Computer Vision HW4

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Homework 4

Mathematical Morphology - Binary Morphology

(a) Dilation

```
////kernel
    int kernel[5][5]={0,1,1,1,0,
                      1,1,1,1,1,
                      1,1,1,1,1,
                      1,1,1,1,1,
                      0,1,1,1,0};
```

```
/////dilation
    for(int i = 0 ; i < x ; i++){
        for(int j = 0 ; j < y ; j ++){
            if(pic[i][j] == 1){
                for(int k = -2 ; k < 3 ; k++){
                    if(k+i >= 512) break;
                    for(int l = -2 ; l < 3 ; l++){
                        if(j+l >= 512) break;
                        if( kernel[k+2][l+2] == 1) dia[i+k][j+l] = 255;
                    }
                }
            }
        }
    }
```

(b) Erosion

```
/////erosion
    for(int i = 0 ; i < x ; i++){
        for(int j = 0 ; j < y ; j ++){
            int temp = 0;
            for(int k = 0 ; k < 5 ; k++){
                for(int l = 0 ; l < 5 ; l++){
                    temp = temp + kernel[k][l]*pic[i+k][j+l];
                }
            }
            if(temp == 21) ero[i+2][j+2] = 255;
        }
    }
```

(c) Opening

step:

1.erosion
2.dilation

$$B \circ K = (B \ominus K) \oplus K$$

(d) Closing

step:

1.dilation
2.erosion

$$B \bullet K = (B \oplus K) \ominus K$$

(e) Hit-and-miss transform

step:

1.make a complement array
2.Use J & K to erosion

```
////kernel
    int J_kernel[3][3]={0,0,0,
                        1,1,0,
                        0,1,0};
    int K_kernel[3][3]={0,1,1,
                        0,0,1,
                        0,0,0};
```

$$A \otimes (J, K) = (A \ominus J) \cap (A^c \ominus K)$$

result image:

(a)Dilation

(b)Erosion

(c)Opening

(d)Closing

(e)hit & miss