$$f'(x) = \lim_{\Delta x \to 0} \frac{f(x + \Delta x) - f(x)}{\Delta x}$$

$$f'(x) = \lim_{\Delta x \to 0} \frac{f(x + \Delta x) - f(x - \Delta x)}{2\Delta x}$$

if $\Delta x = 1$, the weight vector (filter) will be: [-1,0,+1]

$$2f'(x) \approx -1 \times f(x - 1) + 0 * f(x) + 1 \times f(x + 1)$$

One of the edge detection operators is Prewitt filter:

-1	0	$+1$
-1	0	$+1$
-1	0	$+1$