Advanced Lane Following

Test Images

Below is a grid of all test images. I have applied all the steps on each test image and included the result in this report.

Figure 1: Test Images

Camera Calibration and Distortion Correction

First I calibrated the camera using calibration images and saved the camera calibration matrix and distortion coefficients so I don't need to compute these again, and to apply them to undistort each new image.

Figure 2: Undistorted Images: Applied distortion correction on test images

Color and gradient threshold

As the second step I applied color and gradient thresholds to create a binary image. I tried out various combinations of color and gradient thresholds to generate a binary image where the lane lines are clearly visible. The results are visualized in Figure 3.

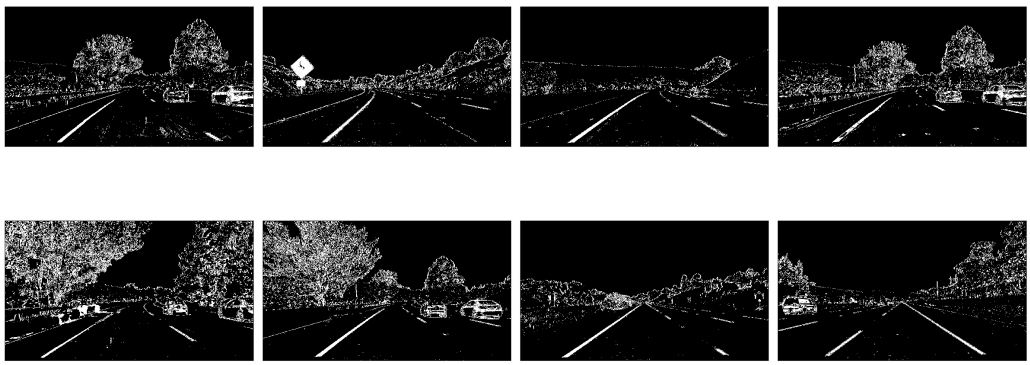

Figure 3: Binary Images: Applied color and gradient thresholds on undistorted images

Perspective transform

I applied perspective transform on binary images to get the bird's eye view representation of an image (Figure 4). For each test image I chose the four points separately, using an interactive method, and saved the transformation matrices to be used later. But for the test video I only chose the four points for the first frame and saved the warped and unwarp matrixes to be used for rest of the videp frames.

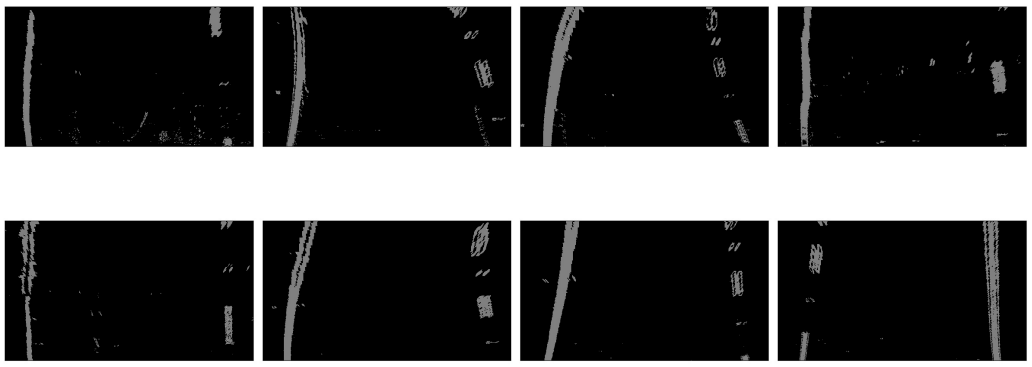

Figure 4: Warped Images:

