

6주차 과제 보고서

학번 : 2020254002

이름: 고정재

1. 히스토그램 평탄화

사용자로부터 R, G, B 중의 하나의 채널을 입력받고 입력받은 채널에 대한 히스토그램을 그리고 평탄화를 한 후에 그 영상을 출력하시오.
(선택받은 채널 이외의 채널 값은 변화하지 않음)

★실행코드

```
import cv2
import numpy as np
import matplotlib.pyplot as plt

grey = cv2.imread('c:/img/House256rgb.png', 0)
cv2.imshow('original grey', grey)
cv2.waitKey()

hist, bins = np.histogram(grey, 256, [0, 255])
plt.fill(hist)
plt.xlabel('pixel value')
plt.show()

grey_eq = cv2.equalizeHist(grey)
hist, bins = np.histogram(grey_eq, 256, [0, 255])
plt.fill_between(range(256), hist, 0)
plt.xlabel('pixel value')
plt.show()

cv2.imshow('equallized grey', grey_eq)
cv2.waitKey()
```

Spyder (Python 3.8)

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C:\Users\W고정재\Desktop\W송복대학교\W2-1학기 산업 컴퓨터비전실제\W6주차과제\W과제1.py

untitled0.py x | 실습 코드 2.py x | 실습코드.py x | 실습코드1.py x | 첫시간 실습 2.py x | 과제1.py x

```

1 import cv2
2 import numpy as np
3 import matplotlib.pyplot as plt
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6 cv2.imshow('original grey', grey)
7 cv2.waitKey()
8
9 hist, bins = np.histogram(grey, 256, [0, 255])
10 plt.fill(hist)
11 plt.xlabel('pixel value')
12 plt.show()
13
14 grey_eq = cv2.equalizeHist(grey)
15 hist, bins = np.histogram(grey_eq, 256, [0, 255])
16 plt.fill_between(range(256), hist, 0)
17 plt.xlabel('pixel value')
18 plt.show()
19
20 cv2.imshow('equalized grey', grey_eq)
21 cv2.waitKey()
22
23

```

original grey

Variable explorer Help Plots Files

Console 6/A

Python 3.8.5 (default, Sep 3 2020, 21:29:08) [MSC v.1916 64 bit (AMD64)]
Type "copyright", "credits" or "license" for more information.
IPython 7.19.0 -- An enhanced Interactive Python.

In [1]: runfile('C:/Users/고정재/Desktop/송복대학교/2-1학기 산업 컴퓨터비전실제/6주차과제/과제1.py', wdir='C:/Users/고정재/Desktop/송복대학교/2-1학기 산업 컴퓨터비전실제/6주차과제')

Spyder (Python 3.8)

File Edit Search Source Run Debug Consoles Projects Tools View Help

C:\Users\W고정재\Desktop\W송복대학교\W2-1학기 산업 컴퓨터비전실제\W6주차과제\W과제1.py

untitled0.py x | 실습 코드 2.py x | 실습코드.py x | 실습코드1.py x | 첫시간 실습 2.py x | 과제1.py x

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12 plt.show()
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14 grey_eq = cv2.equalizeHist(grey)
15 hist, bins = np.histogram(grey_eq, 256, [0, 255])
16 plt.fill_between(range(256), hist, 0)
17 plt.xlabel('pixel value')
18 plt.show()
19
20 cv2.imshow('equalized grey', grey_eq)
21 cv2.waitKey()
22
23

```

equalized grey

Variable explorer Help Plots Files

Console 6/A

Python 3.8.5 (default, Sep 3 2020, 21:29:08) [MSC v.1916 64 bit (AMD64)]
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Figures now render in the Plots pane by default. To make them also appear inline in the Console, uncheck "Mute Inline Plotting" under the Plots pane options menu.

Python console History

Line 23, Col 1 UTF-8 CRLF RW Mem 67%

2. 공간 도메인 필터링

각 픽셀에 임의의 값을 더해 노이즈를 생성하고, 사용자로부터 Bilateral filtering을 위한 diameter, SigmaColor, SigmaSpace를 입력받아 노이즈를 제거하고 노이즈 제거 전후의 영상을 출력하시오. (다양한 파라미터 변화를 통해 영상이 어떻게 변화하는지 보고서에 넣으시오.)

★실행코드

