Computer Vision HW10

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1. Principle Code and Algorithm

Part 1： Function for mask (3X3)

```
def mask_3 (img , mask ,threshold):
    ret_img = np.zeros((512,512,3),dtype='uint8')
    mat     = np.zeros((512,512))
    img_len  = len(img)
    for i in range (1,img_len-1):
        for j in range (1,img_len-1):
            a=0
            for ii in range (i-1,i+2):
                b=0
                for jj in range (j-1,j+2):
                    mat[i][j]+=mask[a][b]*img[ii][jj][0]
                    b+=1
                a+=1
    for i in range (img_len):
        for j in range (img_len):
            if ( i<1 or j<1 or i>=img_len-1 or j>=img_len-1 ) :
                ret_img[i][j] = (255,255,255)
            else :
                t = mat[i][j]
                if ( abs(t)<=threshold ) :
                    ret_img[i][j] = (255,255,255)
                    continue
                find = 0
                for ii in range (i-1,i+2):
                    if(find ==1 ):
                        break
                    for jj in range (j-1,j+2):
                        if(find ==1 ):
                            break

                            n = mat[ii][jj]
                            if ( (t>threshold  and  n<-threshold) ) :
                                find=1
                                ret_img[i][j] = (0,0,0)
                            else:
                                ret_img[i][j] = (255,255,255)
    return ret_img
```

Part 2 : function for (5x5)

Change all 1 to 5 and 2 to 6

Part3 : Mask :

Laplace Mask1

```
mask1 = [[0, 1, 0],
         [1, -4, 1],
         [0, 1, 0]]
```

Laplace Mask

```
mask2 = [[1, 1, 1],
         [1, -8, 1],
         [1, 1, 1]]
```

Minimum variance Laplacian

```
min_mask = [[2, -1, 2],
            [-1, -4, -1],
            [2, -1, 2]]
```

Laplace of Gaussian

```
gaussian_mask = [
        [0, 0, 0, -1, -1, -2, -1, -1, 0, 0, 0],
        [0, 0, -2, -4, -8, -9, -8, -4, -2, 0, 0],
        [0, -2, -7, -15, -22, -23, -22, -15, -7, -2, 0],
        [-1, -4, -15, -24, -14, -1, -14, -24, -15, -4, -1],
        [-1, -8, -22, -14, 52, 103, 52, -14, -22, -8, -1],
        [-2, -9, -23, -1, 103, 178, 103, -1, -23, -9, -2],
        [-1, -8, -22, -14, 52, 103, 52, -14, -22, -8, -1],
        [-1, -4, -15, -24, -14, -1, -14, -24, -15, -4, -1],
        [0, -2, -7, -15, -22, -23, -22, -15, -7, -2, 0],
        [0, 0, -2, -4, -8, -9, -8, -4, -2, 0, 0],
        [0, 0, 0, -1, -1, -2, -1, -1, 0, 0, 0]
    ]
```

Difference of Gaussian

```
dog_mask = [
        [-1, -3, -4, -6, -7, -8, -7, -6, -4, -3, -1],
        [-3, -5, -8, -11, -13, -13, -13, -11, -8, -5, -3],
        [-4, -8, -12, -16, -17, -17, -17, -16, -12, -8, -4],
        [-6, -11, -16, -16, 0, 15, 0, -16, -16, -11, -6],
        [-7, -13, -17, 0, 85, 160, 85, 0, -17, -13, -7],
        [-8, -13, -17, 15, 160, 283, 160, 15, -17, -13, -8],
        [-7, -13, -17, 0, 85, 160, 85, 0, -17, -13, -7],
        [-6, -11, -16, -16, 0, 15, 0, -16, -16, -11, -6],
        [-4, -8, -12, -16, -17, -17, -17, -16, -12, -8, -4],
        [-3, -5, -8, -11, -13, -13, -13, -11, -8, -5, -3],
        [-1, -3, -4, -6, -7, -8, -7, -6, -4, -3, -1]
    ]
```

Part 4 : Main

The threshold use :

Laplace Mask1 (0, 1, 0, 1, -4, 1, 0, 1, 0): 15

Laplace Mask2 (1, 1, 1, 1, -8, 1, 1, 1, 1): 15

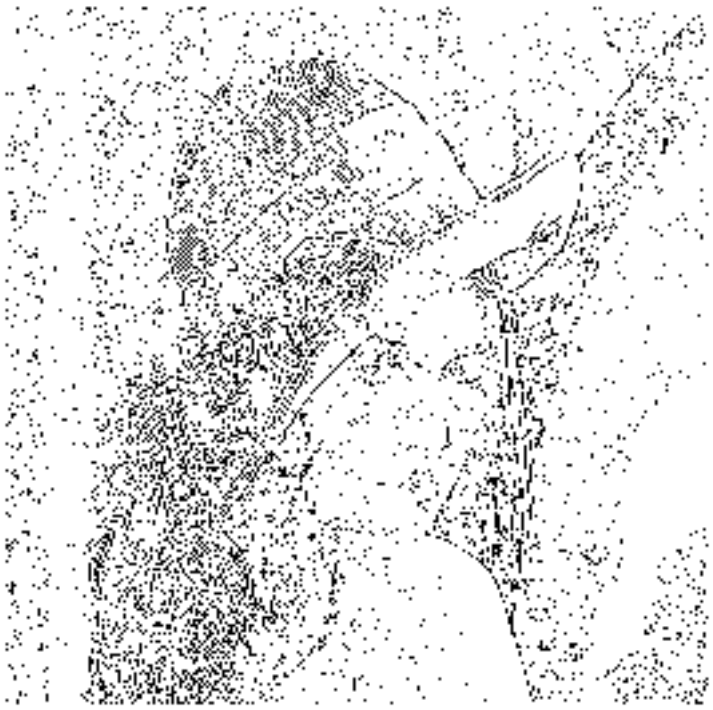
Minimum variance Laplacian: 20

Laplace of Gaussian: 7000

Difference of Gaussian: 1

2. Result

Laplace Mask1



Laplace Mask2

Minimum variance Laplacian

Laplace of Gaussian

Difference of Gaussian