Finding Lane Lines on the Road

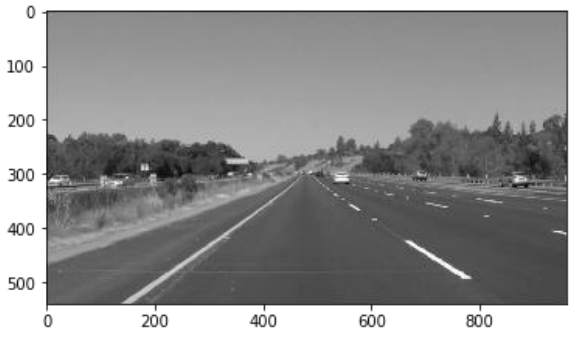
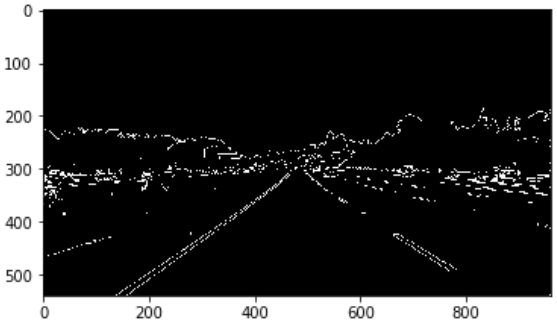
The goals / steps of this project are the following:

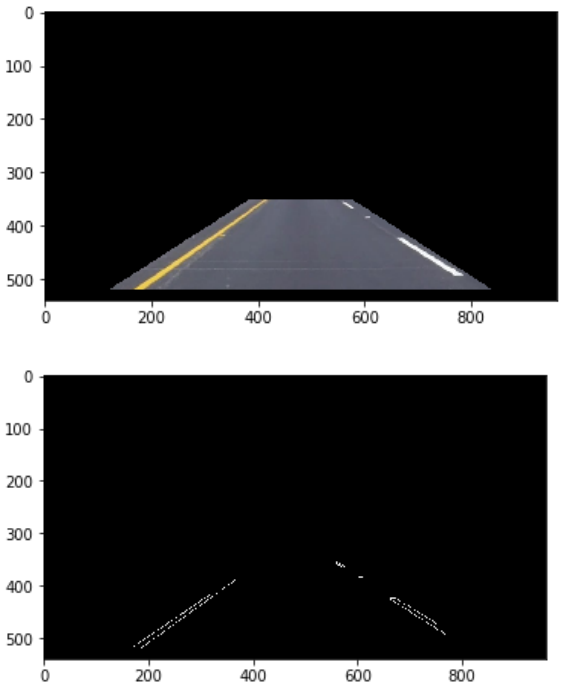
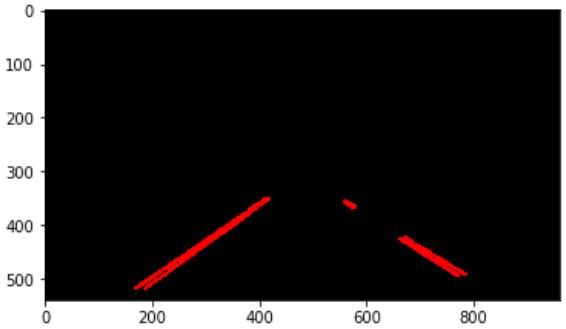
- Make a pipeline that finds lane lines on the road
- Reflect on your work in a written report

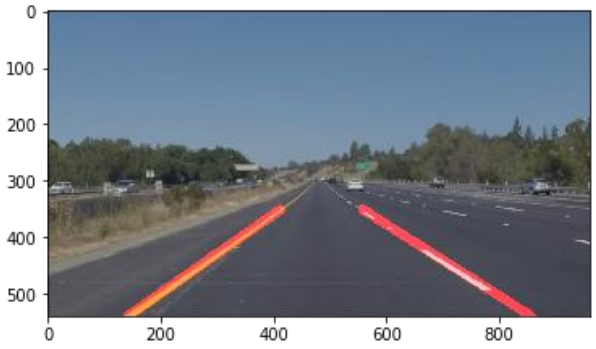
Reflection

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

My pipeline consisted of 5 steps:

Step	Illustration
0. Initial Image	
1. Convert the images to grayscale	
2. Apply Canny transform to find edges of different objects by too drastic change in brightness	

3. Apply Region of interest helper function to look only on trapezoid of the most probable lane appearance	
4. Connect different dots and lines, using Hough lines function of CV2	
5. Calculate a target line equation (y=ax+b) for left and right lines by averaging hough lines: a) Calculate slope, b, and length for each of hough lines b) Divide all hough lines into left and line lines by their x-coordinate and slope c) Average slope and b values for left and right lines by hough lines' length	
Calculate XY-coordinates for left and right lines using final line equation	

Draw lines on a blank picture and combine with initial picture	

2. Identify potential shortcomings with your current pipeline

Challenge video has unveiled a lot of shortcomings:

1) Video of different size
2) Video of different angle
3) Parts of the car in the bottom of the video
4) Traffic in a close proximity of the car
5) Sharp turns

Additional shortcoming may be

1) Weather – overall reduced contrast because of overall picture becoming too bright or too dark
2) Non-visible road lines because of snow
3) Non-right shapes of road lines because of its age
4) If a car for some reason (e.g. accident) will be put in a position of perpendicular to the lane

3. Suggest possible improvements to your pipeline

Internal improvements:

1) Adjustments of overall brightness – e.g. adjusting Canny parameters for Day/Night time or snowy weather
2) Identifying other cars and adjusting region of interest
3) Creating a history of estimated lines (e.g. for the past 50 pictures, assuming 2 sec x 25 frames/sec) and use it to smooth the estimates from the new picture.

On external side, it would be great to use data from compass or accelerometer to validate any big changes in the picture.