

# EC601 HOMEWORK3

Author: Minghe Ren (sawyermh@bu.edu)

## Exercise 1

1. The content of a picture is save in cvMat Object as every pix. And the cvMat is kind of like an array with specific number of rows and cols. One picture consists of thousands of pixes and every single of these pixes are saved in cvMat. For example, the first pix of the pic is row0, col0 (or row1, col1) which is saved in cvMat(row0, col0 or row1, col1). When a program read a picture, it reads every saved pix in cvMat, getting information like color. The reading order should be: first read row, when finishing every column in the same row, then continue to next row. For example:

```
import cv2
import numpy as np

x = np.random.randint(0,5,(500,500))
img = cv2.imread('D:\Project\Capture1.jpg',0)
p = img.shape
print p
rows,cols = img.shape

for i in range(rows):
    for j in range(cols):
        k = x[i,j]
        print k
```

## Exercise 2

1. The output of colorimage.py:



## 2. The value of pix (20,25)

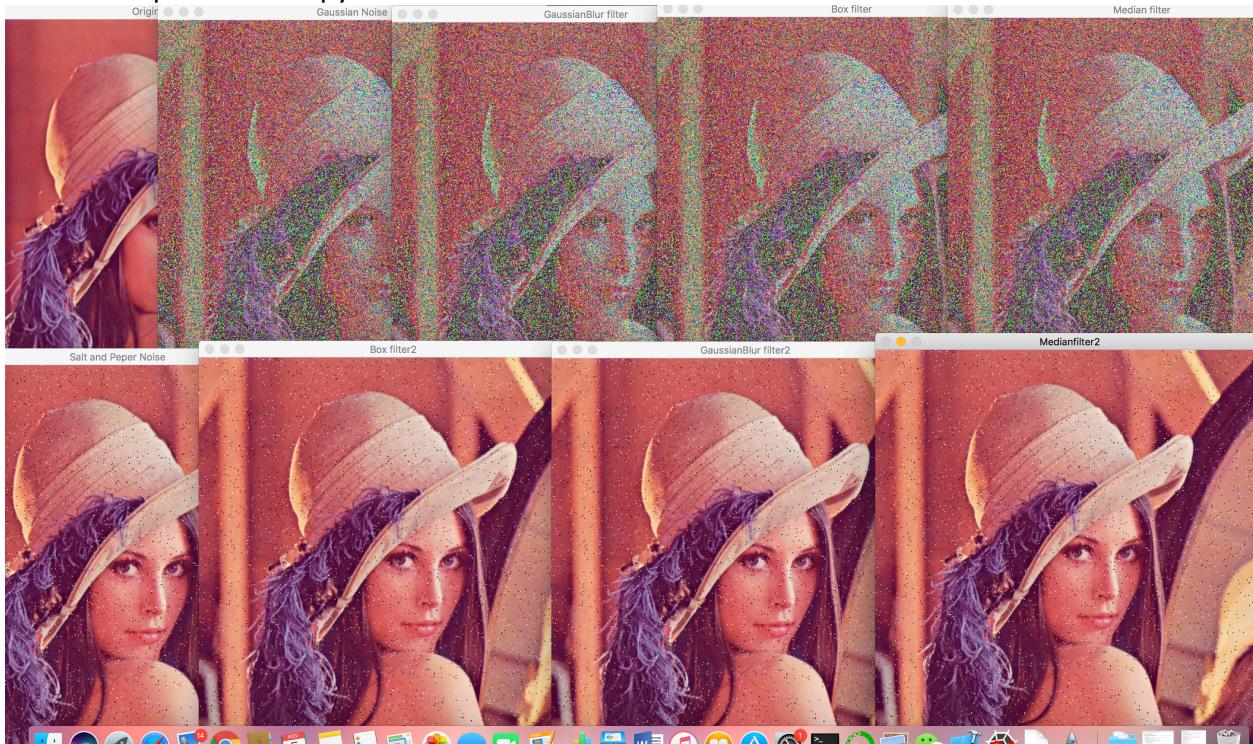
```
Desktop — Python colorimage.py — 80x24
```

```
Last login: Sun Nov  5 18:02:31 on ttys000
dhcp-wifi-8021x-168-122-204-15:~ mingheren$ cd Desktop/
dhcp-wifi-8021x-168-122-204-15:Desktop mingheren$ python3 colorimage.py
RGB value: [106 122 225]
YCrCb value: [151 181 103]
HSV value: [ 4 135 225]
```

RGB, R range is [0,255], G range is [0,255], B range is [0,255].  
HSV, Hue range is [0,179], Saturation range is [0,255] and Value range is [0,255].  
YCrCb, Y range is [0,255], Cr range is [0,255], Cb range is [0,255].

