# CS 116 Project 4 Object Detection Report

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**Figure 1**. Original sample testing mygradient.m (lena512.pgm)

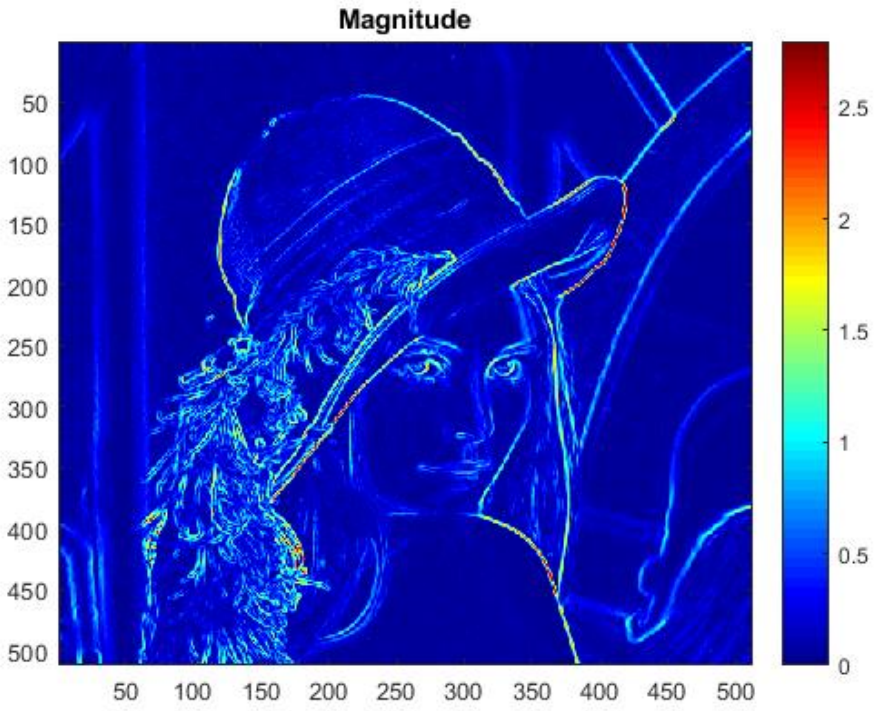


**Figure 2(a)**. Magnitude generated from `mygradient.m`

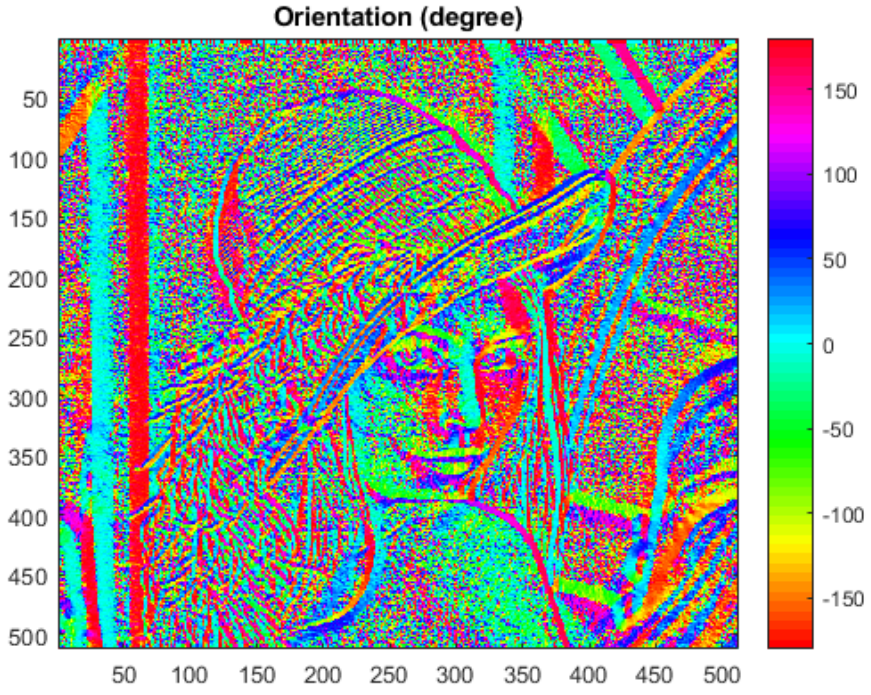


**Figure 2(b).** Orientation in degree generated from `mygradient.m`

## Testing detection code – Part I

**Figure 3**. Original image for testing detection (part I)

**Figure 3(a)**. Positive training sample selected

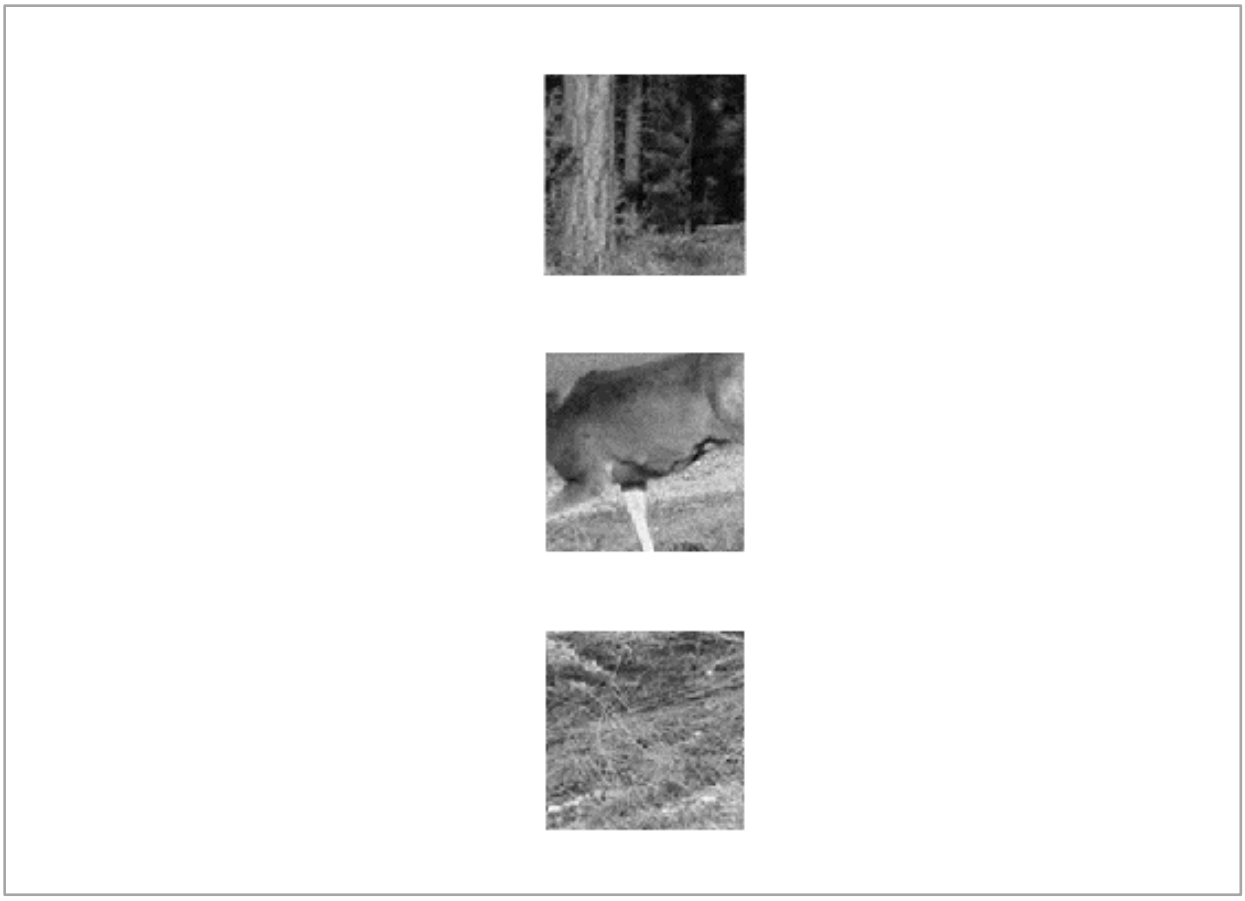

