

ECE/OPTI 532, Spring 2023
Homework 5 Assignment
Due Tue. April 4

Write a computer program to find all maximal connected components in a bi-level image. Use Haralick's algorithm discussed in class (or Rosenfeld's algorithm if you prefer and are comfortable with DFS operations to resolve the equivalence table). Assume the background pixels have gray level 0 and the foreground pixels have non-zero gray level. Find all maximal 8-connected foreground components. Write the output as an image where each pixel value indicates the label of the connected component that it belongs to.

Two options for scaling the output pixel values:

1. $\text{MaxOutputValue} = \text{nComponents}$

Background output pixel value = 0

Foreground output pixel values = 1, 2, 3, ..., nComponents

To display or print such an image, you will probably need to scale it to a normal range first. In MATLAB, do `imshow(I, [])` to automatically scale the gray levels to [0,255] before displaying the image.

2. $\text{MaxOutputValue} = 255$

Background output pixel value = 0

Foreground output pixel value = $\text{RoundToNearestInt}(k * 255 / \text{nComponents})$

for pixels belonging to connected component k , for $1 \leq k \leq \text{nComponents}$.

Submit the following items:

- Turn in your commented source code.
- Run your program on the sample images, `book.png` and `keys.png`. Turn in the output images, where each connected foreground component is shown with a distinct shade of gray (use the full range of gray shades between black and white so it's easy to see the distinct components). Alternatively, assign distinct color values.
- If your program does not work completely, then discuss the debugging steps that you have taken and where you think the problem may lie.