

Self Driving Car Engineer Project 1 - Finding lane lines

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May 2, 2021

1 Project Goal

The purpose of this project is to create a pipeline that detects the lane lines on the road using the openCV library. The pipeline will be tested on images and videos consisting of roads with different lane colors.



The lane finding pipeline should be able to identify lines and draw them on the image as shown in example below



2 Reflection

2.1 Pipeline Description

The steps used in building the pipeline for identifying lane lines in the image shown in the purpose section will be described in this section.

2.1.1 Gray scale and filtering

The original image is converted to gray scale. Then Gaussian smoothing is applied to suppress the noise in the image



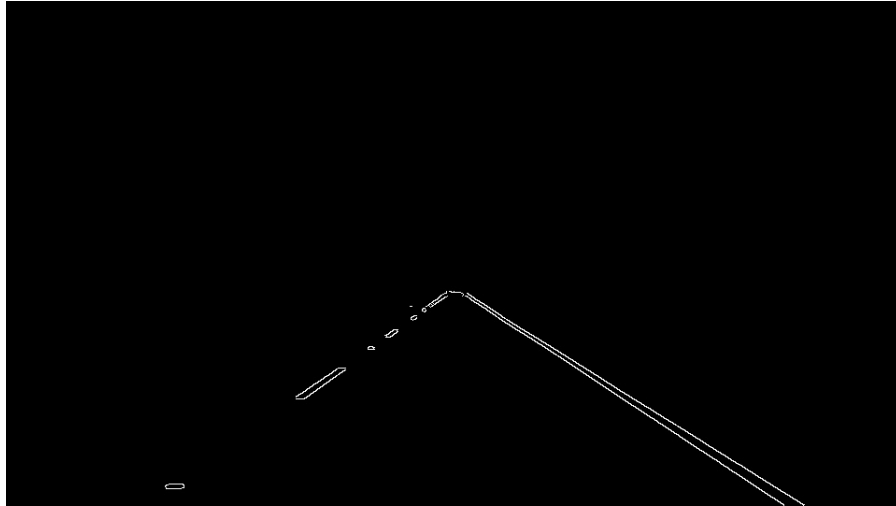
2.1.2 Edge detection

The edges in the filtered image are detected using Canny edge detector.



2.1.3 Masking the relevant region

The relevant region is described using a polynomial assuming that the front camera is always in a fixed position.



2.1.4 Hough transform to detect lines

The detect the lines of the edges detected from Canny, hough transform is used.



2.1.5 Extrapolating lines

The hough transform results in number of lines that form the lanes lines. Those lines need to be extrapolated/averaged in order to draw two lines on the image. The slopes of lines were used to sort left and right lane lines. Average of slopes and intercepts of the hough lines were used to define end points of left and right lane lines. Below image shows the lane lines drawn on the original image.

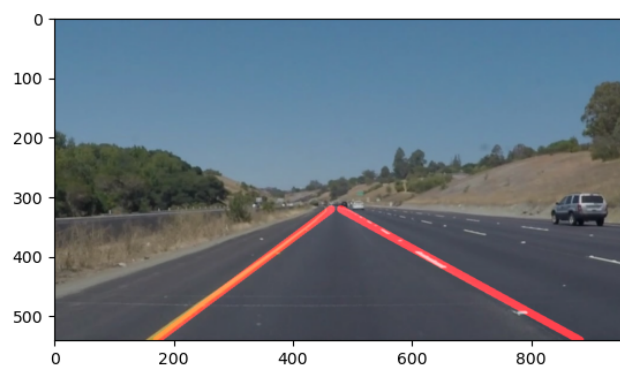


2.2 Test images and videos

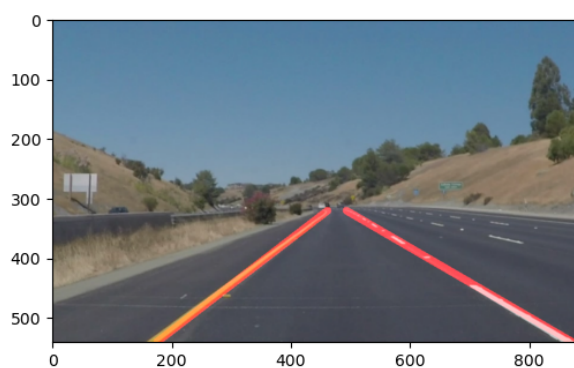
The pipeline created was tested on different images and the result is shown below images. The pipeline was run on video as well and similar effect was observed.



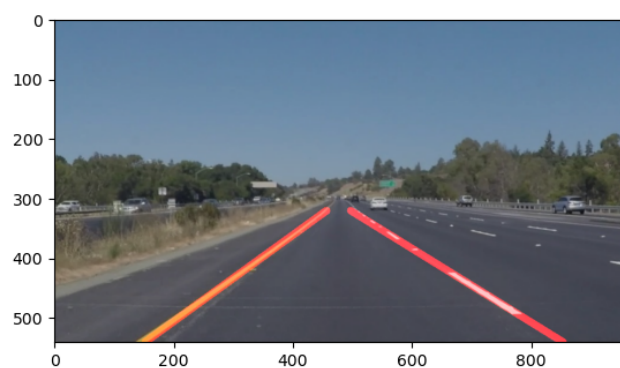
(a)



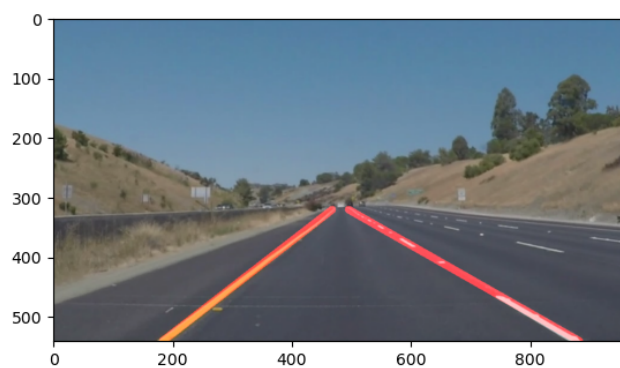
(b)



(c)



(d)



(e)

Figure 1

2.3 Potential shortcomings

Some of the drawbacks of the created pipeline are

- The region of relevance is fixed and is suitable only for this particular camera position
- The above pipeline works well mainly for straight lane lines. Curved lane lines are not captured.
- The pipeline does not work if a vehicle in the front obstructs the view of the camera

2.4 Possible improvements

- The region of relevance could be updated dynamically