

Assignment

Implement 2 Laplacian Mask, Minimum Variance Laplacian, Laplacian of Gaussian, and Difference of Gaussian(inhibitory sigma=1, excitatory sigma=3, kernel size 11x11).

Please list the kernels and the thresholds (for zero crossing) you used.

Threshold Values listed below are for reference:

(僅供參考，同學可自己找出 Edge Image 品質最佳的門檻值 threshold value)

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: 3000

Difference of Gaussian: 1

Introduction

B06507002_HW10_ver1.zip contains

1. HW10_B06507002.pdf
2. HW10_B06507002.py

where 1. is the report and 2. is my source code.

One can reproduce this assignment by putting "lena.bmp" and "HW10_B06507002.py" in the same folder and running "HW10_B06507002.py". Then 5 images "Lap1.bmp", "Lap2.bmp", "Lap_min.bmp", "LoG.bmp", "DoG.bmp" will be dumped.

Original Lena



Original Lena

Result

I define t =threshold in the below description.



Laplacian Mask type1 $t=15$



Laplacian Mask type2 $t=15$



Minimum Variance Laplacian $t=20$



Laplacian of Gaussian $t=3000$



Difference of Gaussian $t=1$

Kernels:

Laplacian Mask type1

$$\begin{bmatrix} 1 & -4 & 1 \\ 1 & -4 & 1 \end{bmatrix}$$

Laplacian Mask type2

$$\begin{bmatrix} 1 & 1 & 1 \\ 1 & -8 & 1 \\ 1 & 1 & 1 \end{bmatrix} \times \frac{1}{3}$$

Minimum Variance Laplacian

$$\begin{bmatrix} 2 & -1 & 2 \\ -1 & -4 & -1 \\ 2 & -1 & 2 \end{bmatrix} \times \frac{1}{3}$$

Laplacian of Gaussian

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

-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