

1. The image pipeline:

- Convert original image to HSL color space
- Extract yellow color and white color from the HSL image
- Combine yellow parts and white parts with original image to identify parts of interests
- Convert combined image into grayscale
- Gaussian Blur
- Canny edge detection
- Mask image with region of interests
- Hough line detection
- To draw a single line on the image, I used linear regression to get the single line based on Hough line detection results
- To smoothen the result, I let the code remember the previous lane parameters, intercepts and slopes, and use the mean of them.
- Draw the lane on the image

2. Potential shortcomings:

- Curve line cannot be represented
- The performance is poor if there is a large area of shadow on the ground

3. Possible improvements:

- Use polynomial instead of a line
- Let the code remember the width of the lane so it can still infer the position of it even if it is covered by shadow