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Self-Driving Car ND

Term 1

Project 1

Title: Finding Lane Lines on the Road

Goals:

There are two major goals of this project. First goals to is come up with a pipeline that finds lane lines on the road for the given test images as well as the two test videos. Finally, reflect on my work in a written report.

1. The Pipeline

My pipeline consists of 5 steps.

- First, I converted the images to grayscale using grayscale() that returns gray
- gaussian_blue() takes the gray as input and returns the blurred image, blur_gray
- blur_gray is then input to the canny() to get edges
- edges input to region_of_interest() to obtain masked_edges
- hough_lines() takes the masked_edges as one of its input and returns line_image the lines are then weighted to have the final image having the red solid lines

1.1. Modifications in the draw_lines()

In order to draw a single line on the left and right lanes, I modified the draw_lines() function. For every line in lines, the average slope and the average intercept values for the left and right lanes are computed. Then cv2.line() is called twice, once for the left lane and once for the right lane.

1.2. Sample Output:

Following is an example of the output of my pipeline for one of the test image

2. Reflection on my Work:

1. Potential shortcomings with my current pipeline

One potential shortcoming would be what would happen when the lanes change drastically. For instance, the lanes will not be straight in a turning vehicle and the straight solid red lines will not work.

Another shortcoming could be when there is an unexpected mark on the roadway in a particular image. For instance in the 2nd video, around 11 sec, there is a horizontal small white line that is encircled in blue in the following image. Or if there is an unattended item lying on the road. In such circumstances the solid red lines should not mark the yellow/while lanes correctly.
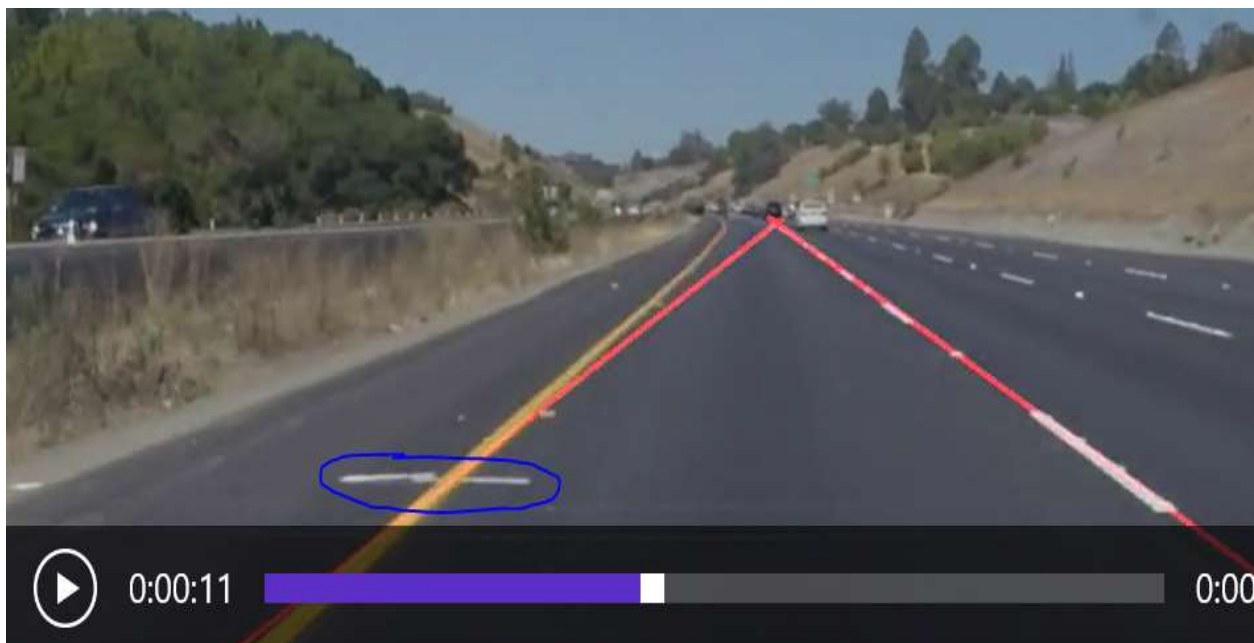
2. Suggestions on possible improvements to my pipeline

A possible improvement would be to draw the line based on the median of the line placements (median of the left and right slopes and b's) in the current and previous 2 or four frames (median of 3 or 5 frames in total). This should remove the occasional flickering of solid lines. However, the lanes in the turns change rapidly and the median values for the 3 or 5 images may not work well in the drawing lines. Hence this median based solution should work while driving straight. While for turning vehicles some other approach should be adopted. For instance, the average value of the current and 2 previous frames' slopes and intercepts should be used for drawing lines in the current image.

Another potential improvement could be to draw the lines adaptively. For instance, the algorithm should be able to detect the turn. Different algorithms in draw_lines() should be employed for straight driving and driving during the turns.