Finding Lane Lines on the Road

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1 Objectives

The goals / steps of this project are the following:

- Make a pipeline that finds lane lines on the road
- Write a written report to reflect on the project

2 Reflection

My pipeline consisted of the following steps:

The first step involved converting the images into Grayscale and then smoothing the images with a Gaussian filter. The kernel size for the filter I used was 5.

I then used Canny detection with lower threshold and upper threshold, 50 and 150 respectively to detect the edges. To select edges only in the region of interest i.e. the lane region of the image, a four sided polygon was used to mask the region.

The next step involved using Hough Transform to identify the line segments.

To draw two straight lines to mark each of the two lanes, the function $draw\_lines()$ was modified. In the function $draw\_lines()$, the logic used for separating the different line segments generated by the Hough Transform was by calculating the slope of each line also the x coordinates of the line. Line segments which had a negative slope and x coordinates less that half the length of the image were grouped into one set of lines, while the ones with a positive slope and x coordinates greater that half the length were bunched into another.

The mean x and y coordinate of each line segment was calculated and then the function $polyfit()$ was used to calculated the equation of the two straight lines, the left lane line and the right lane line, that best fits these points. Here an averaging is used to calculated the equation of line to get smooth lines in the video. If this averaging is not used the two lines fluctuate a lot. Hence using averaging was imperative.

3 Potential Shortcomings

There are some drawbacks in the current implementation. Firstly the region of interest that is defined for selecting edges is hard-coded. A more dynamic implementation would be useful. Secondly, the separation of the line segments based on the slope might not be very efficient in case of very curved lanes where the slopes of both the lane lines can either be positive or negative. A more robust technique for selection of the line segments is needed.

4 Improvements

It would be useful to define a dynamic selection of the region of interest.