Sobel Filter

GNR-607 Course Project

THEORY

- Apply sobel mask for x-direction
- Apply sobel mask for y-direction
- Let **A** be the source image
- Consider $\mathbf{G_x}$ and $\mathbf{G_y}$ are two images, each point contain the horizontal & vertical derivative approximations respectively

Computation

$$\mathbf{G}_x = \begin{bmatrix} -1 & 0 & +1 \\ -2 & 0 & +2 \\ -1 & 0 & +1 \end{bmatrix} * \mathbf{A} \quad \text{and} \quad \mathbf{G}_y = \begin{bmatrix} -1 & -2 & -1 \\ 0 & 0 & 0 \\ +1 & +2 & +1 \end{bmatrix} * \mathbf{A}$$

where $*$denotes the 2-dimensional signal processing convolution operation
The matrix used in G_x is sobel operator for x-axis
The matrix used in G_y is sobel operator for y-axis

Computation

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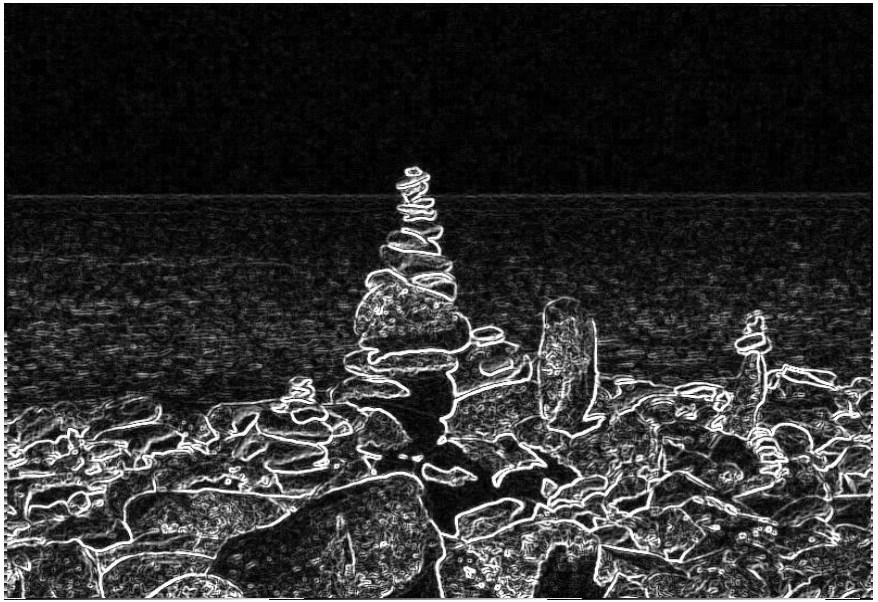
At each point in the image, the resulting gradient approximations can be combined to give the gradient magnitude, using:

$$G^2 = G_x^{\,2} + G_y^{\,2}$$

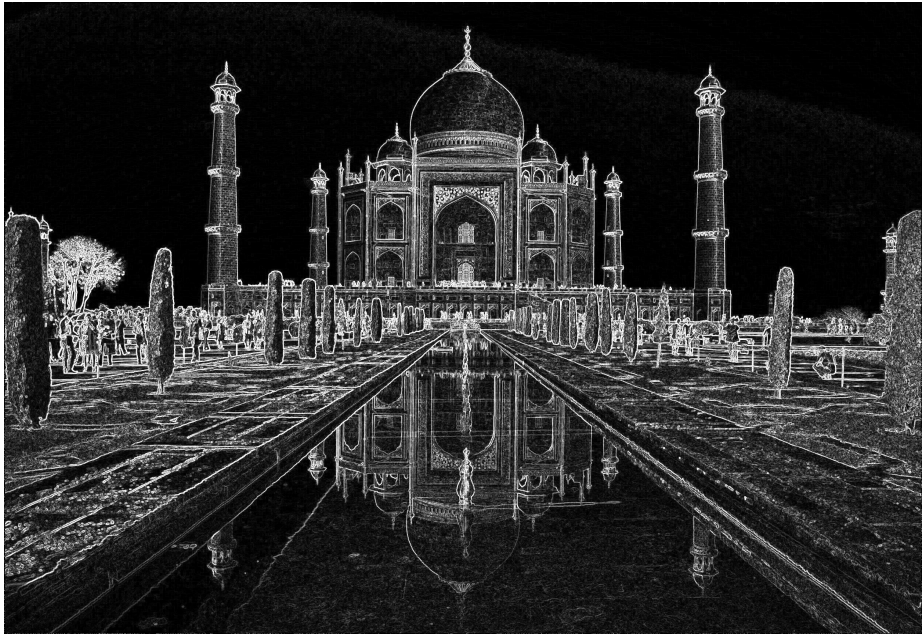
Finally we display the magnitude **G** as the final output.

We can also apply a threshold while displaying the image

Sample Output



Sample Output

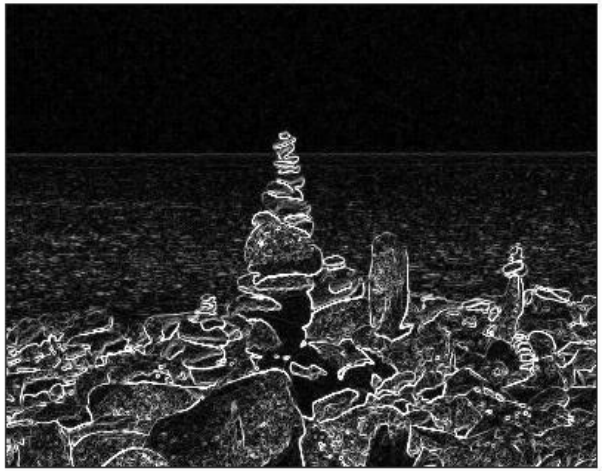


GUI Interface

Threshold 123.3019 Select Image

Input Image

Intensity Gradient



Edge Detected Image