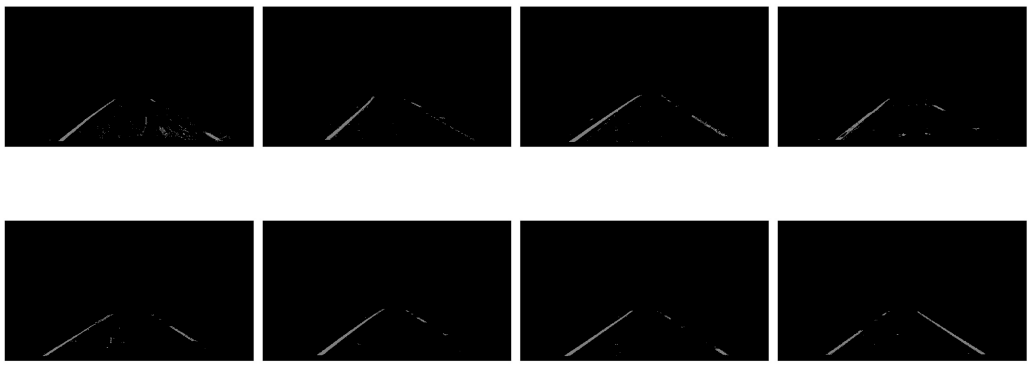

Figure 5: Unwarped Images

Detect lane lines

After applying calibration, thresholding, and a perspective transform to test images, I used sliding window method to find the pixels that are part of the lines. First I took a histogram along all the columns in the lower half of the image.

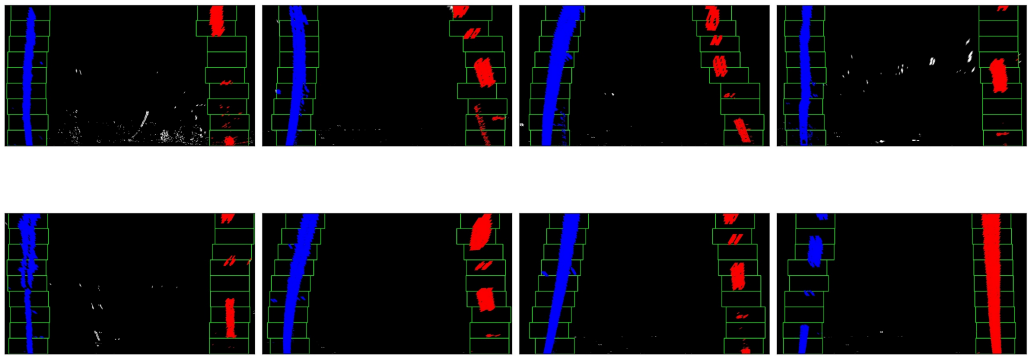

Figure 6: Detected lines using sliding window method

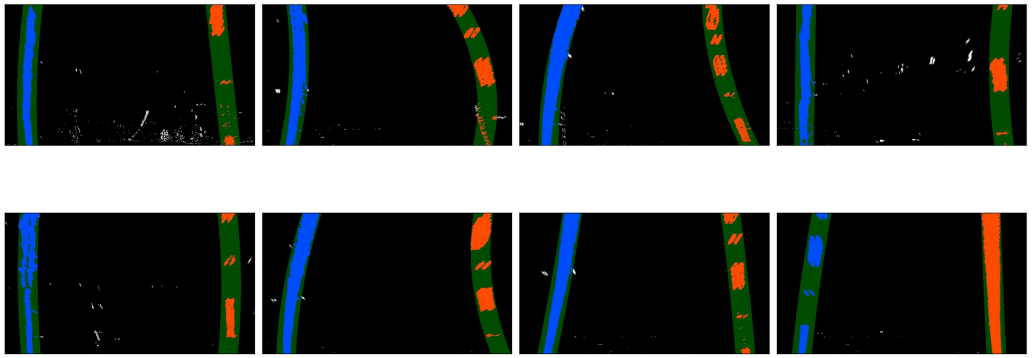

Figure 7: Detected lines

Determine the lane curvature

Figure 8: Detected lanes