**Figure 3(b).** Negative training sample selected – wood, deer, grass

**Figure 3(c)**. Detection result using similar photo

## Testing detection code – Part II

**Figure 4**. Original image – photo of former US president Obama (Part II)

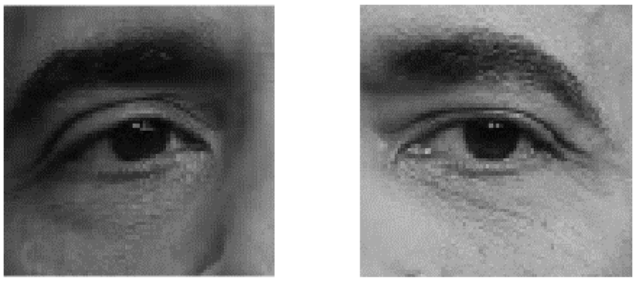

**Figure 4(a)**. Positive training sample selected – eyes

**Figure 4(b).** Negative training sample selected – nose, ear, tie

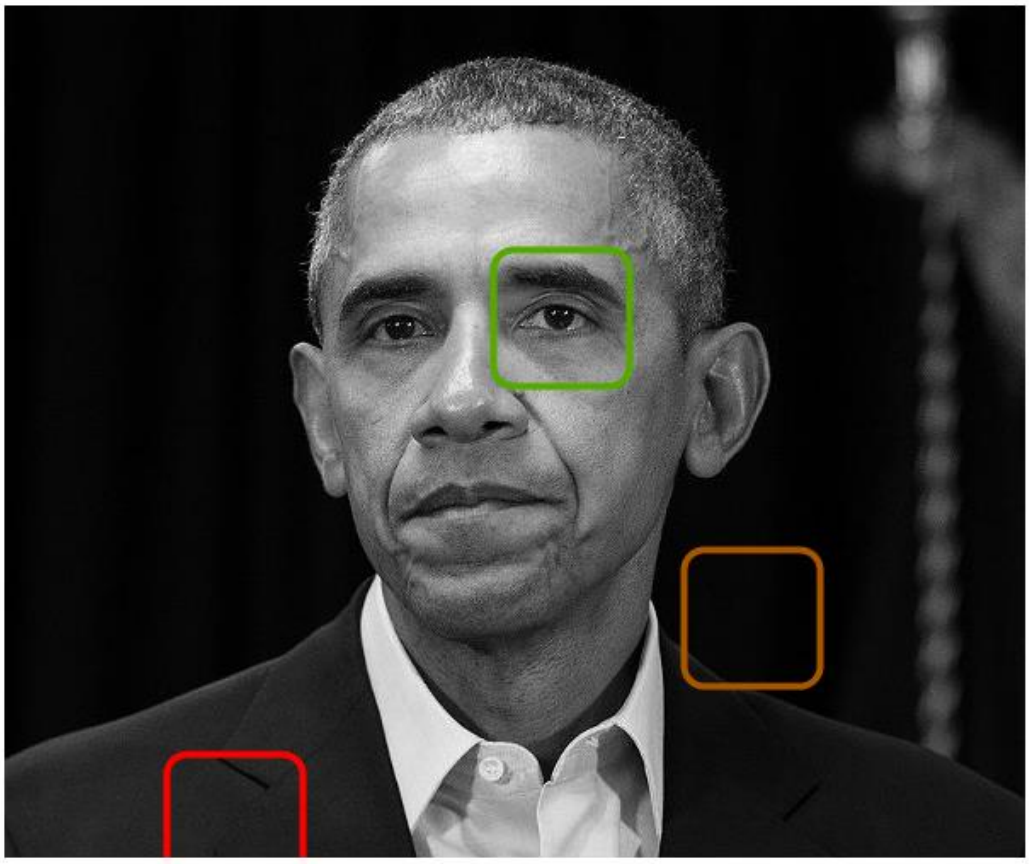

**Figure 4(c).** Detection result using similar photo – fair accuracy

## Testing detection code – Part III


**Figure 5**. Original image