

Project CheckPoint

Goal:

Find a way to detect road lane in real time on mobile device.

We want to detect lanes in following steps:

- Get video captured by back camera on IOS device;
- Get data of the orientation of the camera from IMU and calculate a homography matrix for the image to transform the image into bird eye vision.
- In bird's-eye view, the lanes which are not parallel in the original image will become parallel lines.
- Detect road lines by the feature of the lines (white in the middle, darker in left and right)
- Eliminate noise and do distance transformation.
- Get the line position, and transform back to original image.

As we want to detect the lane in real time, so for each frame the video, we do the steps above and show the processed image on the screen. Since the hough transformation is slow, we will do a binary search based on road line features. It will be fast and theoretically be done in real time.

So far, our goal is mainly to detect the straight lane in the road, if time permitted, we want to detect turns in the road (curves in the image).

*Work have been done:**First week:*

- Doing researches on road lane detection and determine the main method to do detection. —Juedou Liu and Yujun Wang
- Decide methods we need in this project. —Juedou Liu and Yujun Wang
- Learn about OpenCV camera. —Yujun Wang

Second week:

- Learn about CMMotionManager in order to get data from IMU of our device. —Juedou Liu
 - Complete sample app to test camera part that we can do real time image processing. —Yujun Wang
 - Complete sample app to test IMU part that we can get data from IMU to know the orientation of the device. —Juedou Liu
 - Design a simple UI for the app —Juedou Liu
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*Schedule for the next two weeks**First half of third week:*

- Complete and test the homography matrix to transform the image into bird's eye view. —Juedou Liu

Second half of third week:

- Road lines detection. —Yujun Wang
- Distance transformation. —Yujun Wang

First half of Forth week:

- Integrate all the parts and test. —Juedou Liu
- Refine the UI of app. —Yujun Wang

Second half of Forth week:

- Finalize the app. —Juedou Liu
- Make a YouTube clip describing the app. —Yujun Wang
- Finish final writeup. —Juedou Liu and Yujun Wang

Problems we have meet so far and some concerns in the future

- The camera part we use CvVideoCamera in OpenCV(opencv/highgui/ios.h) conflict with armadillo package, so we can't integrate the warp part and the camera part. Thus, we need other method to open the camera and process video frame by frame. AVFoundation is a potential alternation for OpenCv camera.
- There are several methods to generate the homography matrix to warp the image, we may need to try some of the methods to determine which one have fairly good result within the time constrain of the task.
- If we use IMU to get the data for homography matrix, it may not stable because the device will be moving.
- If we use Lucas-Kanade method to match to image captured by camera with the template (a general road image), will it be efficient?