Programming Assignment-I

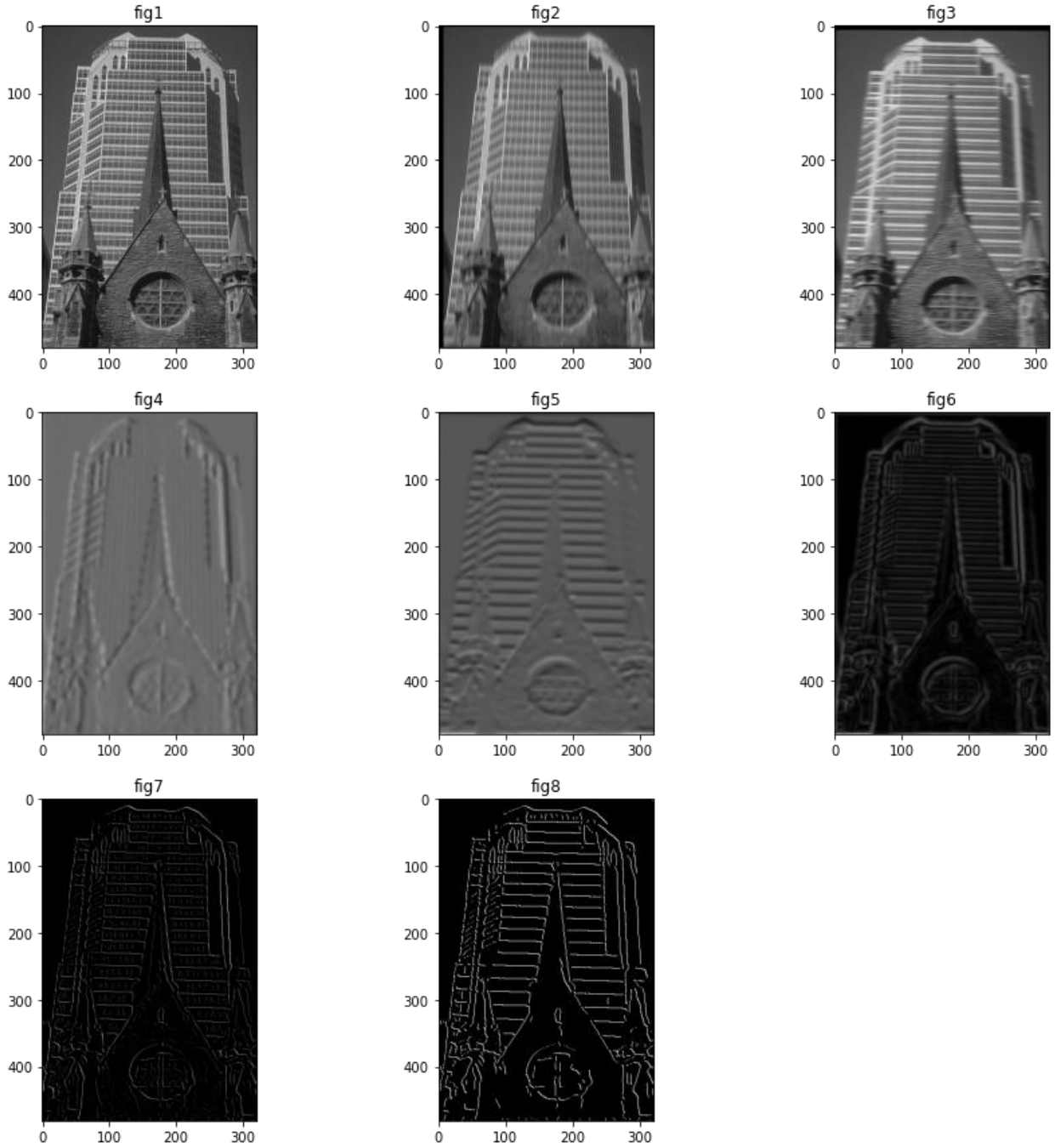
Computer Vision

Implementation

- Created a function for gaussian blur by creating a gaussian kernel of size 15x15.
- Convolution function with zero padding implemented with the images. Image is converted to grayscale if it has 3 channels.
- Gaussian blur takes place over the image matrix. The image's X component of the convolution with gaussian is in fig 2 and the Y component in fig 3.
- Output of gaussian blur is used and first derivative of gaussian is obtained and the formula

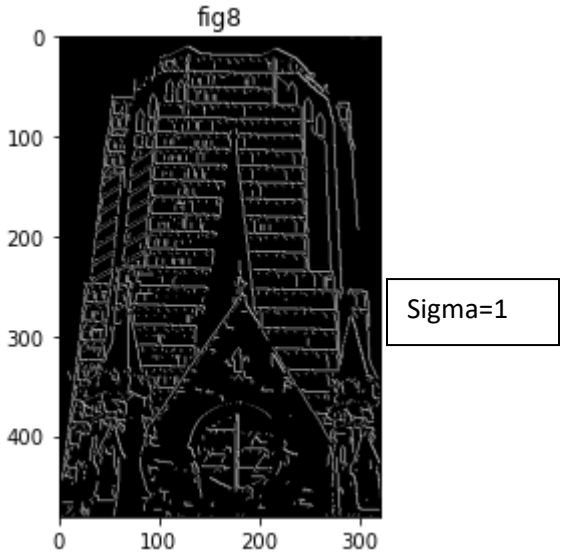
  $\frac{-x}{\sqrt{2\pi\sigma^3}} e^{-x^2/(2\sigma^2)}$ is used abd X(I'x) and Y(I'y) directions are created to and convoluted with X component and Y component of the image respectively to give fig 4 and fig 5.
- Gradient Magnitude is calculated using the formula M(x,y) = sqrt(I'x(x,y)^2 + I'y(x,y)^2).The gradient orientation is also calculated by using the formula theta = arctan(Iy1/ Ix1) .The output of the magnitude is shown in fig 6.
- Non maximum suppression(fig7) and then hysteresis thresholding is applied and final map is obtained in

fig 8.

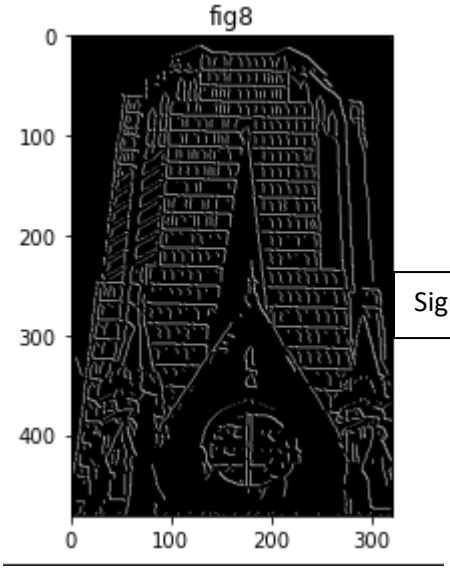


Analysis and Result

- Multiple different values for sigma were tested namely 1,2 and 3.
- In the case of this particular image the sigma value of 2 has the best output.



Sigma=1



Sigma=2

Sigma=3