ECE 6310

Introduction to Computer Vision

Fall 2022

Lab 4

Region Interaction

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Introduction

This lab required the students to create a GUI that implements interactive region growing. The GUI must be able to load and display an image. Whenever the user clicks on a region, then the region should grow according to the two predicates or conditions. The program should enable the user to clear the previous visualization and show the original image. Moreover, the Region growing function should have a play and a step mode. In Play mode, the new pixels are joined after 1ms, whereas in step mode, a pixel should join the region after each 'J' key press. Additionally, the user should be able to switch between the mode.

The two predicates, required for the region grow function, are the absolute difference of the pixel intensity to the average intensity of pixels already in the region and the distance of the pixel to the centroid of pixels already in the region.

Implementation / Methods

For the actual implementation of this lab, the students were provided with a basic GUI that can load and display an image. Students were also provided with a premade function for region growing. However, a few changes were needed to make it work in a GUI with the above-mentioned conditions.

Let us take a look at the GUI and all the available functionalities.

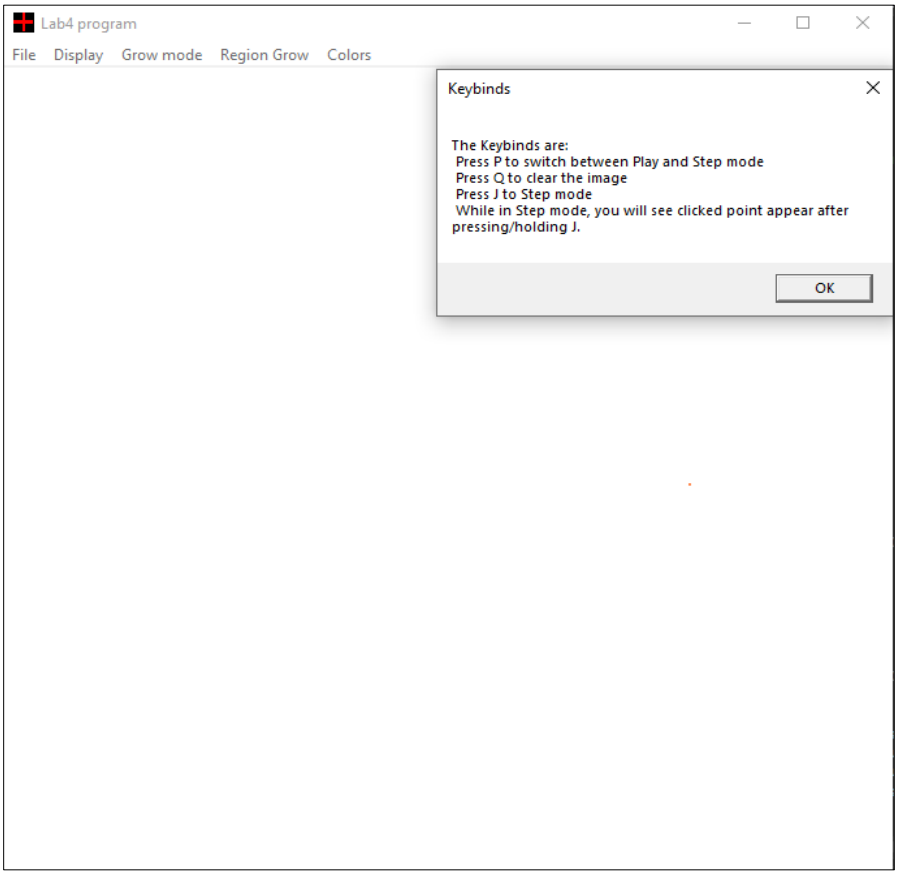

Figure 1. Opening Screen of GUI

The GUI has some keybinds for ease of access. Upon opening the program, we can see a pop-up message giving information about the various keys and their respective functions. Users can either click on ok and proceed, or they can keep this pop-up aside for reference and proceed with the program.

