Assignment 3 Report: Lane Detection

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The problem is to find the orientation of the 2 lanes on the side of a moving car in a series of video frames recorded by a camera placed in front of the car. The orientation of a lane can be described using 2 parameters, theta and rho, which respectively represent the angle of between the x-axis and the line perpendicular to the lane and the distance between the lane and the upper left corner of the image. Thus, the input of the problem was a image, and the output was to be 4 parameters describing the 2 lanes.

To tackle the problem of finding the 2 lanes in the given images, the following approach was taken:

1. To begin with, the images were first thresholded to filter out the ground and surrounding colors.
2. The images were then changed to grayscale, and a polygon mask was used to select only the region of interest.
3. The image was then binarized for edge detection
4. Edge detection was done using Canny method, and the resulting edge image was Hough transformed to find possible lines in the image.
5. The parameters of the 2 lines corresponding to the 2 lanes were initialized with estimates.
6. By searching through the lines found during the Hough transform, lines that were the among the longest in length and not too far from the initial estimates were selected.
7. The lines were further processed to ensure they are not too extreme to be considered lanes.