

## Reflection

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

My pipeline consisted of the following steps:

1. Blur the image
2. Load the image and checked for yellow lanes. If I find any yellow, I replace it with white.
3. Convert to grayscale
4. Find canny edges
5. Mask the image, leaving only the area of interest
6. Find the Hough Lines
7. Calculate the slopes, intercepts, and lengths of each Hough Line
8. Bucket all found lines in one of ten categories. Assume that the top two categories (in terms of number of lines) represent the two lanes.
9. Calculate the average slopes and intercepts of the two lane lines, weighting the average by the length of the Hough Line.
10. Draw the found lane lines back onto the original image

In order to draw a single line on the left and right lanes, I did not directly modify the `draw_lines()` function, but I did calculate the average slopes and intercepts of the initial Hough Lines. This allowed me to identify the two main groupings of lines that corresponded to the two lanes. I then used the averages from each group to draw my final lines on the original image.

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

One potential shortcoming would be what would happen when lighting conditions change due to weather or time of day. Certain light may cause my pipeline to not recognize yellow.

Another shortcoming could be coming to intersections or freeway entrance ramps. My pipeline currently cannot scale to recognize more than two lanes. Therefore, it might recognize the lanes of the other street erroneously.

### **3. Suggest possible improvements to your pipeline**

A possible improvement would be to make the range of what it considers to be “yellow” change based on the time of day and weather. Another potential improvement could be to allow the pipeline to recognize many different lanes. This would require the pipeline to be modified to not draw the lane line all the way down to the bottom of the image. Instead, it would have to connect the lines closer than a certain threshold.