**CSC 545/645 Computer Speech, Music and Images**

**Assignment: Image histogram processing**

**Due February 15, 2016**

**Point processing and histograms**

Write a Processing program to perform histogram operations on an image. Make the image filename a global String variable. Perform histogram stretch and equalization on the image. Allow the user to display images and histograms as follows: ‘1’ will display the original image; ‘2’ will display the stretched image (histogram stretch, implemented as discussed in class); ‘3’ will display the equalized image (histogram equalization, implemented as discussed in class); ‘h’ will display the image of the original histogram; ‘s’ will display the stretched histogram; ‘e’ will display the equalized histogram. You may also want to use ‘c’ to display the cumulative histogram for debugging, but that is your choice.

When displaying histograms, display the red, green, and blue channels separately, side by side or vertically above one another; if the image is grayscale, you may choose to automatically discover that and display only one histogram. Display the pixel values and counts in the display window as the mouse moves over the histogram.

Extend your program to allow a user to select a rectangle of an image using the mouse, then modify only the selected area. One way to do this is to use mousePressed() to set global variables startX and startY; if mousePressed is true, then set global variables endX and endY to mouseX and mouseY (note the difference between the mousePressed() function and the Boolean variable mousePressed ). When selecting, you’ll draw a rectangle from (startX, startY) to (endX, endY)—set rectMode to CORNERS, use noFill(), and set the stroke color to one that shows up. Stretch the histogram to use full dynamic range over the selected part of the image and display it when the mouse is released; use ‘r’ to display the histogram on the regionally modified image. You may assume the user will only select a region on the original image and that regional modifications will NOT be cumulative—in other words, if the user selects a region, the resulting image will be displayed when the mouse is released. If the user selects a different region, mouse release will display the new image and the previous change is lost. You needn’t display the histogram of the selected region; of course, the complete image histogram, displayed by ‘r’, will reflect the changed pixel values.

You may choose to convert your image to YCbCr format and to do the histogram operations on the Y (luminance) channel. In that case, convert the image to YCbCr, modify the Y channel, then convert back to RGB for display. Because the YCbCr channels all fit in the range 0-255, the values can be stored in RGB pixels.

Provide user documentation to describe how to use your program; this can be sparse and could be internal—all the relevant operations are probably prescribed above, but document them anyway to confirm that’s how they work. Also, document any features not prescribed above and document any known bugs.

Name your program Asn1 and put it in your upload folder on eccentric by 11:59 PM on the due date.

**Deliverables**

Processing program, described above

User documentation, describing how to use your program. If the documentation is internal, put it in comments at the top of your program. If it’s a separate document, put it inside your program folder.