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

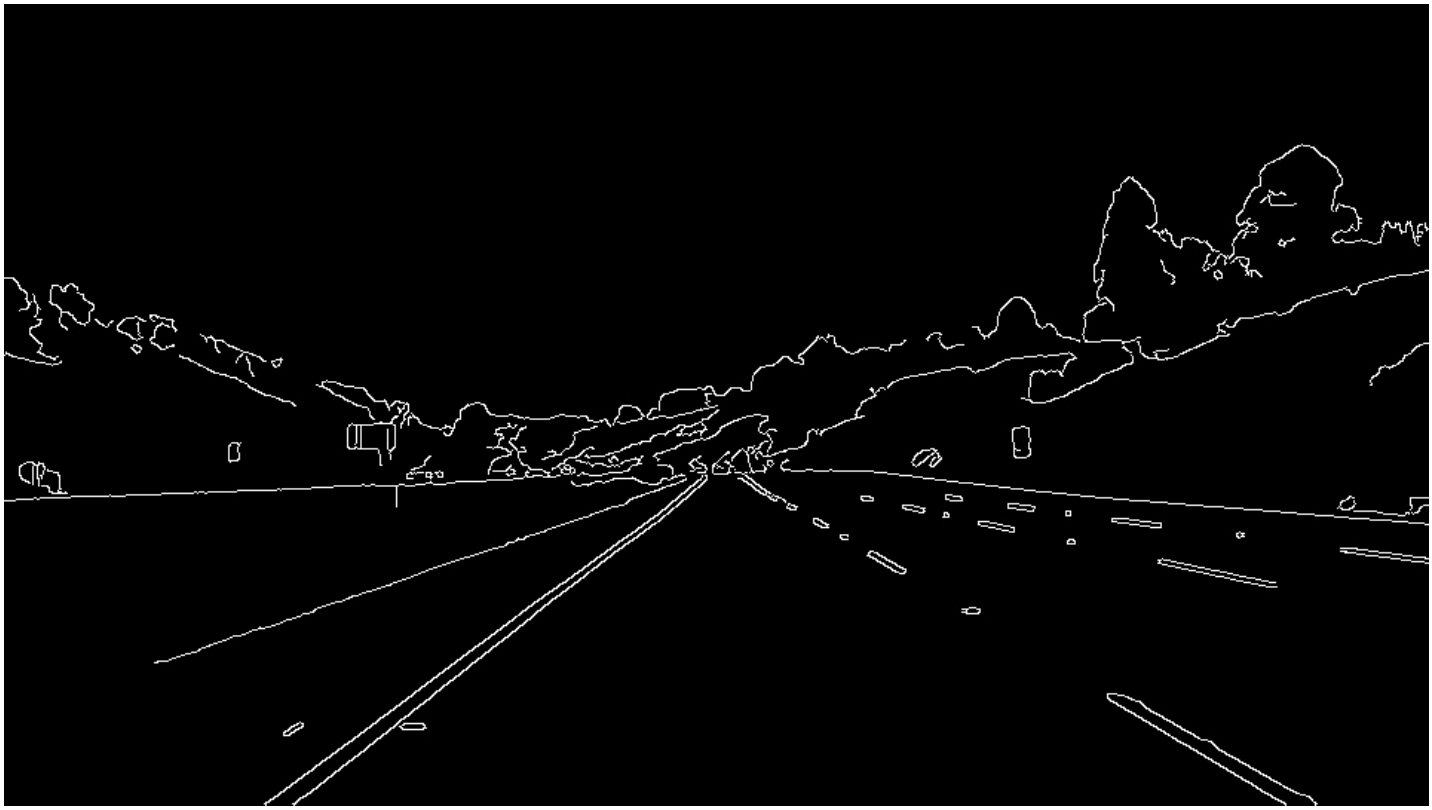
Reflection

1. Describe your pipeline. As part of the description, explain