Advanced Lane Finding

Advanced Lane Finding Project

The goals / steps of this project are the following:

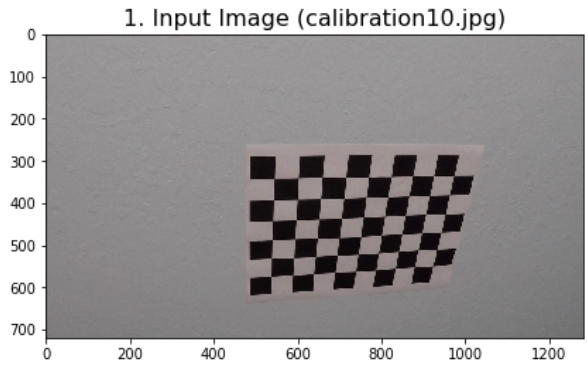
- Compute the camera calibration matrix and distortion coefficients given a set of chessboard images.
- Apply a distortion correction to raw images.
- Use color transforms, gradients, etc., to create a thresholded binary image.
- Apply a perspective transform to rectify binary image ("birds-eye view").
- Detect lane pixels and fit to find the lane boundary.
- Determine the curvature of the lane and vehicle position with respect to center.
- Warp the detected lane boundaries back onto the original image.
- Output visual display of the lane boundaries and numerical estimation of lane curvature and vehicle position.

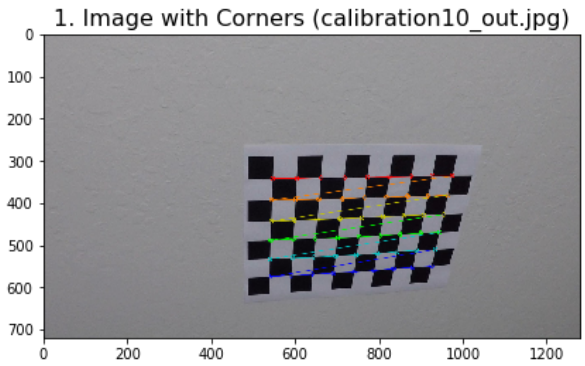
Camera Calibration

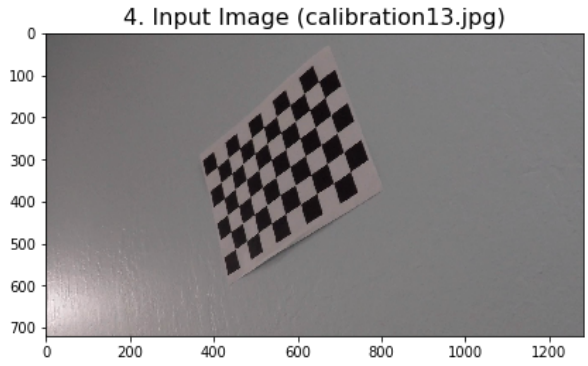
Compute the camera calibration matrix and distortion coefficients given a set of chessboard images.

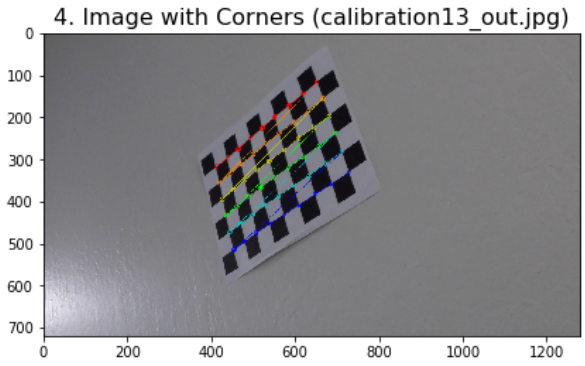
I used the OpenCV functions findChessboardCorners and drawChessboardCorners to identify the locations of corners on a chessboard photos in camera_cal folder taken from different angles.

