CSCI 5561
Section 1

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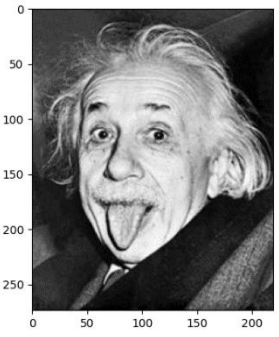
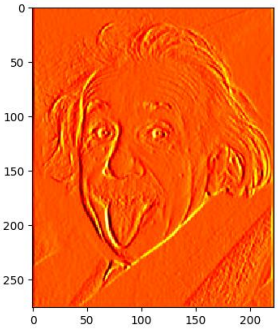
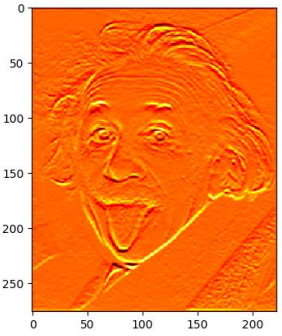
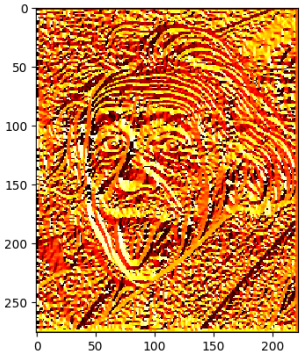
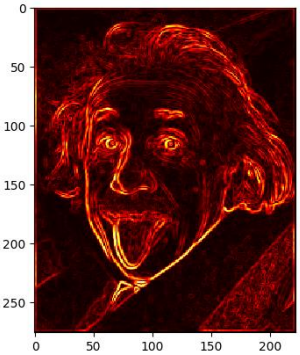
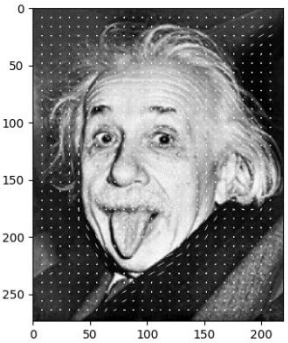
# CSCI 5561: Assignment #1 – Summary

**Part 1:** Histogram of Oriented Gradients (HOG):

In this assignment, I implemented a variant of HOG for the object detection. Given an input image, I first filtered it with Sobel filter in x and y directions:

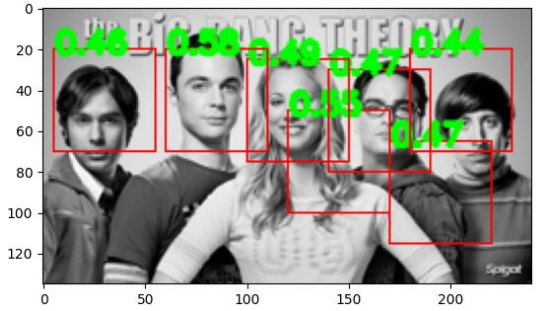




After that, I calculated the angle and magnitude of each pixel. Then, I calculated the histogram of gradients with a given cell size and normalized it within a given block size. Repeating this operation across the image, I successfully used normalized HOGS to visualize the edges.

**Part 2:** Face Detection:

Using the HOG descriptor, I designed a face detection algorithm. Using the first image as a template, I was able to apply its HOG descriptor to different parts of the target to detect the faces.


The face detector works by comparing the HOG descriptors of different parts of the target image to the template image. To have the face detector that finds similarities between the target and the template in a reasonable amount of time, I moved through the target 5 pixels at a time. In addition to that, I used thresholding and non-maximum suppression to get rid of false positives and overlapping boxes. As a result, I was able to detect all the faces.