## Exercise 3

### 1. The output of Noise.py



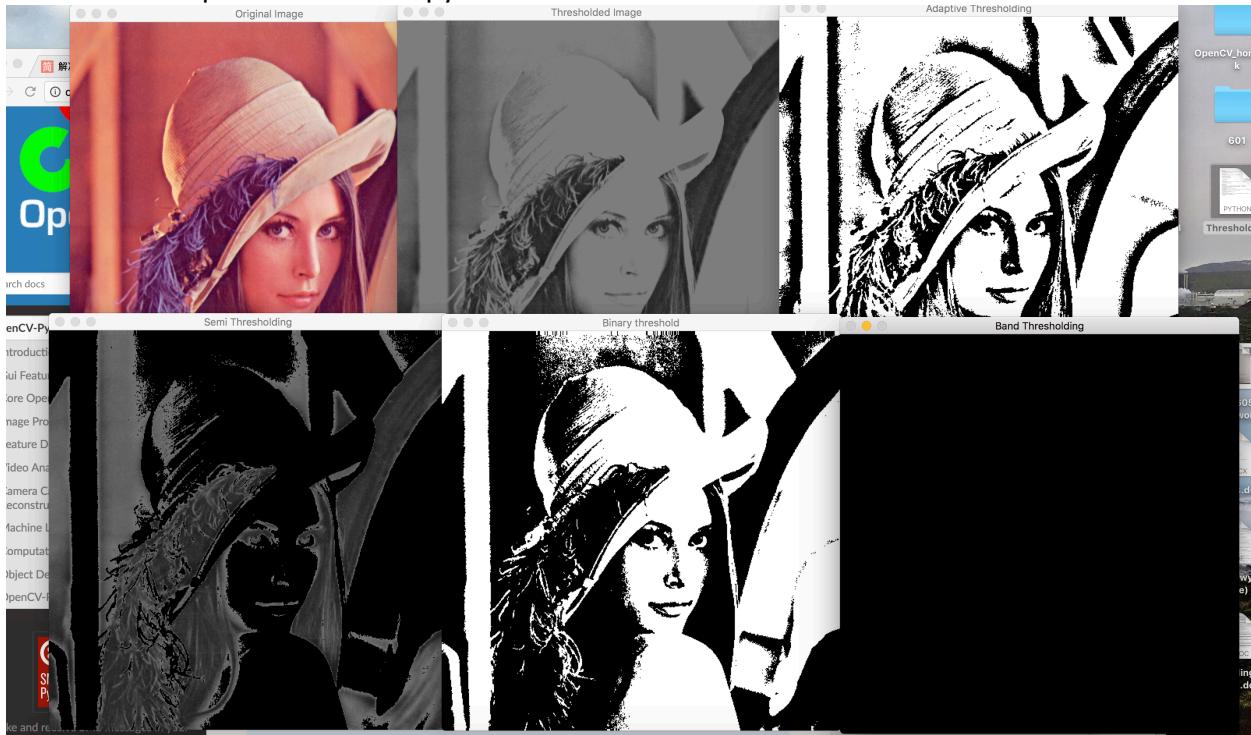
```
"c Desktop — Python Noise.py — 80x24
n e Last login: Sun Nov  5 20:08:50 on ttys000
[ dhcp-wifi-8021x-168-122-204-15:~ mingheren$ python3 Noise.py
User /usr/local/Cellar/python3/3.6.3/Frameworks/Python.framework/Versions/3.6/Resources/Python.app/Contents/MacOS/Python: can't open file 'Noise.py': [Errno 2] No such file or directory
[ dhcp-wifi-8021x-168-122-204-15:~ mingheren$ cd Desktop/
[ dhcp-wifi-8021x-168-122-204-15:Desktop mingheren$ python3 Noise.py
mean: 0
sigma: 50
pa: 0.01
pb: 0.01
"
```

2. The 3x3 kernel works best, because with smaller size, the times of manipulating convolution have been increased. Thus, the pic after filter would been cleaner than bigger size of kernel.

```
"c Desktop — Python Noise.py — 80x24
Last login: Sun Nov  5 20:18:01 on ttys000
[ dhcp-wifi-8021x-168-122-204-15:~ mingheren$ cd Desktop/
[ dhcp-wifi-8021x-168-122-204-15:Desktop mingheren$ python3 Noise.py
mean: 0
sigma: 50
pa: 0.01
pb: 0.01
best kernel size: 3x3
"
13
.f
ile
skl
python3 Noise.py ]
```

## Exercise 4

### 1. The output of Threshold.py



2. It's too easy to judge. There is only one criteria to judge whether to change the whole picture, so this method can't change the partial part of the pic. It's a very basic way to form pic thus, this way is too easy to handle complex pic. "It may not be good in all the conditions where image has different lighting conditions in different areas." (<http://opencv-python-tutroals.readthedocs.io/en/latest/index.html>)
3. In adaptive thresholding, the algorithm calculates the threshold for a small region of the image. "So we get different thresholds for different regions of the same image and it gives us better results for images with varying illumination." (<http://opencv-python-tutroals.readthedocs.io/en/latest/index.html>)