Reflection

1. Describe your pipeline. As part of the description, explain how you modified the draw_lines() function.

My pipeline consisted of 6 steps.

i. Converting the image to grayscale.

ii. Applying a Gaussian blur with a Kernel size of 5, 5 worked well during the Quizes before this project. Also, I did some searches on why it's preferred to take an odd number for the Kernel size eventhough it's not mathematically necessary.

iii. Finding the Canny edges with thresholds of 50 and 150 (keeping the recommended 1:3 ratio). Again, these thresholds worked well during the Quizes.

iv. Applying a trapezoidal region mask to look for Canny edges only around the left and right lanes. Co-ordinates picked up from the test images.

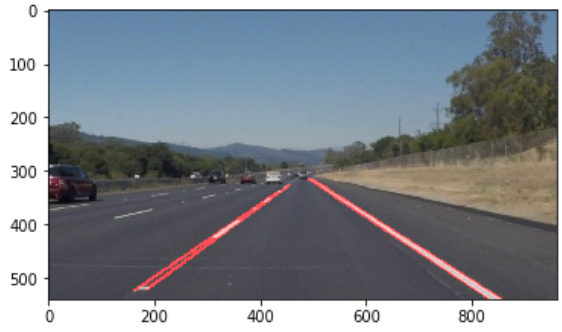
v. Applying a Hough transform and drawing left and right lane lines on an empty pic . Tweaked the parameters several times in the Hough transform to get better solutions. Increasing the threshold and min_line_len helped in getting rid of unnecessary small lines.

By playing on the test images, I found out the range of slopes of the left and right lanes. Using the line equation y = mx + c, I was able to find out the average slope(m) and 'c' values for a given set of left/right lines in a picture. To extrapolate the lines on the lanes, m and c values were used in the line equation with the corresponding y co-ordinartes(top and bottom co-ordinates of the preferred lane area).

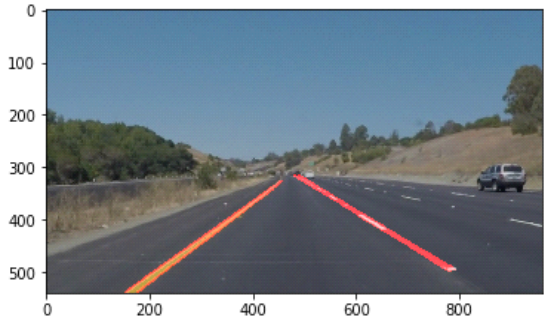
vi. Merging the above pic with the original image.

The below pics were produced before extrapolating and drawing a single left/right lane.

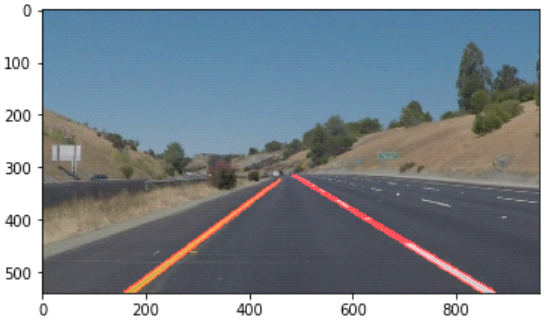
Solid White Curve



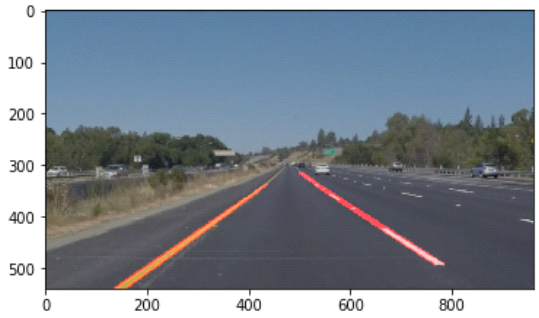
Solid White Right



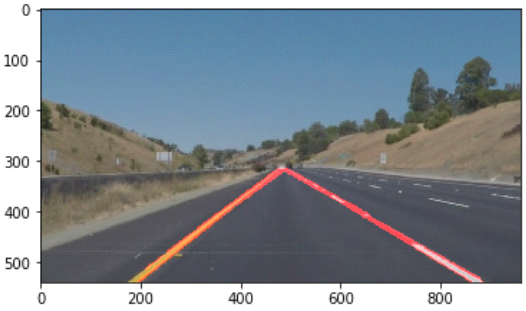
Solid Yellow Curve



Solid Yellow Curve2



Solid Yellow Left



White Car Lane Switch

This pic below produced after drawing single extrapolated lines

Solid White Curve

2. Identify potential shortcomings and possible improvements with your current pipeline

i. The masking region needs to be better defined as a function of image size to make it work properly on any size image/video.

ii. If the roads have long/wide crack lines in the middle like they have on the roads here in Southern California this pipeline may get confused. The range of appliclabe slpoes of the left/right lanes needs to be more precisely defined in such a case.

iii. This hasn't been tested on night road images. The Canny edge detection may not work that well without clear distinction in colors(black to gray to white) during night time. We may have to use a much wider range of thresholds in Canny edge detection and later filter the unnecessary lines by fine tuning the Hough transform parameters.