Computer Vision hw5

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I use PIL to complete the homework. In my program, I use function getpixel() and putpixel() to get the value of every pixel.

For the 3-5-5-5-3 octogonal, I create a list which represent an octagon whose original is in the center.

Dilation and Erosion:

Since the kernel value is all zero, this part is quite simple. For every pixels (i, j) in lena.bmp, dilation compare all the value of pixels within the 3-5-5-5-3 area, and replace the origin value of (i, j) with the local maxima of that area. On the other hand, erosion replace the origin value of (i, j) with the local minima of that area.

The image after dilation:

The image after erosion:

Principal code fragment of dilation and erosion:

```
def dilation(imagein, pixel, kernal, w, h):
    maxval = 0
    for x in kernal:
        x2 = pixel[0] + x[0]
        y2 = pixel[1] + x[1]
        if 0 <= x2 < w and 0 <= y2 < h and imagein.getpixel((x2,y2)) > maxval:
            maxval = imagein.getpixel((x2,y2))
    return maxval

def erosion(imagein, pixel, kernal, w, h):
    minval = 255
    for x in kernal:
        x2 = pixel[0] + x[0]
        y2 = pixel[1] + x[1]
        if 0 <= x2 < w and 0 <= y2 < h and imagein.getpixel((x2,y2)) < minval:
            minval = imagein.getpixel((x2,y2))
    return minval
```

```
octogonal = [(0,0), (0,1), (0,2), (0,-1), (0,-2), (1,0), (1,1), (1,2), (1,-1), (1,-2),
for i in range(w):
    for j in range(h):
        maxval = dilation(img, (i,j), octogonal, w, h)
        imgdilation.putpixel((i,j), maxval)
        imgclose.putpixel((i,j), maxval)
        minval = erosion(img, (i,j), octogonal, w, h)
        imgerosion.putpixel((i,j), minval)
        imgopen.putpixel((i,j), minval)
imgdilation.save("dilation.bmp")
imgerosion.save("erosion.bmp")
```

Opening and Closing:

For opening, we do erosion first and do the dilation; and for closing, do the dilation and do the erosion.

The image after opening:

The image after closing:

Principal code fragment of dilation and erosion:

```
#open and close
for i in range(w):
    for j in range(h):
        maxval = dilation(imgerosion, (i,j), octogonal, w, h)
        imgopen.putpixel((i,j), maxval)
        minval = erosion(imgdilation, (i,j), octogonal, w, h)
        imgclose.putpixel((i,j), minval)
imgopen.save("open.bmp")
imgclose.save("close.bmp")
```