```
import cv2
import numpy as np
import matplotlib.pyplot as plt

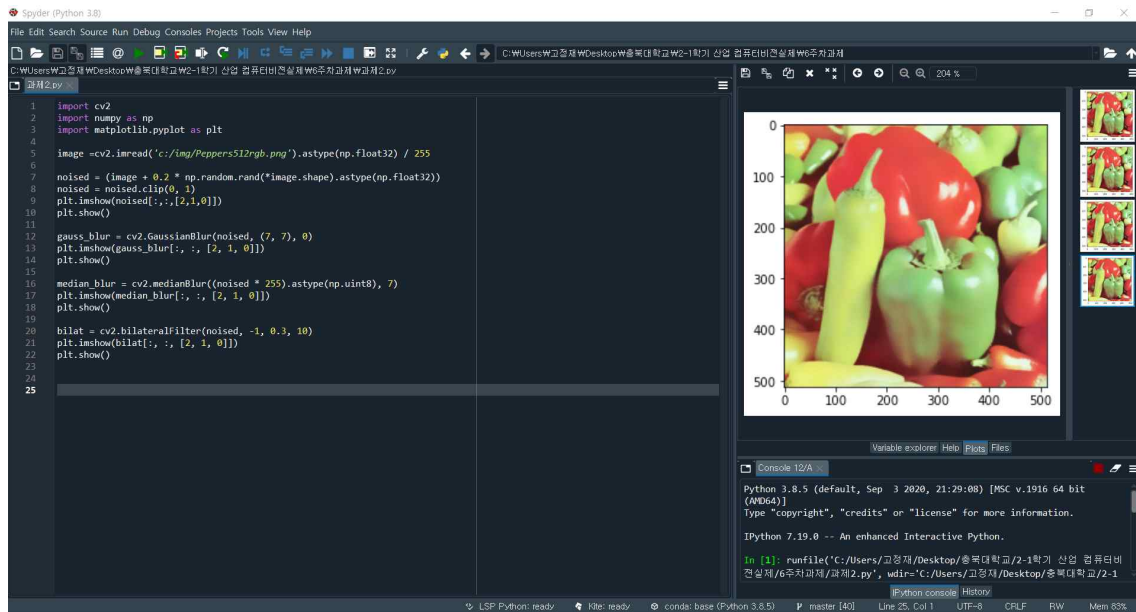
image = cv2.imread('c:/img/Peppers512rgb.png').astype(np.float32) / 255

noised = (image + 0.2 * np.random.rand(*image.shape).astype(np.float32))
noised = noised.clip(0, 1)
plt.imshow(noised[:, :, [2, 1, 0]])
plt.show()

gauss_blur = cv2.GaussianBlur(noised, (7, 7), 0)
plt.imshow(gauss_blur[:, :, [2, 1, 0]])
plt.show()

median_blur = cv2.medianBlur((noised * 255).astype(np.uint8), 7)
plt.imshow(median_blur[:, :, [2, 1, 0]])
plt.show()

bilat = cv2.bilateralFilter(noised, -1, 0.3, 10)
plt.imshow(bilat[:, :, [2, 1, 0]])
plt.show()
```



3. 주파수 도메인 필터링

DFT를 통해서 영상을 주파수 도메인으로 바꿔서 출력 한 후에 사용자로부터 반지름을 입력받아서 그 크기만큼의 원을 그린 후에 DFT 결과에 곱해준 후에 IDFT를 해서 필터링된 영상을 출력하시오. 사용자로부터 Low pass인지 High Pass인지를 입력받아 Low pass면 원 안을 통과시키고, High Pass면 원 바깥을 통과시키도록 하시오.

★실행코드

```
import cv2
import numpy as np
import matplotlib.pyplot as plt

image = cv2.imread('c:/img/Peppers512rgb.png', 0).astype(np.float32) / 255

fft = cv2.dft(image, flags=cv2.DFT_COMPLEX_OUTPUT)
fft_shift = np.fft.fftshift(fft, axes=[0, 1])
sz = 25
mask = np.zeros(fft.shape, np.uint8)
mask[image.shape[0]//2-sz:image.shape[0]//2+sz,
      image.shape[1]//2-sz:image.shape[1]//2+sz, :] = 1
fft_shift *= mask
fft = np.fft.ifftshift(fft_shift, axes=[0, 1])

filtered = cv2.idft(fft, flags=cv2.DFT_SCALE | cv2.DFT_REAL_OUTPUT)
mask_new = np.dstack((mask, np.zeros((image.shape[0], image.shape[1]), dtype=np.uint8)))

plt.figure()
plt.subplot(131)
plt.axis('off')
plt.title('original')
plt.imshow(image, cmap='gray')
plt.subplot(132)
plt.axis('off')
plt.title('no high frequencies')
plt.imshow(filtered, cmap='gray')
plt.subplot(133)
plt.axis('off')
plt.title('mask')
plt.imshow(mask_new*255, cmap='gray')
plt.tight_layout(True)
plt.show()
```

File Edit View Window Help

C:\Users\W고정\Desktop\W중복대학교 W2-1학기 산업 컴퓨터비전실재 W5주차강의 W과제3.py

과제3.py

