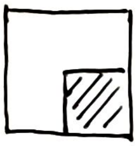
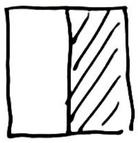
- Scharr operator $D_x^H = \frac{1}{32}\begin{vmatrix} 3 & 10 & 3 \\ 0 & 0 & 0 \\ -3 & -10 & -3 \end{vmatrix}$ $D_y^H = \frac{1}{32}\begin{vmatrix} 3 & 0 & -3 \\ 10 & 0 & -10 \\ 3 & 0 & -3 \end{vmatrix}$
- Sobel operator $D_x^S = \frac{1}{8}\begin{vmatrix} 1 & 2 & 1 \\ 0 & 0 & 0 \\ -1 & -2 & -1 \end{vmatrix}$ $D_y^S = \frac{1}{8}\begin{vmatrix} 1 & 0 & -1 \\ 2 & 0 & -2 \\ 1 & 0 & -1 \end{vmatrix}$

We use convolution to apply scharr and Sobel operators.



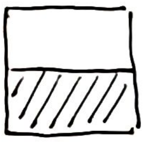
$M = \begin{vmatrix} C_x & 0 \\ 0 & C_y \end{vmatrix}$ $C_x > 1$, $0 \sim 0$. $C_y > 1$.

Corner.



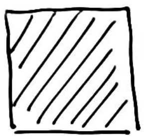
$M = \begin{vmatrix} 0 & 0 \\ 0 & C_y \end{vmatrix}$

Edge.



$M = \begin{vmatrix} C_x & 0 \\ 0 & 0 \end{vmatrix}$

Edge.



$M = \begin{vmatrix} 0 & 0 \\ 0 & 0 \end{vmatrix}$

Blank or filled. (Flat).

- Harris corner.

$$R = \det(M) - K(\mathrm{trace}(M))^2 = \lambda_1\lambda_2 - K(\lambda_1+\lambda_2)^2$$

K is a constant between $K \in [0.04$ and $0.06]$.

① If $|R| \sim 0 \rightarrow \lambda_1 \sim 0$ and $\lambda_2 \sim 0$: Flat.

② If $R < 0 \rightarrow \lambda_1 > \lambda_2$ or $\lambda_2 > \lambda_1$: Edge.

③ If $R > 0 \rightarrow (\lambda_1 \sim \lambda_2) > 0$: Corner.