CSCE 485
Bruno Lopes
LAB#5 - Lab Proposal and Exploratory Coding

Part1:

In order to provide a method to object detection and possible recognition I based my topic of interest and research on Sobel for edge finding on transformed images. My goal is to distinguish and classify the hand element on an image using a top-down approach and if possible be able to count how many finger are shown.

The reason why I chose Sobel was due to its simplicity and overall good results. Due to its low computational cost and efficiency this basic edge finding algorithm allows us to perform alpha numeric character recognition on controlled environments with good results, but how about using it for gesture recognition? I would like to explore this possibility by having a live feed detection seeking hand feature detection and recognition on a controlled environment.I plan to use the application to perform a simple hand gesture recognition that detects a hand, and its position and orientation.

Part2:

OPTIMAL:
The quantity of fingers displayed, the identification of different arrangements of the human hand, from different scales and orientation, for both left and right hand. I plan to have the detection/recognition constantly done on a live video capture, I would like to display a percentage error estimative on the screen along with the captured feature points.

TARGET:
The design and build of a custom threshold counter for Sobel transformed images or video capture that detect and identify a hand object and if it is open or closed. Initially I plan to convert the image to grayscale then have a customized threshold built so it is capable of finding lines from feature points on a Sobel transformed image, my ultimate goal would be to have some of this information displayed on the image.

MINIMUM:
The abstraction of background and a clear Sobel transform convolution done on a hand. I believe that my biggest challenge here will be to make the Sobel transformation and background removal work live on a captured video feed. Im planning to use the examples and code used from previous classes and labs, and many office hours.

Part3:

For my design of a proof-of-concept pilot I attempted to merge the Sobel transformation code with the background elimination, but I got stuck on a segmentation error bug that Im currently investigating, the background differentiation will also need some modification to adequate the new implementation. My plan is to use a more top-down OpenCV implementation to approach image/digits manipulation and common transformations so I can focus the algorithm on the detection of lines from the threshold and the mathematical correlation this data carries. For the minimum target on this project I will work with controlled environments like the code output sample below, and I plan to better implement background elimination as the program evolves.