ECE/OPTI 532, Fall 2020

Homework 5 Assignment: Connected Components Labeling

Due Thu Nov 5 at 5:00 pm

Write a computer program to find all maximal connected components in a bi-level image. Use the iterative procedure discussed in class (or the classical equivalence-table algorithm if you prefer). Specifically, find all maximal 8-connected foreground components. Write the output as an image.

Optional parameters you may want to allow the user to specify:

- Two options for scaling the output pixel values:

  MaxOutputValue = ncomponents or 255

- Two options for identifying which connected components to label: the components having zero gray level or those having non-zero gray level.

  ComponentGrayLevel = Zero or NonZero

  If ComponentGrayLevel = Zero, then the output pixels will be assigned pixel values as follows:

  OutputPixelValue = RoundToNearestInt((k-1) * MaxOutputValue / nregions),
  if part of connected component k, for 1 <= k <= ncomponents
  OutputPixelValue = 255 if not part of a connected component.

  If ComponentGrayLevel = NonZero, then the output pixels will be assigned pixel values as follows:

  OutputPixelValue = RoundToNearestInt(k * MaxOutputValue / nregions),
  if part of connected component k, for 1 <= k <= ncomponents
  OutputPixelValue = 0 if not part of a connected component.

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 component is shown with a distinct shade of gray.
- If you program does not work completely, then discuss the debugging steps that you have taken and where you think the problem may lie.