ENPM673: Project 1

Explanation & Steps for Lane Detection

The following steps were taken into consideration while completing Project-1:

1. **Image Input from the Video**

The Input Video is converted into different Frames and one of them is displayed below.

Fig 1. Input Image

2. **Denoising the image**

The input image is then denoised to remove the noise from the surrounding. The *medfilt3* filter is used here.
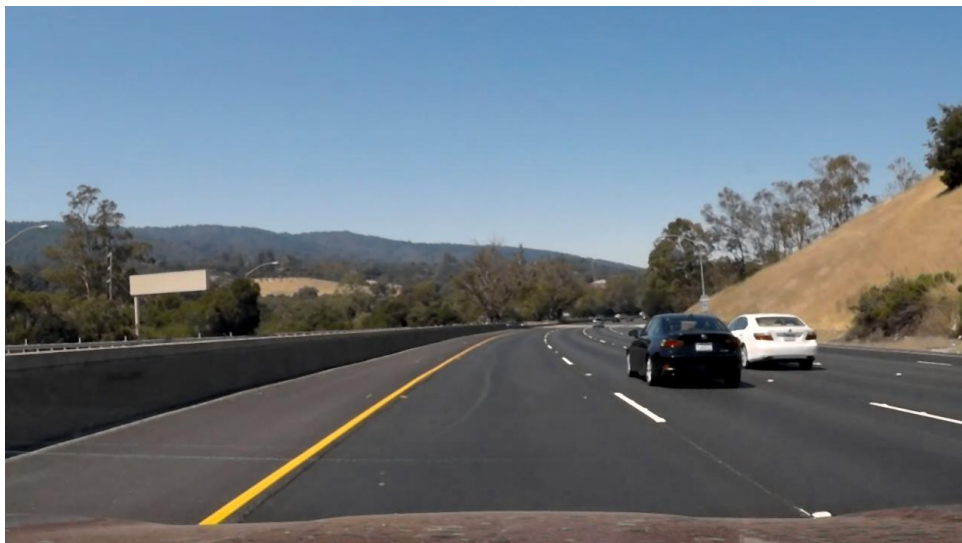

Fig 2. Denoised Image

3. Binarizing the Image

Here, the Denoised Image is converted into Binary Image (BW). The threshold value for binarizing the image is selected based on the trial and error method. The binarized image should clearly depicts the lanes of the road.

Fig 3. Binary Image (B&W)

4. Edge Detection of Image

The *Canny* edge detection method is used to find the edges in the binary image. The reference was used from the Documentation available from the official website of MATLAB-

https://www.mathworks.com/help/images/ref/edge.html

Fig 4. Edge Detected using Canny

5. Masking the Image

All the edges found using Canny are not useful. Hence, it is required to mask out the unnecessary details. The top portion of the image is eliminated and just the bottom portion is kept as depicted below.
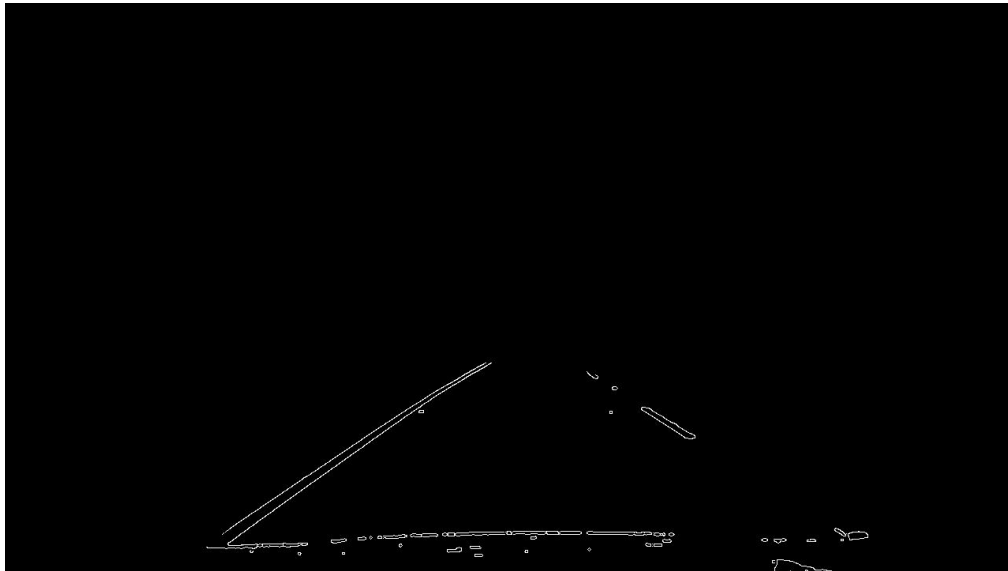

