Finding Lane Lines on the Road

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The goals / steps of this project are the following:

1. Make a pipeline that finds lane lines on the road
2. Reflect on your work in a written report

Reflection

1. Description of the pipeline.

My pipeline consisted of 6 steps. First, I converted the images to grayscale, then I used the Gaussion smoothing on the grayscale image. In the third step, I used the Canny edge detection method on the smoothed image, then I got an image with only edges. In the forth step, I applied region masking with a polygon defined by given vertices. In the fifth step, I applied Hough transform on the masked edge detected image, which outputted line segments of the (detected) lanes lines. In the last step, I combined the original image with the new image created by the line segments. All the results are in the folder 'test_images_output' in my Git repository.

2. How I modified the draw_lines() function.

In order to draw a single line on the left and right lanes, I modified the draw_lines() function by using the line fitting function fitLine() from openCV. Before I apply the fitLine() function, I first separated the line segments into two sets: left_line_points and right_line_points by simply using the x coordinates of the points. After I got the (two) fitted lines, I only need to find the bottom and top points for both lines. Since I know the region of interested, it is trivial to compute the bottom and top points for both lines. In last step, I can just draw two line with given color and thickness. All the results are in the folder 'test_videos_output' in my Git repository.

3. Potential shortcomings with my current pipeline

One main short coming that I see is that I manually prescribed several parameters for images and videos. Those parameters are, for example, min and max threshold for the Canny edge detection method. And also rho, theta, threshold, min_line_length and max_line_gap for the Hough transform are manually prescribed.

Another shortcoming I would expect is that in a curved road, the lane lines might not be straight line and rather curved lines. In this case, the current pipeline will not work.

4. Suggest possible improvements to my pipeline

A possible improvement is that the parameters I mentioned in the first shortcoming can be automatic prescribed with the data we got from images or videos. This way, the current pipeline will work for a much broad range of images and videos.