of a stop sign on a street corner (Part III)

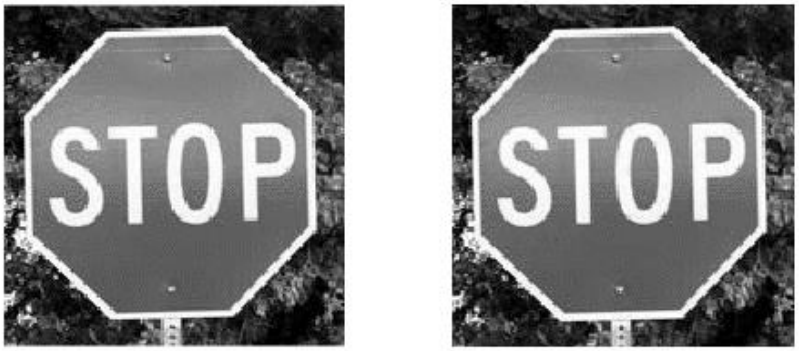


**Figure 5(a).** Positive training sample selected – close-up of sign

**Figure 5(b)**. Negative training sample selected

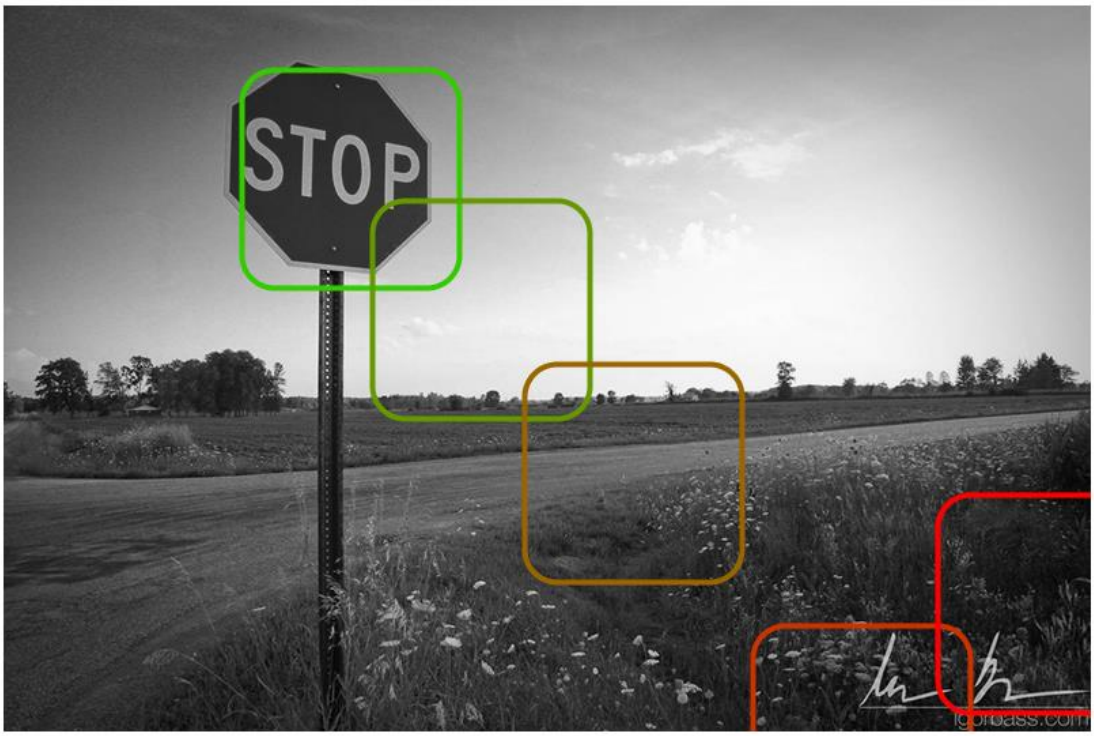


**Figure 5(b)**. Detection result using similar photo – high accuracy

## Conclusion

Concluding from the above samples and other experiments with our detection code, the model performed well with the training data selected. As shown above, the detection successfully detected and shown the best candidates as our expected outcome.

However, through further experimentations, we found that the detection worked poorly when objects have complex structures or definitions. For example, the detection failed with images of people with different facing or facial expressions. While there could possibly be coding defects, the underperformance was primarily due to i) the limited size and ii) the limited variation of our training data. Thus, we need to allow onloading more training images. Furthermore, for images with low resolutions, it has been found that they negatively affected our detection accuracy.