

# Finding Lane Lines on the Road

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The goals / steps of this project are the following:

- Make a pipeline that finds lane lines on the road
  - Reflect on your work in a written report
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## Reflection

### 1. My pipeline.

My pipeline consisted of 5 steps.

Step1, I converted the images to grayscale;

Step2, I made the edge detection;

Step3, I set the ROI;

Step4, Detecting the lines with Hough transform;

Step5, Show the lines on the image.

In order to draw a single line on the left and right lanes, I modified the `draw_lines()` function by the method below:

Step1, Assuming the left lane and right lane have the lines with similar features (slope and position) respectively, calculate the value of slope and average position.

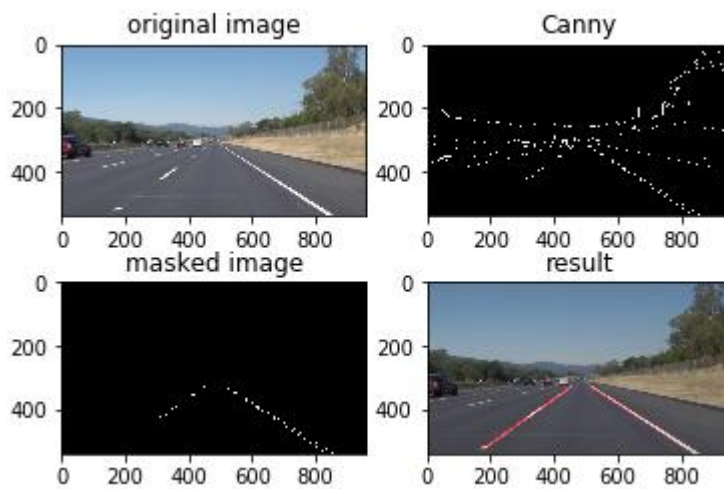
Step2, To Removing spurious lines and lane shakiness, calculate the mean value and variance of the slope of the lines, get rid of the odd lines;

Step3, calculate the average of the slope and position to get one line;

Step4, calculate the bottom point and top point of the line, then draw the line;

The left lane and the right line use the same pipeline.

The result is below:



In video test, to the frames of the video, I used the same pipeline as in the image test .

## 2. The potential shortcomings with my current pipeline

One potential shortcoming:

If the road is curving, the line detecting maybe not ok.

Another shortcoming:

If the ROI is set to be too large, some horizontal line is detected, such as the edge of the car's rear or the edge of the tree's shape.

Third shortcoming:

I think if there is water on the road , the lanes' feature will be weakened.

## 3. Possible improvements to my pipeline

To the above three shortcomings, the possible improvement would be:

1. If the road is curving, I think the curve fitting method should be used.
2. Before detecting the lines, maybe I should detected the cars in the ROI and erase them.

3.To the water problem, maybe we should do some work such as edge enhancement, but that may cause other problems.