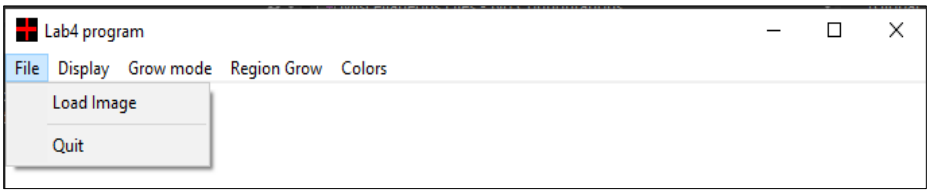

Figure 2. File Menu

Figure 2 above shows the options in the File menu. In order to load an image, users have to select Load Image and then choose an image from any desired location.

Figure 3. Display Menu

Users can see the pixel coordinates of their cursor by enabling the Show pixel coordinates option. Users can either click on the menu shown above or press the ‘S’ key.

Figure 4. Grow Mode Menu

Figure 4 above shows the options in the Grow mode menu. This menu allows the users to switch between play and step modes. Users can also restore any previously drawn region. Users can press P to switch between the Play and Step modes. Users will have to hold the J key to grow the region while in step mode. Users can start multiple seeds while in step mode. However, only the first click or seed will be seen on the screen until the J key is pressed. After the J key is pressed, all other seeds or clicks will also be seen on the screen.

Users can also press Q to clear any previously drawn region.

Figure 5. Step mode operation

Figures 5 and 6 show the working of the step mode. In Figure 5, we can only see one seed (red dot in the middle), despite having multiple seeds on the screen.

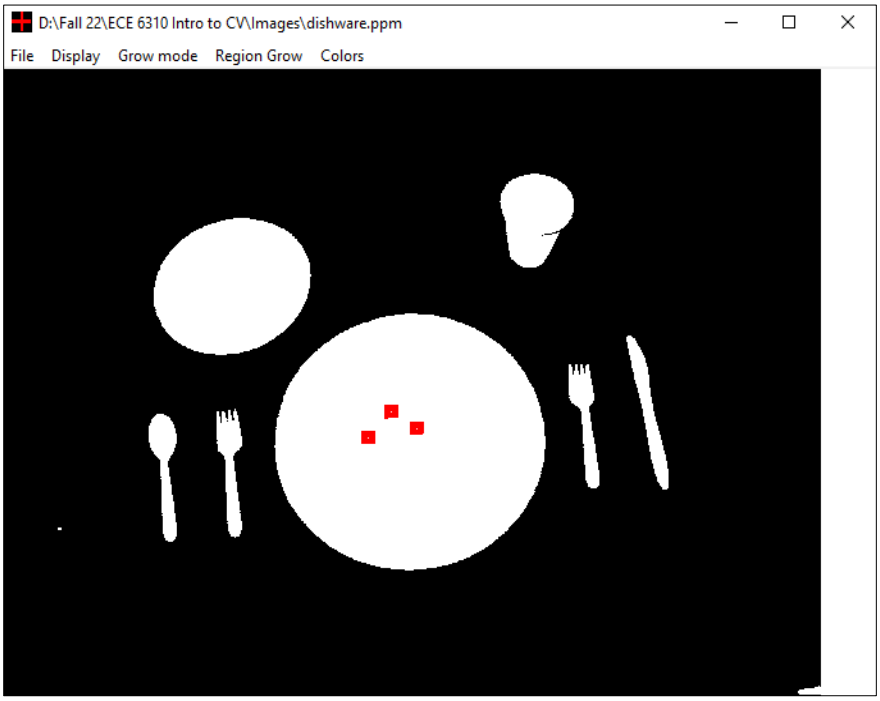

Figure 6. Step mode operation (multiple seeds)

In Figure 6, we can multiple seeds on the screen after J key is pressed.