Fig 5. Top Portion of the Image Masked

6. <u>Applying Hough Transform</u>

Next, the Hough Transform is applied to the image. As a result, the Hough Lines and Hough Peaks are generated.
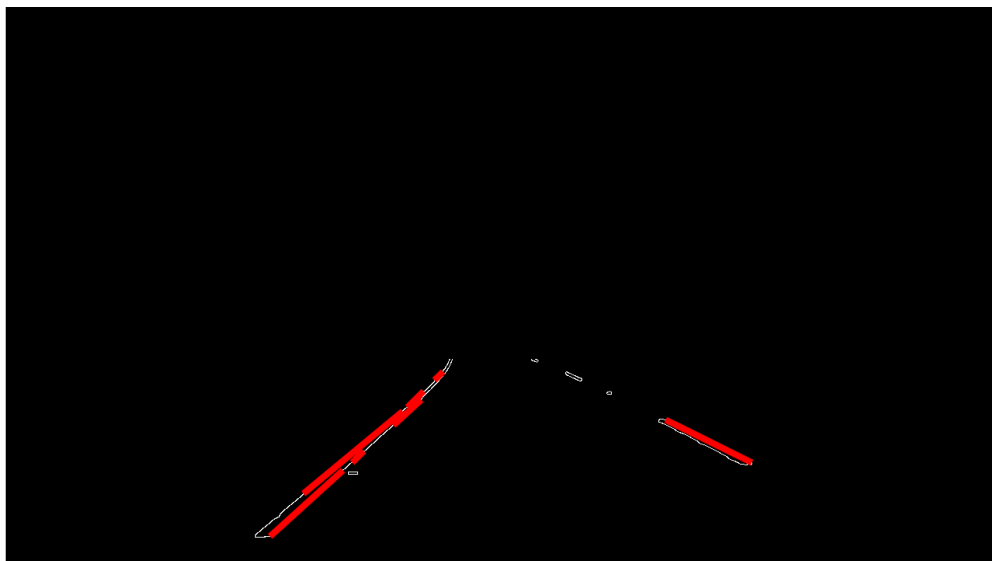

Fig 6. Plotting of Hough Lines

7. <u>Dividing the Hough Lines in Left and Right Lanes</u>

The obtained Hough Lines are then divided into Right & Left Lanes. This operation is performed by comparing the Initial and Final points of the Hough Lines with the center line of the image. Also, the slopes of the Hough Lines are compared too.

8. <u>Polynomial Fitting</u>

Next, a polynomial of first order is passed through the points of the left and right lanes. The slope and constants obtained are used to obtain final points for the given initial points which are further plotted on the image.

9. <u>Turn Prediction</u>

For turn prediction, to make the process easier, instead of using the Vanishing Point Method, the turn is predicted using the slope of the left line and using some threshold values. The threshold values are obtained using trial & error method.

This method was collaboratively implemented by Me and My Classmates- Gunjan Khut, Utsav Patel.

Also, reference was used from Mr. Yash Manian's Lane Detection code from his GitHub repository.

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