HW-08
Edge Detection
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I. LICENSE PLATE DETECTION

This program takes the name of the file containing a picture of a red car with a license plate 'TOPH3R', as the input. To detect the edges of just this license plate, we first smooth the image using a Gaussian smoothing filter with a radius of 3 and . It is also seen that the license plate is white in color and has a bit of blue shade at the top. Therefore, we use the blue color channel to find the edge. The Canny edge detector is used to detect the edges. The threshold and sigma values were decided depending on the edge detection performed by the Canny edge filter. On increasing or decreasing the values by a significant amount, we observe the the adjacent edges of the car and the sounding tree edges are detected.

Algorithm
1. Read in image using 'imread' function.
2. Create a Gaussian filter using 'fspecial'.
3. Select the blue channel of the image.
4. Smooth the channeled image using the Gaussian filter.
5. Apply Canny edge detector on filtered image.
6. Display the image.

The threshold and sigma values were varied to obtain better results of license plate edge detection. The following results were observed.

Figure 3: Output image with lesser threshold and sigma values
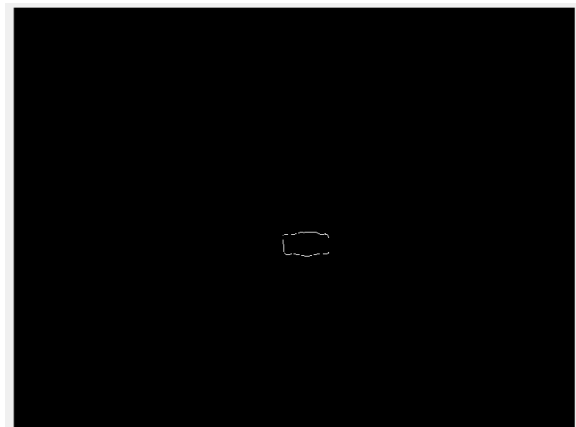

Figure1: Original Image

Figure 2: Output with edges of License Plate

When smaller values of threshold and sigma were used, they detected edges of the surrounding trees and also those of vehicles and objects around. Therefore, the current values were selected to obtain the required results. It is also seen, that the right side edge of the license plate is not detected. This might be due to the light or the angle of the camera when the picture was taken.

II. DROP OFF SIGN DETECTION

This program takes a filename, of one image, containing the image of the "Parent Drop Off" sign. To detect the image, we first read in the image and then convert the grey format from the RGB format. Filter the horizontal and vertical parameters of the image to detect the horizontal and vertical edges of sign board. Compute the Hough transform of the image to detect lines. The peaks in the Hough matrix are detected using the Hough peaks. Hough lines are used to extract line segments in the image, associated with particular bins in a Hough transform. This helps in detecting the edges better. Green lines are used to display the edge lines.

Figure 3: Original Image

Algorithm
1. Read in image using 'imread' function.
2. Convert the image to grey scale.
3. Detect the horizontal and vertical edges using the Sobel Edge Detector.
4. Combine the vertical and horizontal edges.
5. Calculate the Hough transform of the image.

6. Detect the Hough peaks and Hough lines of the matrix calculated using the Hough transform. They help in detecting the edge borders and lines.
7. A loop is used to print these lines that represent the edges detected.
8. Display the image.

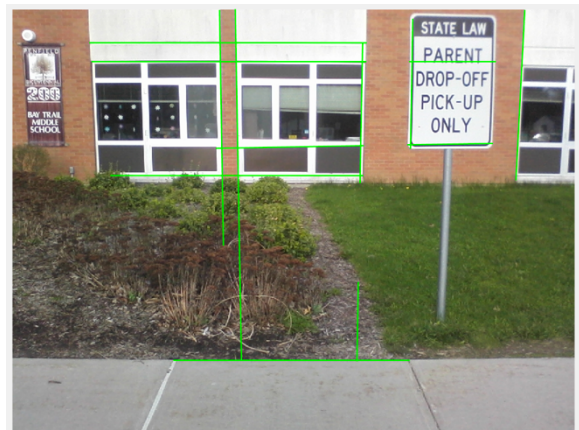Figure 4: Image with smaller 'houghline' parameter values

Figure 5: Output Image with edges detected

The values for the 'FillGap' and the'MinLength' values in houghlines function were decided to eliminate the smaller window pane edges that were being detected. The current values in the program helped to detect all the required edges.

The top and right hand side of the sign board does not get detected as that portion of the image is slightly blurred and the board is also slightly disoriented (slightly tilted on the towards the wall). The top portion also may not have been detected due to it being to close to the upper boundary of the image frame. Another problem observed is that the edge detector

detects other edges along with those of the sign board. Alteration of the parameters of the edge detectors did not help as edges of the sign board were not detected properly on doing so.

III. RESULT

The license plate and the sign board edges were detected using the provided guidelines. Documentation examples of 'hough', 'houghpeaks' and 'houghlines' from MATLAB were used in the code. The results obtained have been included in the above respective sections.