Andrew Kozempel

Professor Avanzato

CMPSC 497

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**Lab 4: Color Tracking with Webcam**

**Objective:** Design and test a MATLAB algorithm and code to identify the largest red object in a video and display the centroid (location) and bounding box on the processed

video.

**MATLAB Script:**

| **%{ Andrew Kozempel CMPSC 497 Fall 2023 LAB #4: Color Tracking with Webcam %}  cam = webcam;  % define figure for later figure;**  **% loop through frames for i = 1:10000   % get image from video  RGB = snapshot(cam);  fprintf('\nSize: %d x %d', size(RGB, 1), size(RGB, 2));    % split into R, G, B planes  r = RGB(:, :, 1);  g = RGB(:, :, 2);  b = RGB(:, :, 3);    % create binary mask for red objects  redMask = (r > 2\*g) & (r > 2\*b) & (r > 30);    % apply closing  se = strel('disk', 35);  redClosed = imclose(redMask, se);    % remove small objects  redObjects = bwareaopen(redClosed, 35);    % properties of labeled regions  properties = regionprops(bwlabel(redObjects), 'Centroid', 'BoundingBox', 'Area');    % if red objects were detected  if ~isempty(properties)   % find the largest red object  [~, largest] = max([properties.Area]);  centroid = properties(largest).Centroid;  boundingBox = properties(largest).BoundingBox;   % display original image  imshow(RGB);  title(sprintf('Frame %d', i));  hold on;    % mark centroid and draw bounding box  plot(centroid(1), centroid(2), 'b+');  rectangle('Position', boundingBox, 'EdgeColor', 'b', 'LineWidth', 2);    else  imshow(RGB);  title(sprintf('Frame %d - No Red Object Detected', i));   end**  **% Update the figure window  drawnow;  end** |
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**Results:**

| **Successful Color Recognition** | |
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| **Unsuccessful Color Recognition** | |
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| **Successful Color Recognition (LARGEST ONLY)** | |
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| **MATLAB OUTPUT** |
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| The output gave the size of the screenshots, so it was constantly printing:   Size: 480 x 640  This obviously applied to all images because they are all coming from the same source. |

**Conclusion:**

This basically reused a lot of the code from Lab 3, so I just had to make some slight modifications. I also used the same objects as before. Having a live video feed made this lab a lot more interesting, though. Overall, it seemed to do what it was supposed to do, but there were a couple issues. Mainly, it sometimes randomly detected a red object where there wasn’t a red object, but I guess that is just because there was more red than green and blue.

For the first image in the “unsuccessful color recognition” table, I counted that as unsuccessful just because it is not a red object, even though the keyboard light was red. It was also unsuccessful because there were two other objects it could have detected in that screenshot (red icons on shirt and shorts). Even then, it highlighted the whole keyboard and only a very, very small portion of it is red.