I then used the output points_3d and points_2d to compute the camera calibration and distortion coefficients using the cv2.calibrateCamera() function. I applied this distortion correction to the test image using the cv2.undistort() function and obtained this result:



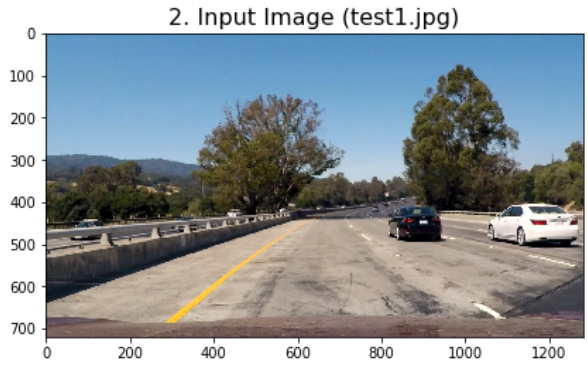


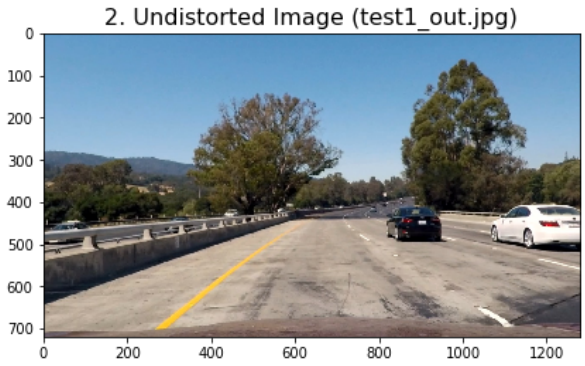


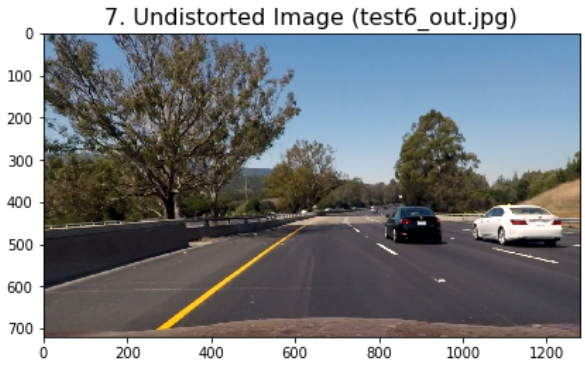


Pipeline

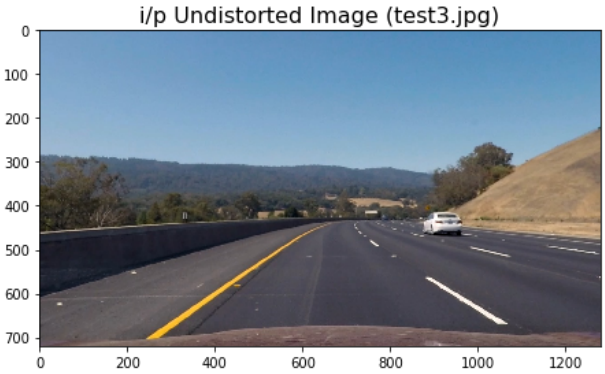
1. Applied distortion correction on the images provided using calculated camera calibration matrix and distortion coefficients

