Universidad Peruana de Ciencias Aplicadas
Escuela de Ingeniería de Sistemas y Computación
Carrera de Ciencias de la Computación

CC235 Procesamiento de Imágenes

Filtro (espacial) de imágenes: Parte II

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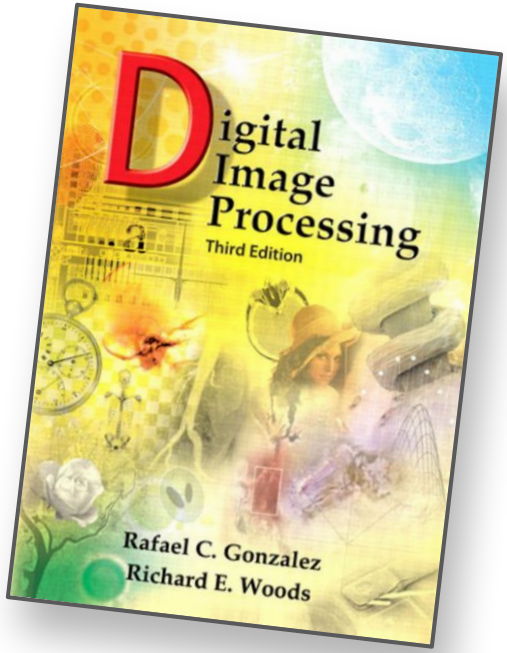
Agenda

- Filtros
- Convolución
- Filtro de la media

Nota

- Esta sesión está basada en el libro “Digital Image Processing” 3ra edición de Rafael C. González y Richard E. Woods. En especial el capítulo **3**



Correlation vs Convolution

$$F \circ I(x,y) = \sum_{j=-N}^{N} \sum_{i=-N}^{N} F(i,j) I(x+i, y+j)$$

$$F * I(x,y) = \sum_{j=-N}^{N} \sum_{i=-N}^{N} F(i,j) I(x-i, y-j)$$

https://towardsdatascience.com/convolution-vs-correlation-af868b6b4fb5

Detección de bordes

-1	-1	-1
0	0	0
1	1	1

-1	0	1
-1	0	1
-1	0	1

(a) Prewitt

-1	-2	-1
0	0	0
1	2	1

-1	0	1
-2	0	2
-1	0	1

(b) Sobel

Figure 1: Horizontal (left) and vertical (right) gradients of Prewitt and Sobel filter.

https://hinumduman.home.blog/2018/12/16/edge-detection/

Detección de bordes

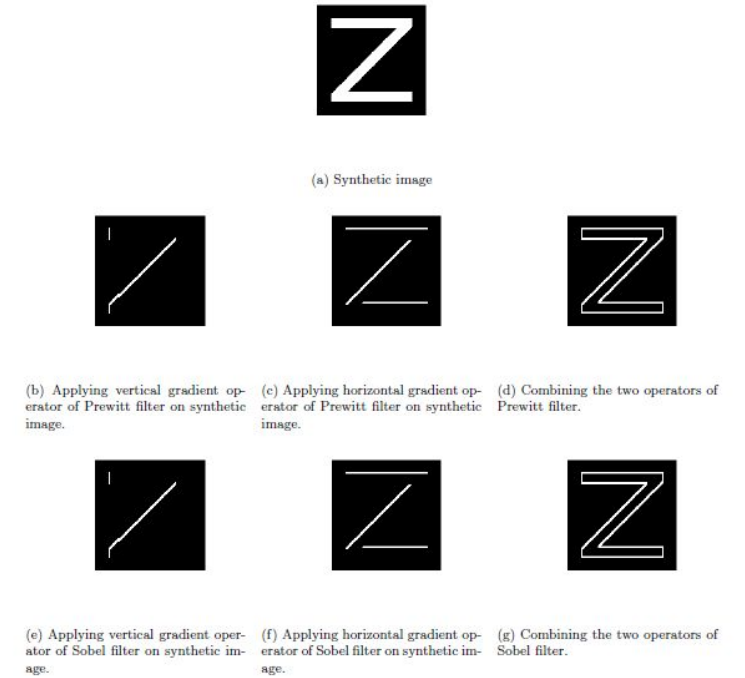
-1	-1	0
-1	0	1
0	1	1

-1	-2	0
-2	0	2
0	2	1

Figure 2: Two filters, filter 1 and filter 2 , designed for detecting diagonal edges.

https://hinumduman.home.blog/2018/12/16/edge-detection/

Detección de bordes



(a) Synthetic image

(b) Applying vertical gradient operator of Prewitt filter on synthetic image.

(c) Applying horizontal gradient operator of Prewitt filter on synthetic image.

(d) Combining the two operators of Prewitt filter.

(e) Applying vertical gradient operator of Sobel filter on synthetic image.

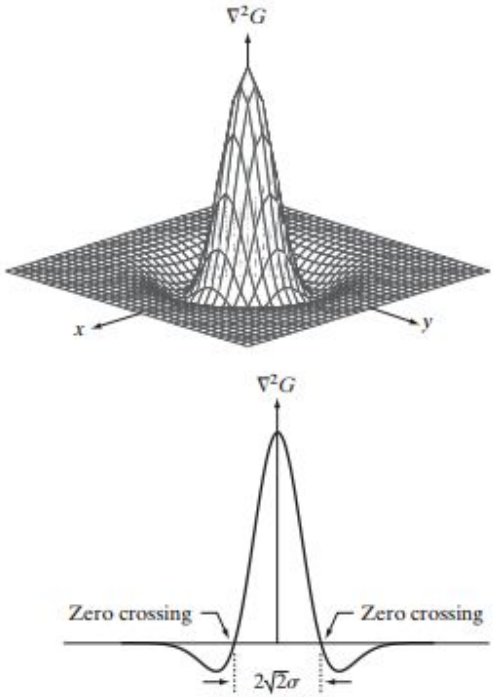
(f) Applying horizontal gradient operator of Sobel filter on synthetic image.

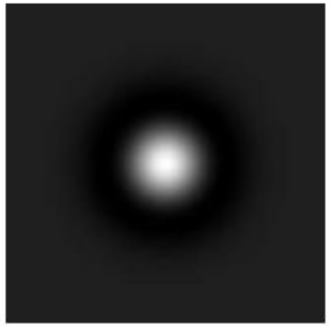
(g) Combining the two operators of Sobel filter.

Figure 4: Effect of applying horizontal and vertical components of Prewitt and Sobel filters on a synthetic image

https://hinumduman.home.blog/2018/12/16/edge-detection/

Laplacian of a Gaussian





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

a b
c d

FIGURE 10.21
(a) Three-dimensional plot of the *negative* of the LoG. (b) Negative of the LoG displayed as an image. (c) Cross section of (a) showing zero crossings. (d) 5 × 5 mask approximation to the shape in (a). The negative of this mask would be used in practice.

Filtro de la Mediana

25	151	84	34	62	132
1	224	71	188	178	71
71	153	120	111	238	184
65	61	14	15	26	226
58	144	72	41	94	191
152	66	153	184	18	225

https://upload.wikimedia.org/wikipedia/commons/thumb/a/ae/Median_filter_2D.gif/551px-Median_filter_2D.gif