how you modified the draw_lines() function.

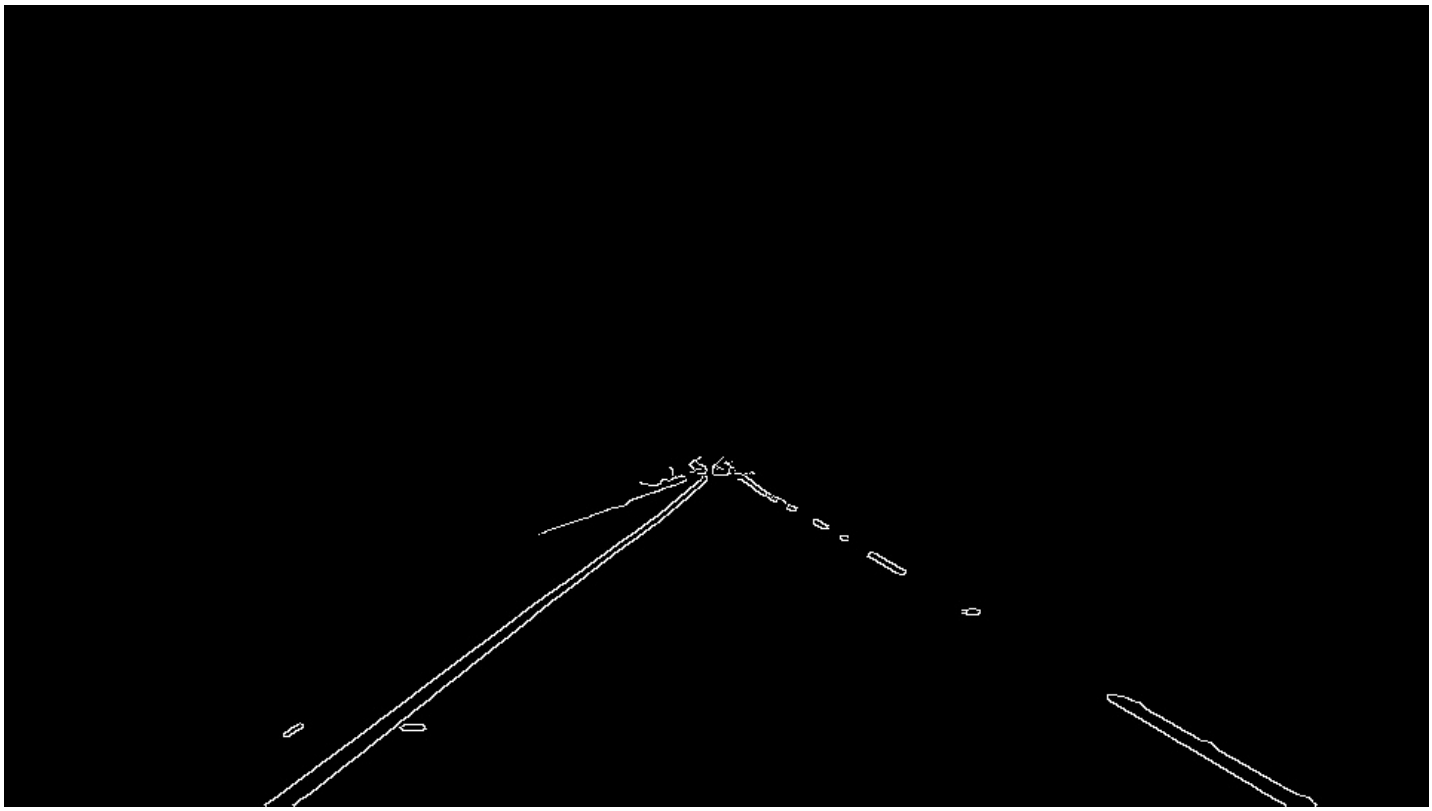
My pipeline consisted of a number of steps:
Convert the image to grayscale

