

Introduction

This project is an introduction to OpenCV and the goal is to find lane lines, first on different images and then on the video feed of a car driving on different highways.

Finding lane lines

While manually driving on the road, we use our eyes to keep track with the path mainly with the help of the lane lines drawn on the road. While developing a self-driving car, we would like the car to automatically detect the lane lines using an algorithm.

In order to achieve this, we were taught some computer vision techniques like:

- Canny Edge Detection
- Hough Transform

Steps

1. In my pipeline, I first converted the given images to grayscale.
2. Then I applied Gaussian smoothing to blur the image, with kernel size 5.
3. Canny edge detection was applied with a low_threshold of 50 and a high_threshold of 150.
4. Then I created a mask to define the working region, where the road might be.
5. Used Hough transform to find the lines with a minimum line length of 100 pixels and a maximum line gap of 200 pixels.
6. Then I iterated over the output to draw lines on the images.
7. The videos were fed into the pipeline to find the lanes.

Lane line detection solutions for the given images/videos:

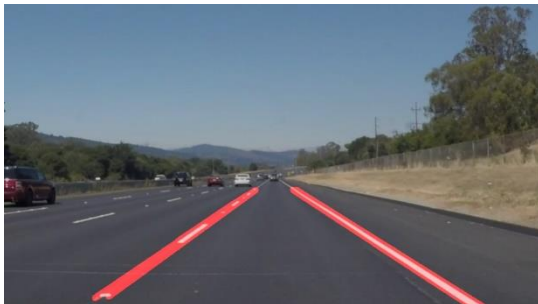


Figure 1 Solid White Right



Figure 3 Solid Yellow Curve

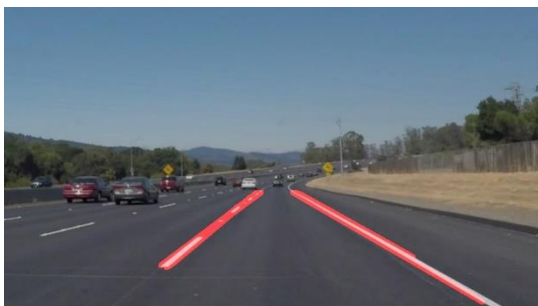


Figure 2 Solid White Curve



Figure 4 Solid Yellow Curve 2



Figure 5 Solid Yellow Left



Figure 6 White Car Lane Switch



Challenge video

The solutions for the images given can be found in the `'test_images_output'` file in the Jupyter Notebook. The videos can be found in the `'test_videos_output'` file. The source code for all the solutions is in `'P1.ipynb'`.

Obstacles and outcome

The program worked quite well for finding lane lines on the given images and the white/yellow videos. It was tricky to get single lines on both sides of the road. The challenge video involved shady regions and patches on the road and the approach was not successful. I hope there can be even more robust ways to get accurate solutions for lane detection by applying techniques to be taught in the upcoming classes.