```
1 import cv2
2 import numpy as np
3 import matplotlib.pyplot as plt
4
5 image = cv2.imread('c:/img/Peppers512rgb.png', 0).astype(np.float32) / 255
6
7 fft = cv2.dft(image, flags=cv2.DFT_COMPLEX_OUTPUT)
8 fft_shift = np.fft.fftshift(fft, axes=[0, 1])
9 sz = 25
10 mask = np.zeros(fft.shape, np.uint8)
11 mask[image.shape[0]/2-sz:image.shape[0]/2+sz,
12       image.shape[1]/2-sz:image.shape[1]/2+sz, :] = 1
13 fft_shift *= mask
14 fft = np.fft.ifftshift(fft_shift, axes=[0, 1])
15
16 filtered = cv2.idft(fft, flags=cv2.DFT_SCALE | cv2.DFT_REAL_OUTPUT)
17 mask_new = np.dstack((mask, np.zeros((image.shape[0], image.shape[1]), dtype=np.uint8)))
18
19
20 plt.figure()
21 plt.subplot(131)
22 plt.axis('off')
23 plt.title('original')
24 plt.imshow(image, cmap='gray')
25 plt.subplot(132)
26 plt.axis('off')
27 plt.title('no high frequencies')
28 plt.imshow(filtered, cmap='gray')
29 plt.subplot(133)
30 plt.axis('off')
31 plt.title('mask')
32 plt.imshow(mask_new*255, cmap='gray')
33 plt.tight_layout(True)
34 plt.show()
35
36
```

original no high frequencies mask

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Console 2/A

Figures now render in the Plots pane by default. To make them also appear inline in the Console, uncheck "Mute Inline Plotting" under the Plots pane options menu.

In [2]:

Python console History

LSP Python: ready | Jupyter: ready | conda: base (Python 3.6.5) | master [40] | Line 19, Col 1 | UTF-8 | CRLF | RW | Menu Tools

4. 모폴로지 필터

영상을 이진화한 후에 사용자로부터 Erosion, Dilation, Opening, Closing에 대한 선택과 횟수를 입력받아서 해당 결과를 출력하시오.

★실행코드

```
import cv2
import numpy as np
import matplotlib.pyplot as plt

image = cv2.imread('c:/img/Peppers512rgb.png', 0)
_, binary = cv2.threshold(image, -1, 1, cv2.THRESH_BINARY | cv2.THRESH_OTSU)

eroded = cv2.morphologyEx(binary, cv2.MORPH_ERODE, (3, 3), iterations=10)
dilated = cv2.morphologyEx(binary, cv2.MORPH_DILATE, (3, 3), iterations=10)

opened = cv2.morphologyEx(binary,
cv2.MORPH_OPEN,cv2.getStructuringElement(cv2.MORPH_ELLIPSE, (5, 5)), iterations=5)
closed = cv2.morphologyEx(binary,
cv2.MORPH_CLOSE,cv2.getStructuringElement(cv2.MORPH_ELLIPSE, (5, 5)), iterations=5)
grad = cv2.morphologyEx(binary,
cv2.MORPH_GRADIENT,cv2.getStructuringElement(cv2.MORPH_ELLIPSE, (5, 5)))

plt.figure(figsize=(10,10))
plt.subplot(231)
plt.axis('off')
plt.title('binary')
plt.imshow(binary, cmap='gray')
plt.subplot(232)
plt.axis('off')
plt.title('erode 10 times')
plt.imshow(eroded, cmap='gray')
plt.subplot(233)
plt.axis('off')
plt.title('dilate 10 times')
plt.imshow(dilated, cmap='gray')
plt.subplot(234)
plt.axis('off')
plt.title('open 5 times')
plt.imshow(opened, cmap='gray')
plt.subplot(235)
plt.axis('off')
plt.title('close 5 times')
```



```

plt.imshow(closed, cmap='gray')
plt.subplot(236)
plt.axis('off')
plt.title('gradient')
plt.imshow(grad, cmap='gray')
plt.tight_layout()
plt.show()

```

