Reflection

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

My pipeline totally consisted of 6 steps. First step involved converting the image to grayscale. Second step was to perform Gaussian blur on the image before Canny Edge Detection to improve the edges detected. As described, third step consisted of Canny Edge Detection to identify the edges from the image. Fourth step was to mask the image and select only the area of interest from it.

Next, Hough lines transformation was performed to identify lines from the masked image after canny edge detection. The identified lane lines were averaged and extrapolated so that the final image consisted only two lines, one for the left and one for the right. The averaging process involved collecting points that formed a line from the Hough transformed image. Based on the slope made by these lines, two sets of slope, intercept and line length were determined for the lane lines. A weighted average of the slope using the line length was performed to identify the average slope of the lane line. Similar procedure was followed to find average intercept. Using the average slope and intercept values two lines were drawn from the bottom of the image to the apex of the area of interest.

Finally, the image with lines drawn is superimposed with the actual colour image to provide the final output.

2. **Identify potential shortcomings with your current pipeline**

- My detection of lane lines works fine for a single image. However, when applied to a video, the lines seem to shake and flicker due to small changes in slope of the line from image to image.
- My pipeline was developed for straight lines. Hence the performance to detect curved lanes would be poor.
- If the lane lines are hidden in the image due to traffic, the detection might be difficult

3. Suggest possible improvements to your pipeline

- First improvement needed would be to identify a methodology to smoothen the difference of slope and intercept of the identified lines from image to image. This would avoid the shakiness of the drawn lines in the video. A moving average of slope might work to improve the steadiness.
- Additional curved lane images will help to optimise the pipeline to work for curves
- Many more training images must be used to test the robustness of the pipeline