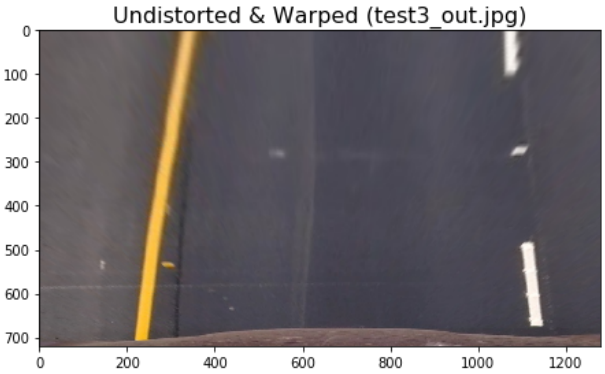


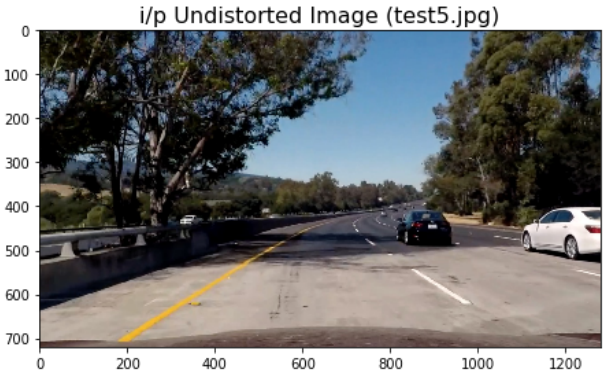


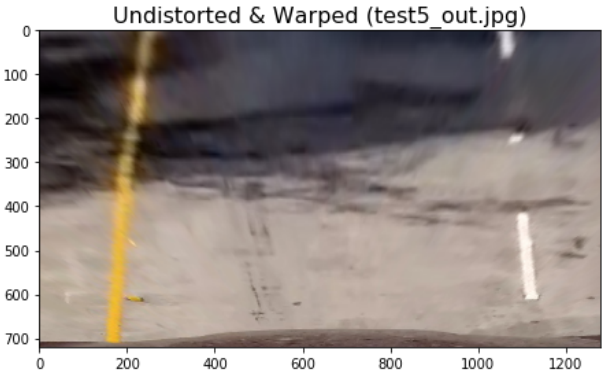


2. Apply a perspective transform to the image ("birds-eye view").

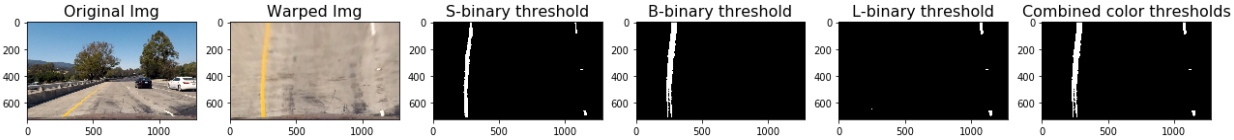


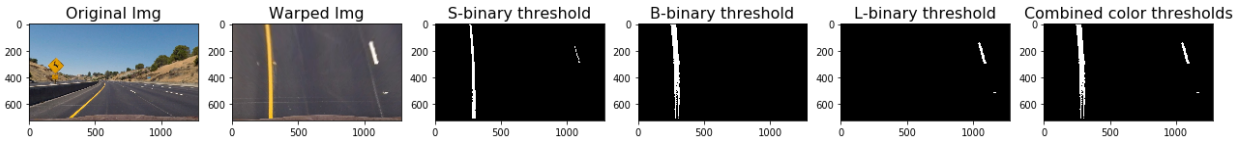




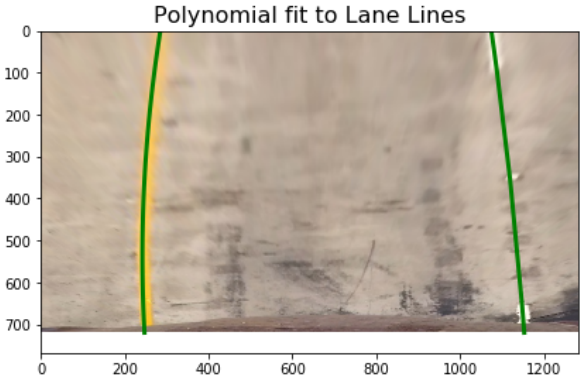


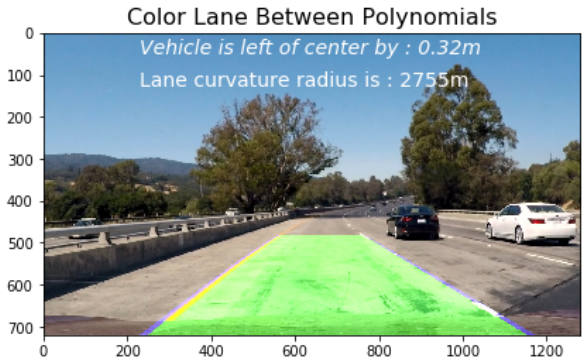
3. Use color transforms, gradients, etc., to create a thresholded binary image. To find the following channels and return them and combined image:
    a. S-Channel
    b. B-Channel
    c. L-Channel

