

For an image I ,

$$X = \frac{\partial I}{\partial x} \quad Y = \frac{\partial I}{\partial y}$$

Let $w = \text{Gaussian}(\sigma)$

$$A = X^2 \otimes w$$

$$B = Y^2 \otimes w$$

$$C = (XY) \otimes w$$

such that a matrix $M = \begin{bmatrix} A & C \\ C & B \end{bmatrix}$

we define response function

$$R = \text{Det}(M) - k \text{Tr}^2(M)$$

where k is a parameter we can manipulate.

Then find the points which are local maxima in function R .

The corresponding points in the image are our interest points.