Apply some Gaussian Blur to smooth out any outliers in the image

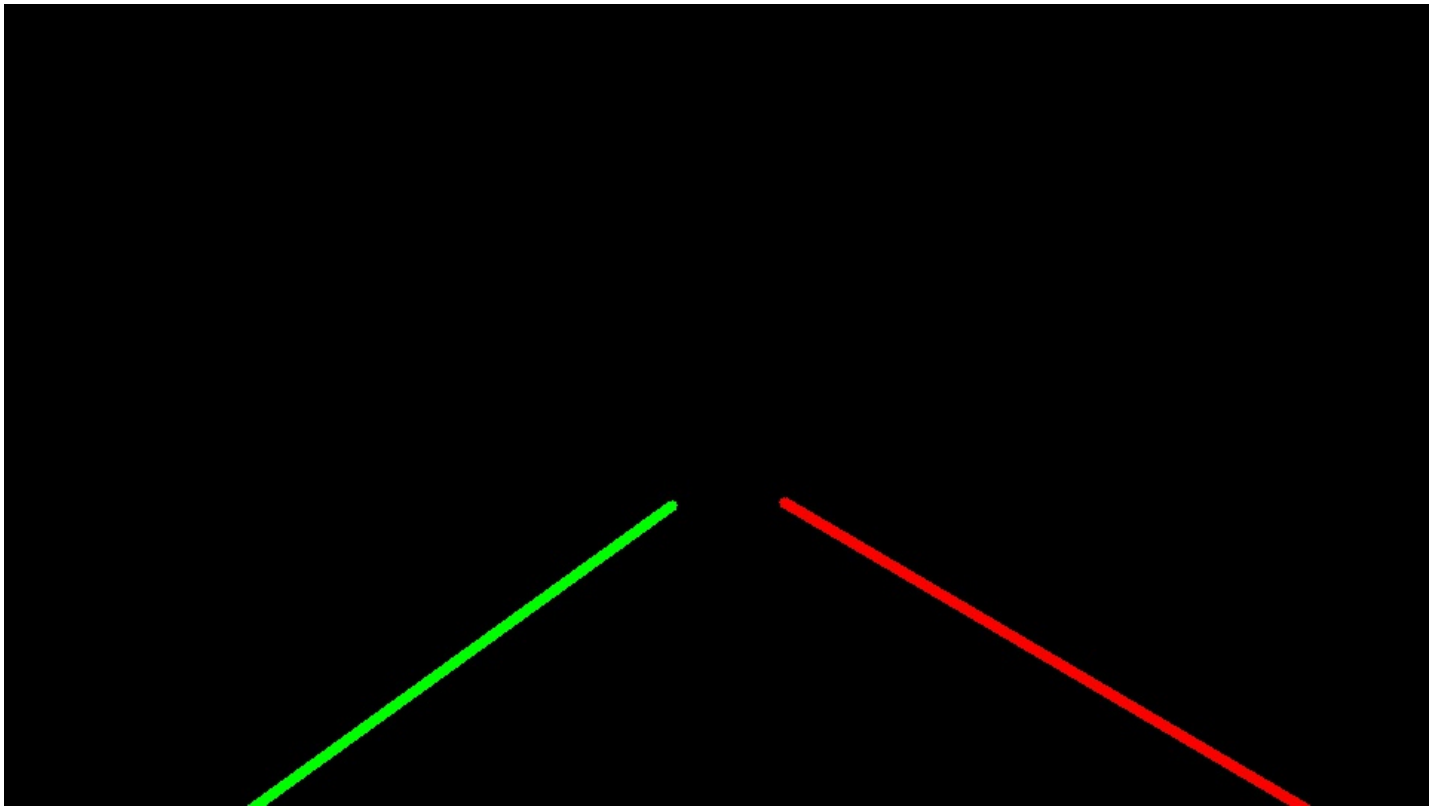
Use Canny edge detection to build an array of edges in the image



Subset the detected edges to just the trapezoidal region of interest making further operations more computationally efficient



Convert the detected edges into Hough space where line segments can be detected and drawn onto a layer



Overlay the identified lines onto the original image

In order to draw a single line on the left and right lanes, I modified the draw_lines() function by:

- The overall premise was to divide the lines in the image into left lane lines and right lane lines then process them as necessary
- This splitting of left and right lane lines was performed by looking at the gradient. Lines with a positive gradient are Right lane lines and those with a negative gradient are Left
- The start and end points of each of the lines were collected in arrays r*line and l*line and then averaged over the number of left and right lane lines that were identified
- Following this coordinate geometry was used to find the overall lane line, specifically the Equation of a Line Using One Point and the Gradient
- These lines were then drawn in blue and green on the image and video feed

2. Identify potential shortcomings with your current pipeline

- The algorithm does not work well when the image becomes noisy with lots of "edges" distributed throughout the region of interest
- Nor does it work well when presented with corners as the line matching program is linear
- Also, for some reason the right lane line always seems to be longer than the left and I am not sure why?

3. Suggest possible improvements to your pipeline

- The algorithm's performance could be improved on corners by using a spline instead of a linear equation to join the line segments