CS 378: 3D Reconstruction with Computer Vision
Project 3

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1 Introduction

For this project, we were required we were required to track different objects in video sequences. Our tasks included:

- Tracking a yellow ball in various backgrounds
- Tracking the location of a human face in a video

As a general overview, to complete this project, we used a combination of both Hough Circle Transformations and Meanshift to detect the locations of the objects that we were trying to track.

2 Tracking Ball

The generic overview of how we accomplished tracking a ball in various backgrounds is by using Hough Circle Transform and Meanshift to detect the flow of the object. The steps to track the ball were that we used the hough circle to get the initial location of the ball. Then, we call our generic function *_track_ball* which calclates the region of interest and use that to get a back projection which then is passed into *meanShift()*. The mean shift algorithm would then return the new x, y, width, and height values. By doing this, we append (x, y, x + w, y + h) to our list of values that we are supposed to return.

3 Track Face

For tracking the face, we used the Cascade Classifier in order to track the faces. The cascade classifier in OpenCV gives use the chance to train the classifier and to

detect the objects. Furthermore, OpenCV provides us with a dataset to train the classifier.

We use the cascade calssifier to detect the faces by calling *detectMultiScale*. This gives us the x,y coordinates in addition to the width and heights for each face that was detected. Then, we just simply append those values onto our list that we return at the end of the function.

4 Extra Credit

For the extra credit, we attempted to track multiple pedestrians in a street video. This function was called *ETH_tracking()*. Essentially the steps to get this done was by using the background subtractor to track the pedestrians in the video. Essentially what the background subtraction function call does is that it creates a binary foreground mask. What this means is that in order to get the foreground mask, which keeps the object tracked white and the background black, we subtract the current frame from a background frame. This then returns the background mask. We repeatedly do this in order to track the multiple pedestrians.