tags: 影像處理

Image Processing Homework 4

408410027 Lu,Tsung-Che

January 7, 2021

Data due : January 7, 2021

Data handed in : January 5, 2021

1 Technical description

Sobel

1. 先padding 邊界補0 轉uint16
2. 根據課本上的sobel mask

Sobel

Sobel

matlab code

```matlab
for i = 2:(x+1)
    for j= 2:(y+1)
        gx(i-1,j-1) = (Image(i+1,j-1) + 2*Image(i+1,j) + Image(i+1,j+1)) - ...
            (Image(i-1,j-1) + 2*Image(i-1,j) + Image(i+1,j-1));
        gy(i-1,j-1) = (Image(i-1,j+1) + 2*Image(i,j+1) + Image(i+1,j+1)) - ...
            (Image(i+1,j-1) + 2*Image(i,j-1) + Image(i+1,j-1));
        gxy(i-1,j-1) = (Image(i-1,j) + 2*Image(i-1,j+1) + Image(i+1,j)) - ...
            (Image(i,j-1) + 2*Image(i+1,j-1) + Image(i+1,j));
        gyx(i-1,j-1) = (Image(i-1,j) + 2*Image(i-1,j-1) + Image(i,j-1)) - ...
            (Image(i+1,j) + 2*Image(i+1,j+1) + Image(i,j+1));
        result(i-1,j-1) = gx(i-1,j-1) + gy(i-1,j-1) + gxy(i-1,j-1) + gyx(i-1,j-1);
    end
end
```
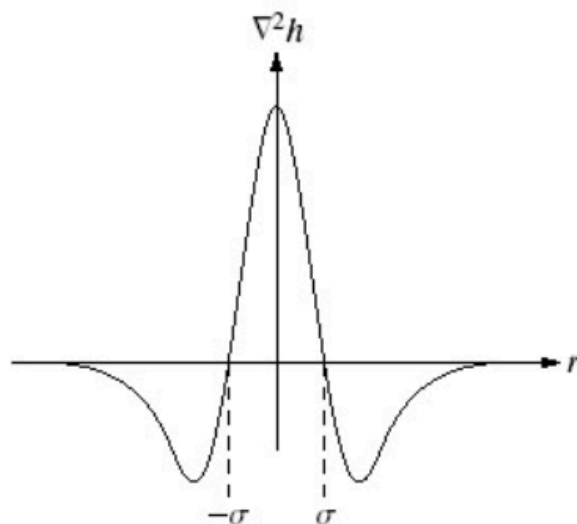
3. 最後/4轉回uint8

```matlab
result = uint8(result/4);
```

Laplacian of a Gaussian (LoG) operators.

1. 先padding 邊界補0 轉uint16
2. 根據簡報所寫的LoG mask

0	0	−1	0	0
0	−1	−2	−1	0
−1	−2	16	−2	−1
0	−1	−2	−1	0
0	0	−1	0	0

matlab code

```matlab
for i = 3:(x)
    for j= 3:(y)
        result(i-2,j-2) = 16 * Image(i,j) ...
            - 2 * (Image(i+1,j) + Image(i-1,j) + Image(i,j-1) + Image(i,j+1)) ...
            - (Image(i+1,j+1) + Image(i+1,j-1) + Image(i-1,j+1) + Image(i-1,j-1)) ...
            - (Image(i+2,j) + Image(i-2,j) + Image(i,j+2) + Image(i,j-2));
    end
end
```

