HW3 - Movement Detection and Contours
Due 7/5/2024

1 Introduction

Ever wonder why security footage is always low resolution and blurry? That is because security cameras are always recording just in case something happens and recording at high resolutions will take up a lot of storage space. Which costs money. One way around having to store a lot of footage is to record at a low resolution. What if you can tell the camera only to record if something significant happens? That way, there is less need to store as much footage?

That is what you get to design for this assignment. Your job is to implement a movement detection algorithm that detects if there is a significant amount of movement, and draw a bounding box around the object that is moving.

The key idea behind movement detection is take two frames (current frame and previous frame) of a video and subtract the two frames. If there is no movement the two frames will be exactly the same, and the output of subtracting the two frames will be a completely black image (all 0's). If there is a difference between the two frames, then there must have been movement between the old frame and current frame. The output of subtracting the two frames that has movement will be a completely black frame besides where there is something moving. You then can use that image to find the contours of the object that is moving.

You CAN use any built in function that does not require the TA's to download external libraries.

1.1 Steps to implement movement detection:

- Save previous frame.

- Subtract previous frame from the current frame to the difference between the two frames.

- Threshold the difference to get a binary image.

- Run contour detection on the threshold image.

- Find the bounding boxes of the objects with large contour areas.

- Display the bounding boxes on the original colored video.

1.2 Example end output
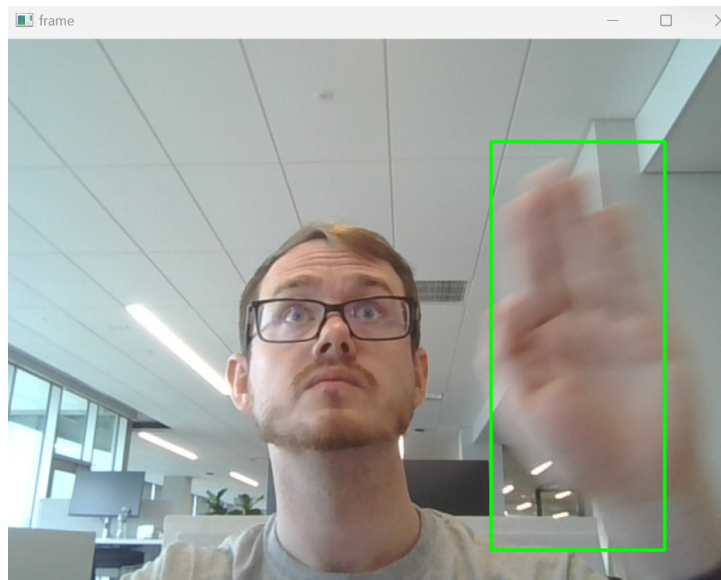
1.3 Example difference after thresholding

2   Grading (Out of 100 points)

- 10 Points : Add your name and date to the beginning of your code.

- 10 Points : Use appropriate comments throughout your code.

- 10 Points : You are able to find the difference between the old frame and current frame.

- 10 Points : Appropriately threshold the image to avoid too much noise.

- 10 Points : You are able to find the contours on thresholded image.

- 50 Points : Only the most significant bounding boxes are displayed on the video.

3   How to turn in

You must submit a zip folder that includes all files, folders, and images that are required to run your program. Name the zip folder "HW3-Lastname.zip" and upload it to canvas.

Good Luck Cat!