Computer Vision_HW10

- Command Line

  python main.py Laplace1

  python main.py Laplace2

  python main.py Minimum

  python main.py Gaussian

  python main.py DoG

- Threshold

  Enter Threshold: (*choose any threshold you want*)

- Two Main Function

  1. 計算 Kernel 的結果

```python
def Magnitude(pixel, mask, alpha):
    sizeY = len(mask)
    sizeX = len(mask[0])
    result = 0

    for y in range(sizeY):
        for x in range(sizeX):
            result += pixel[y][x] * mask[y][x]

    result *= alpha

    return result
```

  2. 比較該點與周遭是否有 zero-crossing

```python
def CheckNeighbors(label, size):
    img_new = np.full(label.shape, 255, np.int)
    rawSize = label.shape[0]
    half = size[0]//2

    for y in range(label.shape[0]):
        for x in range(label.shape[1]):
            img_new[y][x] = 255
            #check neighbors
            if label[y][x] == 1:
                for row in range(-half,half+1):
                    for col in range(-half,half+1):
                        if y+row >= 0 and y+row <= rawSize-1 and x+col >= 0 and x+col <= rawSize-1:
                            if label[y+row][x+col] == -1:
                                img_new[y][x] = 0

    return img_new
```

- Different Masks

  1. Laplace Mask1

```python
mask = [[0,1,0],[1,-4,1],[0,1,0]]
```

2. Laplace Mask2

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

3. Minimum variance Laplacian

```
mask = [[2,-1,2],[-1,-4,-1],[2,-1,2]]
```
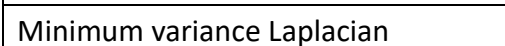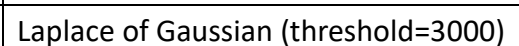
4. Laplace of Gaussian

```
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]]
```
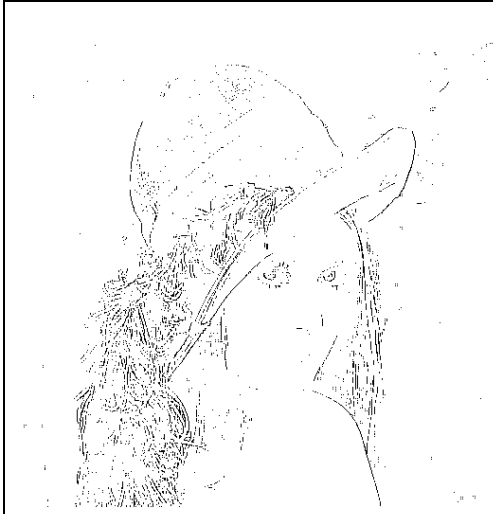
5. Difference of Gaussian

```
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]]
```

- Results

Laplace Mask1(threshold=15)	Laplace Mask2(threshold=15)
Minimum variance Laplacian	Laplace of Gaussian (threshold=3000)

(threshold=20)	
Difference of Gaussian(threshold=1)	