Example in Convolution

The Sobel operator is a 3×3 filter of one of the forms below. The one to the left is the vertical mask, the one to the right is the horizontal mask.

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

Here is the result. The original image is given first, followed by the result of applying the vertical mask, then the horizontal mask: