Computer Vision - Assignment 5

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(a) Dilation

Assign each pixel with the maximum value of surrounding pixels defined by the kernel.

[Output]

[Code]

```
kernel = [(-2, -1), (-2, 0), (-2, 1), (-1, -2), (-1, -1), (-1, 0), (-1, 1),
(-1, 2), (0, -2), (0, -1), (0, 0), (0, 1), (0, 2), (1, -2), (1, -1), (1, 0),
(1, 1), (1, 2), (2, -1), (2, 0), (2, 1)]

for y in range(height):
    for x in range(width):
        max_value = 0
        for rel_y, rel_x in kernel:
            new_y = y + rel_y
            new_x = x + rel_x
            if new_y < height and new_y >= 0 and new_x < width and new_x >= 0:
                if img[new_y, new_x] > max_value:
                    max_value = img[new_y, new_x]

        out_img[y, x] = max_value
```

(b) Erosion

Assign each pixel with the minimum value of surrounding pixels defined by the kernel.

[Output]

[Code]

```
for y in range(height):
    for x in range(width):
        min_value = 255
        for rel_y, rel_x in kernel:
            new_y = y + rel_y
            new_x = x + rel_x
            if new_y < height and new_y >= 0 and new_x < width and new_x >= 0:
                if img[new_y, new_x] < min_value:
                    min_value = img[new_y, new_x]

        out_img[y, x] = min_value
```

(c) Opening

Do erosion, then dilation.

[Output]

[Code]

```
erosion_img = erosion(img, kernel)
out_img = dilation(erosion_img, kernel)
```

(d) Closing

Do dilation, then erosion.

[Output]

[Code]

```
dilation_img = dilation(img, kernel)
out_img = erosion(dilation_img, kernel)
```