3. 轉回uint8

2 Experimental results

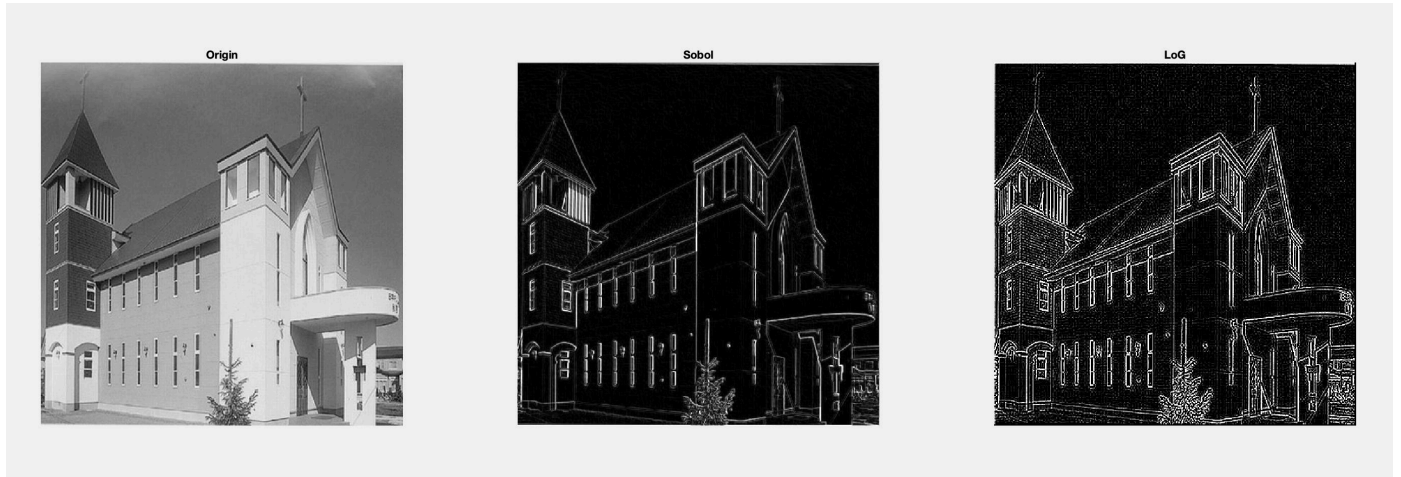左中右分別是 原圖 sobol LoG
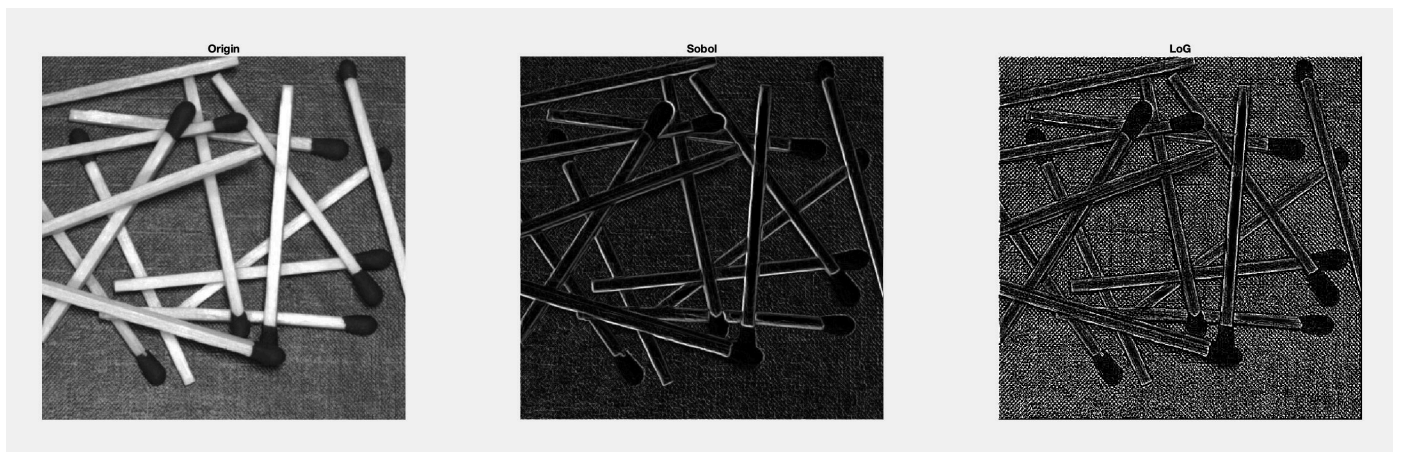
Image1

Image2

Image3

| Origin | Sobol | LoG |

3 Discussions

Sobol的效果不錯，畫面相較LoG比起來更佳的乾淨，在Image2特別的明顯．

在Image1中LoG有著更多的細節，但是有些許的噪點，Sobol則是比較乾淨．

在Image3的部分，兩種方法都有著不錯的效果，LoG的噪點不明顯且細節更多，Sobol則是有更乾淨的影像．

4 References and Appendix

powerpoint on ecourse2