

My pipeline consisted of 6 steps. First, I converted the images to grayscale. Then, I applied a Gaussian Noise kernel to smooth out the image. After that, I used the Canny transform to find edges. The next step was to apply a mask to the image in order to ignore the parts of the image that did not matter and focus on the part where the lane lines would be located. The next step was applying the `hough_lines` function, which returns an image with hough lines drawn. Basically, this function allows us to find lines and draw the lane lines of an image given a certain criteria. The final step was combining our original image with the result from applying the `hough_lines` function, which is basically just a blank image with lines drawn on it.

In order to draw a single line on the left and right lanes, I modified the `draw_lines()` function by separating line segments by their slope to decide which segments were part of the left lane vs. the right lane. If the slope of the line was negative, then it belonged to the right lane. If it was positive, then it belonged to the left lane. Then, I averaged the position of each of the lines and extrapolated to the top and bottom of the lane.

Here are images of the an original image and the result of the image after going through the pipeline:



One potential shortcoming would be what would happen when the lane lines curve. The pipeline I used for this project only detects lines, so there would be problem if the lane lines appear to be anything other than straight lines. Another shortcoming could be if the color of the lane lines changes. For example, if for some reason there were a white road with dark lane lines. Other countries might have different color roads. A third shortcoming could also be if the lighting conditions change. If the lighting conditions change, colors can appear different.

A possible improvement would be to have a pipeline that is capable of recognizing lane lines even if they curve. Another potential improvement could be to use a color model other than RGB like HSV or HSL.