Forrest Meng

Jurj PD 2

5/9/20

CV Augmented Reality Chessboard Cube Lab Journal:

So far in this lab, I have learned a lot about PnP problems and camera calibration, and have saw how OpenCV can utilize these algorithms to create rotation and translation matrices for the camera. Findchessboardcorners is also very useful as it uses the chessboard grid to identify the angles and rotations of the camera.

In my code so far, Findchessboardcorners works very well on frames that have the chessboard fully in view. In those frames where the chessboard is slightly obscured by the tissue box, the chessboard detected was either not available or was glitched. Therefore, I included a triangulation algorithm using OpenCV’s optical flow, which uses previous frames’ results to estimate the result of the next frame. I found that 6 pyramids of optical flow provided with mediocre results and a relatively fast time to calculate. 1 pyramid was not accurate enough, while more than 10 was fairly slow on my computer, so I found that 6 was optimal for my machine. This may change if I find better ways to do optical flow or if it runs better on the linux server.

My code right now takes the chessboard corners and every 15 frames runs calibrateCamera() to create the sets of rotation and translation matrices for each frame. It is necessary to use more than 3 frames in calibrate Camera since the method compares multiple frames together to triangulate and determine the cameraMatrix. By using the cameraMatrix created and the rotational and translational matrices, I could loop through the video again to apply the matrices to the frame and project the object points onto there.

This currently should work and it does project the cube to an extent. However, the projections are not at all accurate nor consistent. The cube is barely on the chessboard and usually looks like a rectangular prism than a cube. I believe this may be due to the matrices given by the calibrateCamera to the projection method. However, I am not sure where it could be wrong, since the chessboard corners drawn seem to be all pretty accurate for the most part. I will need assistance from Mr. Jurj as well as other resources and peers to solve this issue, for right now I am a bit lost. You can see in the video that the cube is shown but not in the right shape, orientation, or position.