Finding Lane Lines on the Road

Writeup

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

Pipeline

The pipeline can be viewed as a Jupyter Notebook at the link below.

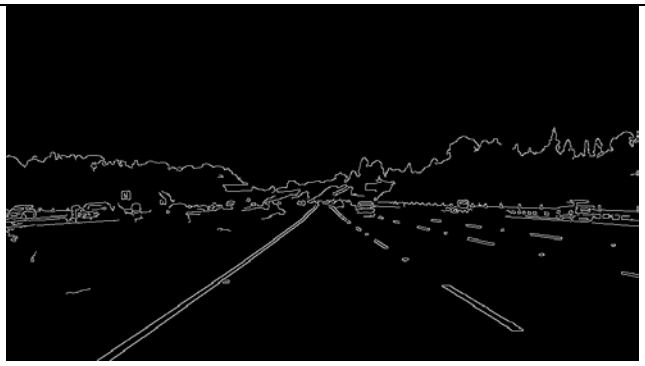
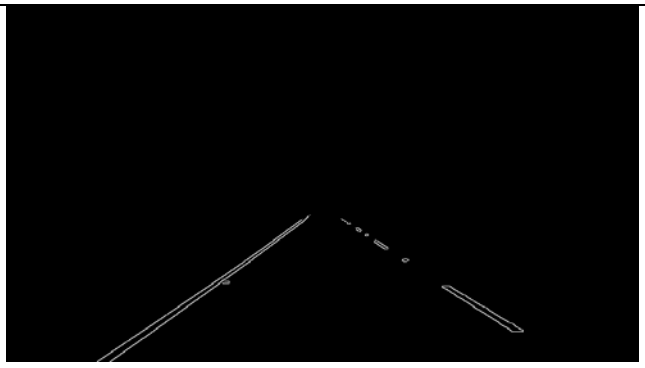
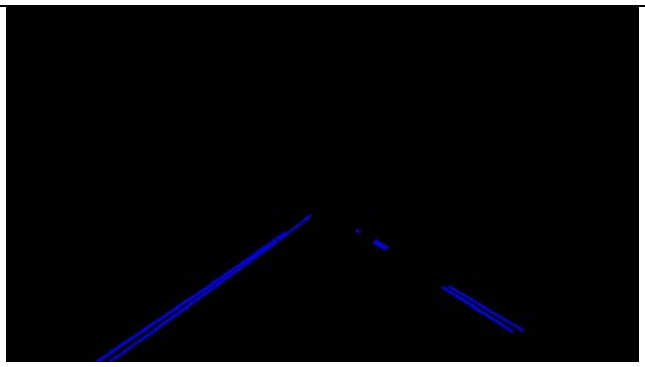
https://github.com/vsagarmb/CarND-LaneLines-P1/blob/master/P1.ipynb

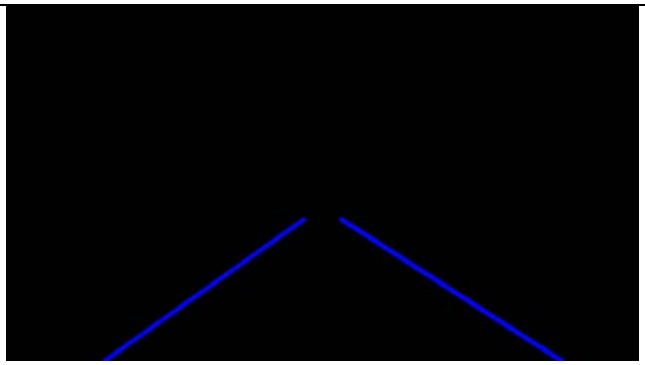
Reflection

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

My pipeline consisted of 8 steps.

1. Convert the video into a series of images (frames) and pass through the below pipeline	

2. Convert the image to Grayscale	
3. Apply Gaussian blur with a kernel size of 5	
4. Apply the Canny edge detection algorithm to detect all the edges in the image	
5. Select a region on interest where we estimate the lane lines to be	
6. Pass the edges detected in the above step through hough lines to detect line segments.	

7. Combine all individual line segments into a single line that defines the left/right lane line The method of how this is done is explained below.	
8. Superimpose and merge the lines and the original image to get an image with lane lines identifies. This image/frame is combined with others to get a new video which has the lane markings.	

The draw_lines function is modified to combine all individual line segments into a single lane line. The method used here is followed from article below.

https://medium.com/@mrhwick/simple-lane-detection-with-opencv-bfeb6ae54ec0

The method used is described below.

- First, we calculate the slope of all individual line segments from the hough lines function.
- We use the slope to determine if this is a left lane line or a right lane line
- Using all the x, y co-ordinates from each of the lane line we fit it to form a straight-line equation
- Based on our region of interest we know at what length the y coordinates will be placed.
- Using the line equation and the y coordinates we calculate the x coordinates of the end points of left and right lane lines

2. Identify potential shortcomings with your current pipeline

Potential shortcomings that were identified when running the challenge video were

- Curved lanes are not handled well
- Lane lines are extended beyond the lanes when there is a sharp curve
- Shadows on the road cause the lines to distort
- Any patches on the road where the color of the road changes is detected as an edge and the lines are

3. Suggest possible improvements to your pipeline

Potential improvements are:

- Modify the region of interest based on the curvature of the road
- Handle the edges that are straight lines and not lane lines