The project I chose was 2-1: Evaluation of bump or hole.

In this project, I was presented with 2 tasks:

1. Design a software that will allow the user to specify images of a braille “document”, and identify which are the raised and perforated points of the document
2. Write code to automatically calculate the confusion matrix to evaluate the accuracy of the software. I did not fully understand this part and was unable to request help as this was a final examination.

For the first part, I started off with analyzing the sample images provided by the professor. At first read of the document, I did not fully understand the problem as there was very scarce detail provided, but it did give us a lot of room to manuever. I printed out the pictures and analyzed them for similarties or consistencies across the images. I noticed that all the bumps had a “flatter/wider” shadow and the holes were smaller and almost a perfect circle. I decided to use this as the focal point of my plan of attack. I started off by blurring the greyscale image to reduce the noise, then running it through a threshold generator to get a binary image as this will be easier on the edge detection that I employed soon after. After each step I used cv::imshow to print the image to see how I was progressing. After using Canny edge detection, I used the findContours function to find the contours in the binary images. This is when I could really see the difference between the holes and bumps in the braille document. The findContours function also offered the bonus: drawContours, which made it very easy to draw the contours to the image later on. I had to convert each contour to a rectangle to calculate the area and add it to a vector to find the “splitting point” between hole area and bump area. Once this was done, I simply evaluated the list of contours to see which one was a bump and which one was a hole to finalize the solution. In conclusion, I would say that this is a very “casual” solution, as it entirely depends on the terrible picture quality and shadows to evaluate if it is a bump or a hole.