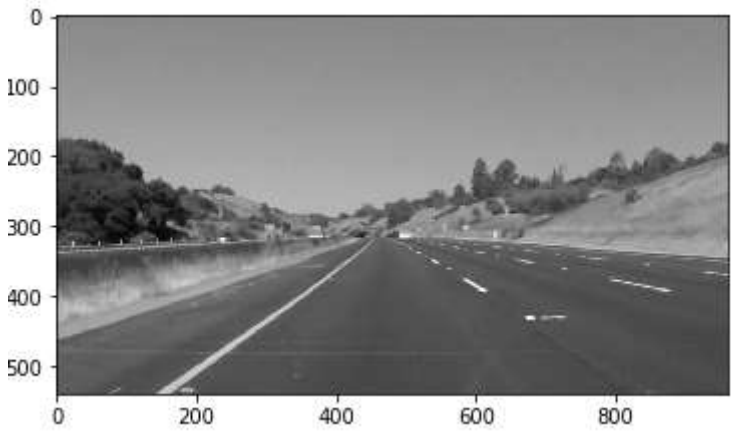
Project 1: Finding Lane Lines on the Road

The goals / steps of this project are the following:

- Make a pipeline that finds lane lines on the road
- Reflect on your work in a written report

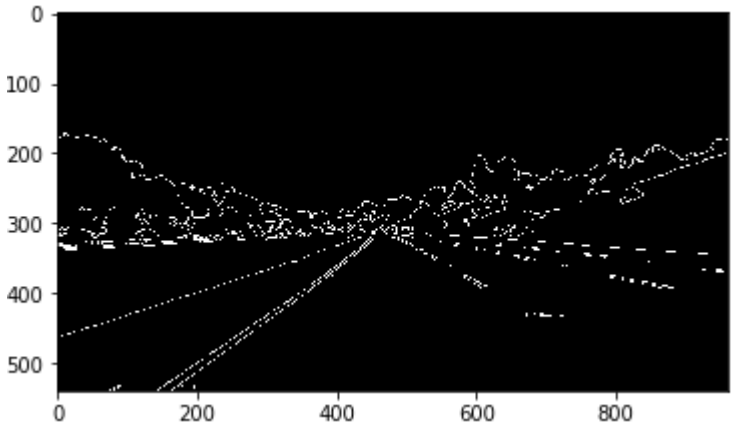
Pipeline steps:

1. Convert the given test image to a grey scale

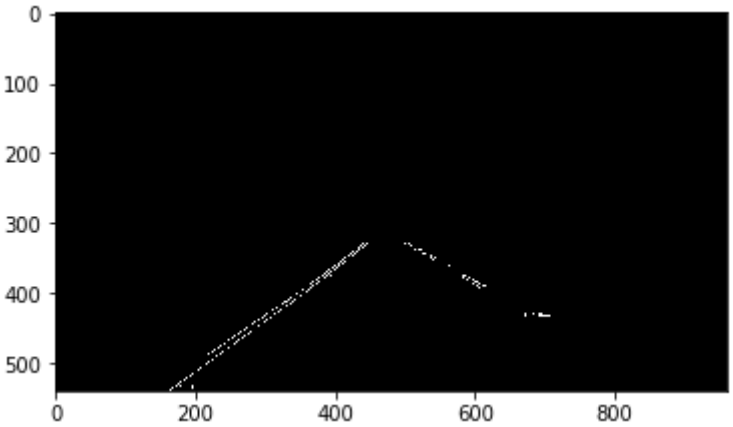


2. To reduce image noise and reduce detail the **Gaussian Blur** Technique is applied of kernel size 3.

3. The edges are detected using **Canny Edge Detector,** this function finds edges for the input image which is applied Gaussian blur and marks them in the output map edges using the canny algorithm. The low threshold and high threshold are set to 50 and 150 respectively.



4. Masking the region of quadrilateral shape to mask only the area of interest.



5. Straight lines from the image are detected using **Probabilistic Hough line Transform** algorithm with following parameters values:

   rho: 1 pixel.
   theta: 1 degree
   threshold: 50
   minLinLength: 30
   maxLineGap: 50

6. Compute avg of lines returned by Hough line transforms to find the top and bottom x,y coordinates for right and left lane lines This step is implemented in the function *find_lines().*

Steps in *find_lines()*:

1. Finding the average of all lines' x, y coordinates get single left and right lane lines, and ignoring any lines with slope m in the range of -0.1 to 0.1. Such lines do not fall under a vertical slope value.
2. Finding the slope m and b for the line equation to compute the x coordinate start values

   Line equation y = mx +b

   Slope (m) = (y2-y1)/(x2-x1)

   b = y – mx: using any point on line and substitute for x, y
3. Compute the left and right bottom value for x for each lane to extend the averaged line to quadrilateral boundary

   x = (y- b)/m

   by substituting y as quadrilateral top boundary which is hard coded to 330 pixels

Potential shortcomings with pipeline

The quadrilateral mask drawn as fixed boundary has this could cause problem if the lane has short bends /curve

Possible improvements to pipeline

The overcoming would be to automate the quadrilateral boundary range so it can accept the short curves.