2
3  img=cv2.imread('pic-01.jpg')
4  resizeImg=cv2.resize(img,(640,480))
5  resizeGray=cv2.cvtColor(resizeImg,cv2.COLOR_BGR2GRAY)
6  ret,threshHoldImage=cv2.threshold(resizeGray,127,255,cv2.THRESH_BINARY)
7
8  cv2.imshow('photo',threshHoldImage)
9  cv2.waitKey(0)
10 cv2.destroyAllWindows()
11
```

cv2.add( )

cv2-add.py

```python
import cv2

img=cv2.imread('pic-01.jpg')
resizeImg=cv2.resize(img,(640,480))
resizeGray=cv2.cvtColor(resizeImg,cv2.COLOR_BGR2GRAY)
mathImg=cv2.add(resizeGray,-100)

cv2.imshow('photo',mathImg)
cv2.waitKey(0)
cv2.destroyAllWindows()
```

결과값 { 0>: 0 , 255<:255 }

cv2.subtract( )

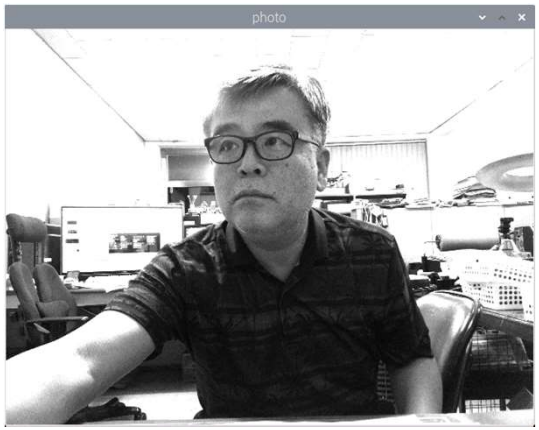
cv2.multiply( )

cv2-add.py cv2-multiply.py

```
1  import cv2
2
3  img=cv2.imread('pic-01.jpg')
4  resizeImg=cv2.resize(img,(640,480))
5  resizeGray=cv2.cvtColor(resizeImg,cv2.COLOR_BGR2GRAY)
6  mathImg=cv2.multiply(resizeGray,2)
7
8  cv2.imshow('photo',mathImg)
9  cv2.waitKey(0)
10 cv2.destroyAllWindows()
```

결과값 { 0>: 0 , 255<:255 }

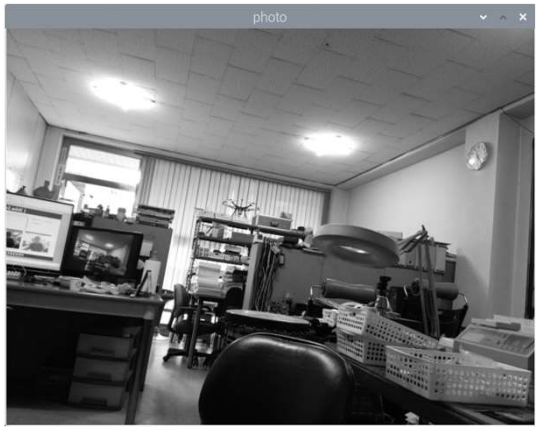
cv2.divide( )

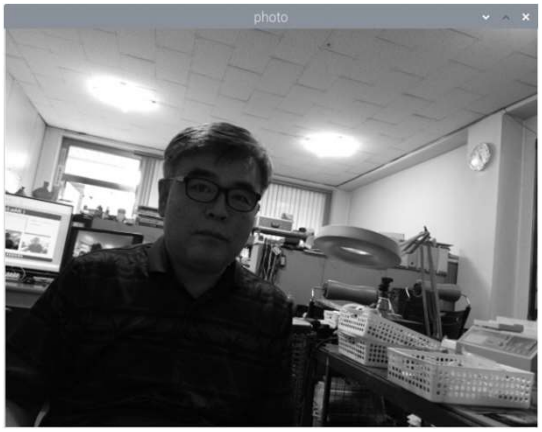


cv2.absdiff( )

cv2-absdiff.py

```
1  import cv2
2
3  img_1=cv2.imread('pic-04.jpg',cv2.IMREAD_GRAYSCALE)
4  img_2=cv2.imread('pic-05.jpg',cv2.IMREAD_GRAYSCALE)
5  mathImg=cv2.bitwise_not(cv2.absdiff(img_2,img_1))
6
7  cv2.imshow('photo',mathImg)
8  cv2.waitKey(0)
9  cv2.destroyAllWindows()
```

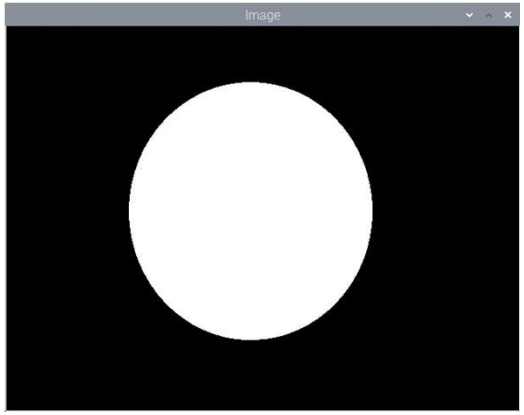




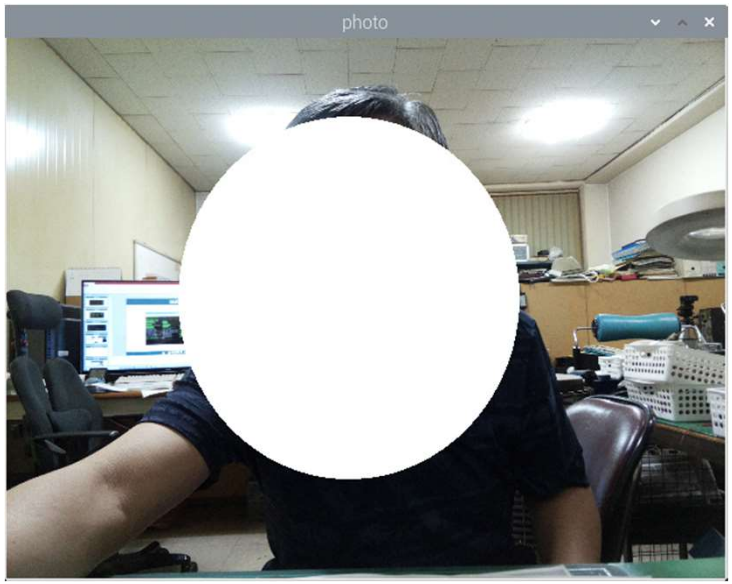
cv2.bitwise_and( )

cv2-mask.py *

```
1  import cv2
2
3  img=cv2.imread('pic-01.jpg')
4  resizeImg=cv2.resize(img,(640,480))
5  maskImg=cv2.imread('mask-01.jpg')
6
7  masked=cv2.bitwise_and(resizeImg,maskImg)
8
9  cv2.imshow('photo',masked)
10 cv2.waitKey(0)
11 cv2.destroyAllWindows()
12
```



cv2.bitwise_or( ) , xor( )



cv2.bitwise_not( )

cv2-mask.py cv2-bitwise_not.py

```
1  import cv2
2
3  img=cv2.imread('pic-01.jpg')
4  resizeImg=cv2.resize(img,(640,480))
5  maskImg=cv2.imread('mask-01.jpg')
6
7  inverse=cv2.bitwise_not(resizeImg)
8
9  cv2.imshow('photo',inverse)
10 cv2.waitKey(0)
11 cv2.destroyAllWindows()
12
```