Journal Report 2
9/9/19-9/16/19
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Period 1, White

Daily Log

Monday September 9

Further struggled to find algorithm to automatically locate ball. Tried changing parameter of Hough Circle Transform. Messed with dp argument and min width argument. Failed to locate ball with ranges of parameter. At home my Mac bricked, and I realized that my MacBook was no longer reliable to do this research project on. I started bringing in my bulky and noisier windows laptop after the incident.

Tuesday September 10

Talked with Mr. White. Fire drill happened. Changed goal. Now, I will hard code an initial bounding box and implement a tracker to see if the ball can even be tracked. CSRT tracker seems to be best tracker according to internet search. Made a small initial bounding box around the ball. Made it a rectangle because the ball is a blur, not really a perfect sphere at all. Does not end up working.

Thursday September 12

Downloaded another video. This one is an official NCAA lacrosse video of UVA vs. Maryland. Should be higher quality. Try to implement CSRT tracker here. Does not work. Was close to calling it a day and quitting here. Suspected something was up with malfunctioning tracker. Implemented Background subtractor. Then, applied tracker to masked frame. Now, it worked. Full explanation of my thinking and why I think this worked in reflection.

Timeline

Date	Goal	Met
Sept 2	Locate and mark a lacrosse ball when it is visible in frame	Was able to mark and track ball, need to address locating it.
Sept 9	Locate and mark a lacrosse ball when it is visible in frame	Refer to above.
Sept 16	Locate the lacrosse ball when it is visible in frame	to be determined.
Sept 23	Identify and track all players on the field	No
Sept 30	Identify and track all players on the field	No

Reflection

I was finally able to implement the CSRT tracker to track the ball during a simple pass. The process to make it work was challenging.

I initially thought that the my original video was too low quality. The ball was travelling too far in between each frame in every pass in the video. The most likely reason that the tracker could not track the ball in the video was because it could not locate the ball in the subsequent frame because it had moved too far from its initial location. Additionally, the ball's shape differed between each frame because the speed of the pass made the ball more visually appear to be a rectangle in some frames compared to a circle in others. Inconsistencies with the ball's appearance and the long distance between each frame were the two main most likely reasons the tracker could not accurately track the ball. Instead the tracker remained close to the starting frame's location on each following frame, which seemed to me like something to take note of.

At the time I thought that the tracker's inaccuracies were because of the quality of the video, so I downloaded a higher quality video. However, when the tracker still did not work, I realized that it must be due to other reasons that the tracker was not working. Then I remembered that the tracker seemed to stay in the same location, as if it were latched onto something else it thought it was an object. There was nothing else in the initial bounding box I hard-coded in besides the ball and the grass in the background. I realized that if the tracker was not tracking the ball, it was tracking the grass. To test the hypothesis, I implemented the background subtractor in opencv to just the initial frame, and sure enough the tracker started tracking the ball.

I met the goal of being able to track the ball once located, but now in order to meet my initial goal, I need to find some way of automatically locating the ball initially without coding into the computer a starting location. I should also test the subtractor-tracker combination on my old video to see if the problem was the same for both videos. For these reasons I modified my goal for this week, pushing my next goal back a week to tackle these next steps of my first goal. My first goal is so much more challenging than I had initially thought it would be.

Figure 1: Beginning of pass. White-jerseyed player on the right is making an underhand pass to player on the left. (Ball is enclosed in square bounding box just above player making the pass).

Figure 2: 15 frames later, the white-jerseyed player on the left lifts his lacrosse stick to catch the ball, still enclosed by the bounding box, successfully tracked throughout pass.