Finding Lane Lines on the Road

Write-up

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The goals / steps of this project are the following:
* Make a pipeline that finds lane lines on the road
* Reflection on my work, potential short comings and Suggestions

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Reflection

This project involves Lane Detection using Python and OpenCV. The important concepts which are used to detect lanes are:

- Grey-Scaling an Image using cvtColor()
- Edge Detection using Canny Edge Detection Algorithm [Canny() function]
- Filtering the Image by using Gaussian Blur [GaussianBlur() function] .
- Region Masking using fillPoly().
- Converting an Image Space into a parameter space using Hough Transform [HoughLinesP()].
- Drawing solid lines on the Edge Image using drawLines() .

The image captured is converted into a Grey Scale and then Canny Detection Algorithm is applied to denote the edges in the image. It determines the edge w.r.t sudden pixel density variations. So, the lower and upper threshold values have to be selected appropriately and I have chosen it to be 50 and 125 respectively. Suitable kernel size has to be determined to filter the edge detected image which should be an odd number (7 in this case). I have selected a 4 sided Polygon for region masking. Then the image has to be transformed into the parameter space using Hough Transform. All the edges are converted to short Line segments by selecting the parameters of Hough transform such as rho, theta, minimum Line length and maximum line gap. All other spaces in the image except the lanes are masked and the lanes are drawn solid lines (red color) by calculating the positive and negative slopes. The positive and negative slopes are checked and their respective slopes are calculated. The averages of all coordinates are calculated and extrapolated with a red line on both lanes by deciding on the coordinates of the polygon and coefficients of the line which is found out using polyfit(). The whole procedure of drawing line can be found in draw_line() function.

2.Potential shortcomings with my current pipeline

One potential shortcoming would be when the road is down the slope or inclined, the parameters of the region masking is not dynamic enough while drawing the line. Another shortcoming would be during night time when there is very less intensity of light, I guess the images cannot be processed properly.

3. Possible improvements to my pipeline

A possible improvement would be to consider the curvature of the road before finding lanes and another would be to find where to drive on roads which do not have lanes.