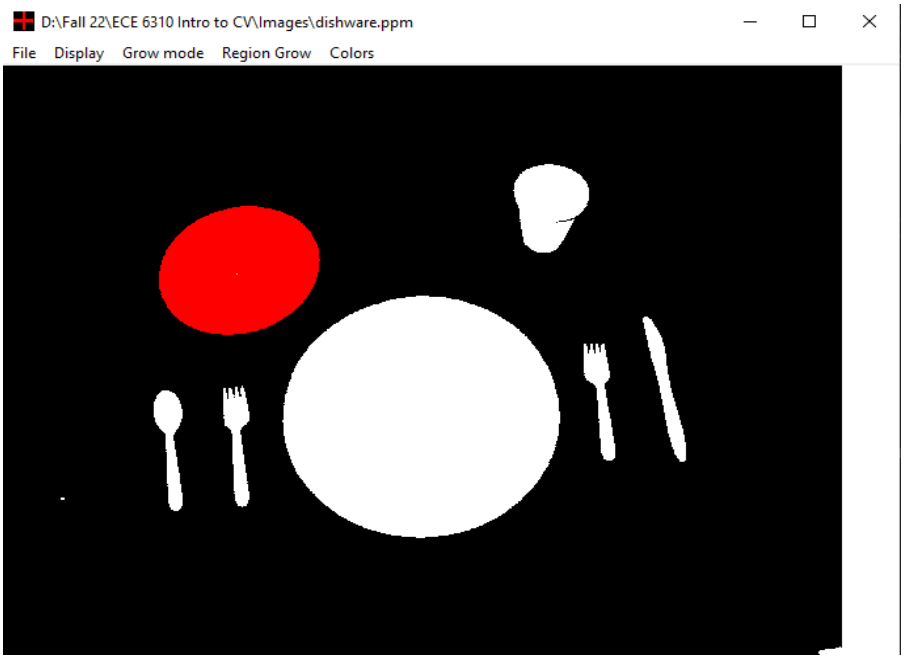

Figure 7. Play mode

Figure 7 is simply an example of play mode. In play mode, after clicking, the whole region is continuously joined according to given predicates.

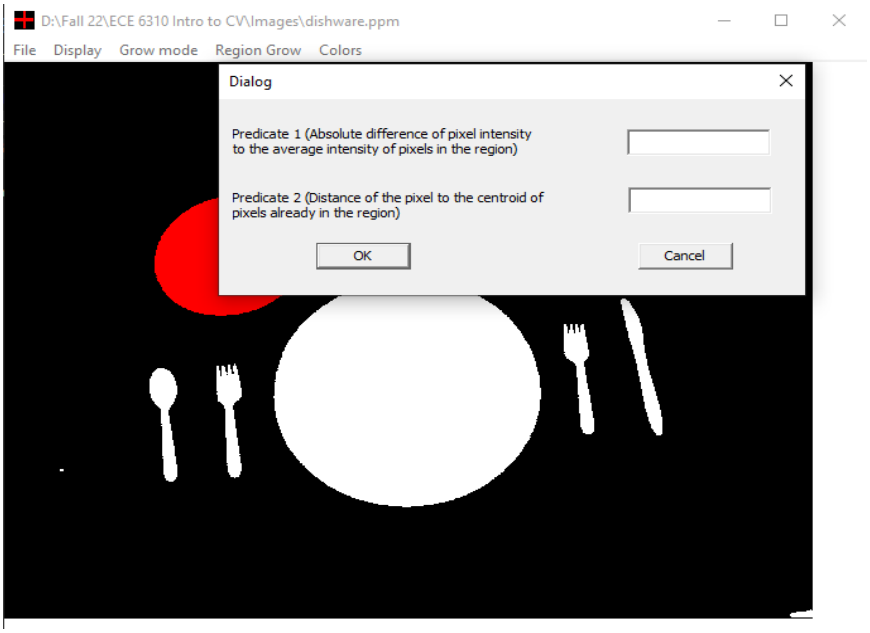

Figure 8. Region grow menu for Predicate Selection

Figure 8 shows the dialog box for predicate selection. By default, the value for predicate 1 is 100 and for predicate 2 is 200. The user can override the default values to any desired values in this dialog box. The figure 9 shows an example of region grow after predicate selection.

Figure 9. Output when both predicates are set to 50

Figure 10. Colors menu

Users can also select from four colors: Red, Yellow, Green, and Blue. The figure above shows an example of multiple regions with different colors.

Code

No code is written in this document. All the required files are attached on canvas.