

Computer Vision Hw5 Report

I. Implementation

a. Dilation

As described in the lecture note, dilation actually get local maxima of the kernel.

```
def dilation(img, kernel):
    to_return = img.copy()
    for i in range(512):
        for j in range(512):
            lst = []
            for k in kernel:
                if (i+k[0] >= 0 and i+k[0] <= 511) and (j+k[1] >= 0 and j+k[1] <= 511):
                    lst.append(img[i+k[0]][j+k[1]])
            to_return[i][j] = max(lst)
    return to_return
```

b. Erosion

As described in the lecture note, erosion actually get local minima of the kernel.

```
def erosion(img, kernel):
    to_return = img.copy()
    for i in range(512):
        for j in range(512):
            lst = []
            for k in kernel:
                if (i+k[0] >= 0 and i+k[0] <= 511) and (j+k[1] >= 0 and j+k[1] <= 511):
                    lst.append(img[i+k[0]][j+k[1]])
            to_return[i][j] = min(lst)
    return to_return
```

c. Opening

As described in the lecture note, we just need to apply erosion to the given image and continue by dilation.

```
def opening(img, kernel):
    to_return = erosion(img, kernel)
    to_return = dilation(to_return, kernel)
    return to_return
```

d. Closing

As described in the lecture note, we just need to apply dilation to the given image and continue by erosion.

```
def closing(img, kernel):
    to_return = dilation(img, kernel)
    to_return = erosion(to_return, kernel)
    return to_return
```

e. Kernel

This function is use to get all the point in the given kernel. For given a center point and kernel pattern (value = 0), it generates all the neighbors point.

```
kernel01 = [[1,0,0,0,1], [0,0,0,0,0], [0,0,0,0,0], [0,0,0,0,0], [1,0,0,0,1]]

# Get neighbour point according to given center
def get_neighbour(center, kernel):
    to_return = []
    for y in range(len(kernel)):
        for x in range(len(kernel[0])):
            if kernel[x][y] == 0:
                to_return.append([x - center[0], y - center[1]])
    return to_return
```

II. Result

a. Dilation



b. Erosion



c. Opening



d. Closing