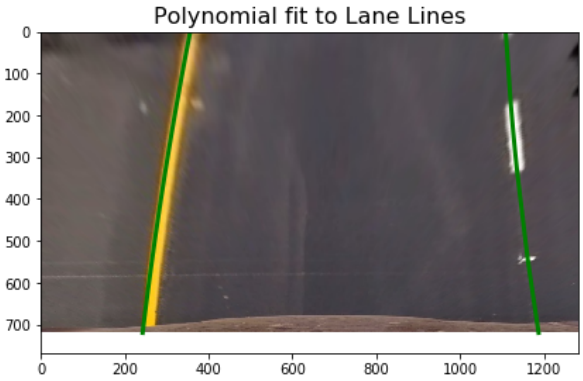


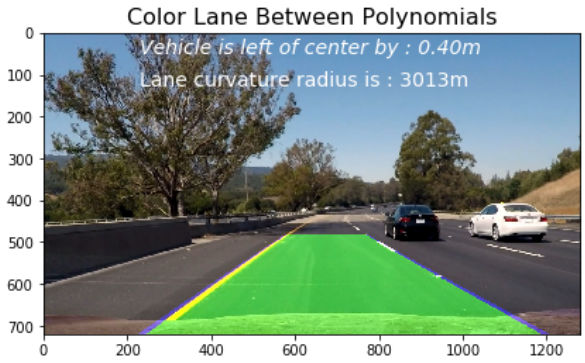


4. Fitting a polynomial to the lane lines and fill the space between them



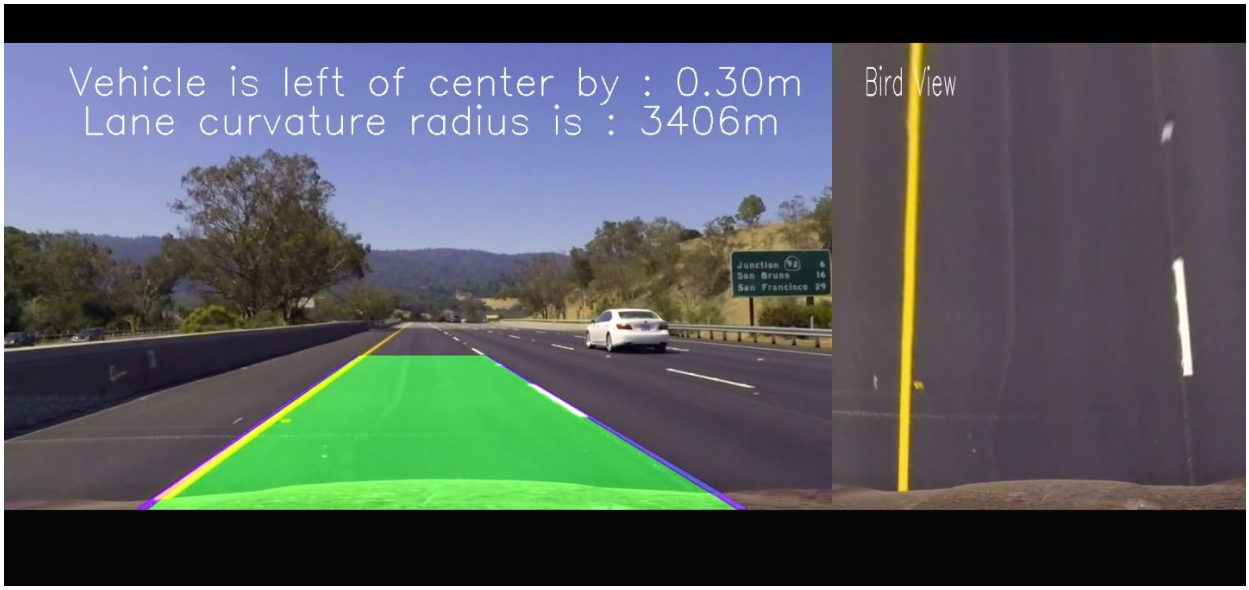






Final output

Final output videos are in the output_video folder, and below sample of the output video.


Vehicle is left of center by : 0.30m
Lane curvature radius is : 3406m
Bird View
Junction 92 6
San Bruno 16
San Francisco 29