Project 1:- Finding Lane Lines

This project proposes a problem to identify and mark lane lines on the road.

Pipeline Description

Series of steps followed to identify, and mark lane lines are given below

  a. Create a copy of the original image to perform operations.
  b. Convert the image to grayscale
  c. Use Gaussian blur to reduce noise
  d. Convert image to edges using Canny edge detection algorithm
  e. Select a polygonal region and blackout the remaining regions
  f. Perform Hough transform to detect straight lines. Adjust parameters of Hough transform to select only the lane lines and remove other edges or noise
  g. Overlay the output of Hough Transform (i.e. lane lines) on top of the original image

The above steps were done using the implementations provided in the notebook by adjusting different parameters.

An additional merge_lines method was added whose function was to merge the lines outputted by Hough transform into a left and right lane line. Please find below a shot description of the merge_lines implementation.

  a. Separate lines returned by Hough Transform into a left part and right part based on their slopes
  b. In each part consider the top most and bottom most point. These points will be used to find a new line that would pass through these points and will be the single representative of all the lines in this part. This idea works as we have considered a quadrilateral region that narrows at the top and widens at the bottom as is seen in most examples for lanes.
  c. Try to extrapolate the two lines, left line and right line, by finding its slope and using the equation y = mx +c to find a point that intersects with the bottom of the image
  d. Return only these two new lines

Potential Shortcomings
There are a few shortcomings in this approach

1. Finding an optimal region of interest, a quadrilateral in our case, is not always possible. The current implementation would fail when the vehicle will approach a curve or bend.
2. Finding optimal parameters for all the steps in the pipeline would be difficult given different lighting conditions, different lane marking colours, etc…

Improvements

Few points on which the current implementation can be improved are

1. Detecting if the road is straight or getting curved.
2. Speed improvement.