Filters

Prewitt Filter

$$\begin{bmatrix} -1 & 0 & 1 \\ -1 & 0 & 1 \\ -1 & 0 & 1 \end{bmatrix}$$ → Vertical edges

Convolving Prewitt will give you:

$$\nabla I = \frac{\nabla I}{\partial x} + \frac{\nabla I}{\partial y}$$

↑ horizontal change   ↑ vertical change

$$\begin{bmatrix} -1 & -1 & -1 \\ 0 & 0 & 0 \\ 1 & 1 & 1 \end{bmatrix}$$ → Horizontal edges

Sobel Filter

$$\begin{bmatrix} +1 & 0 & -1 \\ +2 & 0 & -2 \\ +1 & 0 & -1 \end{bmatrix}$$
$$\begin{bmatrix} +1 & +2 & +1 \\ 0 & 0 & 0 \\ -1 & -2 & -1 \end{bmatrix}$$

Used in edge detection

Smoothing

We can do ⟶ $$\begin{bmatrix} 1 & 1 & 1 \\ 1 & 1 & 1 \\ 1 & 1 & 1 \end{bmatrix}/9$$ which is brute force

Better solution ⟶

Gaussian Smoothing

$$\begin{bmatrix} 8 & 9 & 8 \\ 9 & 10 & 9 \\ 8 & 9 & 8 \end{bmatrix}$$

closer ones should be smoothed less

$$G(i,j) = \frac{1}{2\pi\sigma^2} e^{\frac{-(i^2+j^2)}{2\sigma^2}}$$