COS 339 - Advanced Programming Final Exam Project

Due: January 29, by 23:59pm through UBIS system

First Part (image processing)

Note: You can work in a group of at most 2 students. We will have a zoom meeting to discuss your implementation. No credit will be given unless we have a zoom meeting.

You will create a GUI application where each tab will show a different aspect of an image that is provided for you. Please make sure to use the image provided by your instructor.

Done! Tab0: Show the original image in this tab.

Done! Tab1: You will create the edge image of the given image. Please refer to the class discussions we had about what kernel to use. In this this tab, you will show the edge in the x direction of the given image. Hint: Show only the Gx from our class discussions.

Done! Tab2: You will create another tab that shows the edge image in the y direction. Hint: Show only the Gy.

Done! Tab3: Show the edge image of the given image combining both Gx and Gy.

In all tabs 1 through 3 make sure that the color value components is within the range. That is, between 0 and 255 inclusive. Please refer to the class discussions on this as well.

Tab4: Basically, show the angle of intensity change in this tab. Note that you are working on each individual pixel value of the image provided. For this tab, you need to find the angle of intensity change (Gy/Gx) for each pixel and create a histogram out of these in the following way: Divide the image into 8x8 cells, that is, in each cell you will have 64 pixels. If the image width or height is not divisible by 8 discard the remainder pixels. For each 8x8 cell create a histogram where each bin is 20 degrees which is the x axis of the histogram. The y axis should be the magnitude totals. The bins then are between 0-19 degres, 20-39, 40-59, ..., 160-179 (total 9 bins).

Done! Tab5: Click somewhere in the original image (Tab 0) which will mark the top left corner of the image. Then click another point in the original image to mark the bottom right corner of the image that you will make a copy of. The rectangle that you marked the top left and bottom right corners of will be expanded by doubling it in a different tab. That is, each pixel of the chosen rectangle of the original image will be shown as 4 pixels in a differnt tab (Tab 5) where the original image pixels are copied (Again, each original image pixel is now a 2x2 pixels where each of the 4 pixles is the copy of the original image pixel. Go back to our class discussion (listen to the lectures on this).

Deliverables:

1) Your source code.
2) A readme.txt file that explains briefly what you accomplished and what not.
3) The two group members, if you worked in a group of two students.

Note: Please use the link https://learnopencv.com/histogram-of-oriented-gradients/ for a more detailed description following only instructions given in Tab4 (do not do everything discussed in the link given here)

Importan last note:
Please make sure that your answers to this first part (image processing) and the Java stream (second part) are put together in your submission.
Your Java code for the first and second part should all be in pdf form, that is, Have your all your Java source code for the first part and second part be turned in as a single pdf file.

Your outputs (the gui window with tabs for the first part) and your console output for the second part should be included in the single pdf file of your source code.

Advanced Programming Done! Final Exam Project, second part

Create a Customer class with first, last names, year, city he/she lives in and the amount of purchase (transaction) made at that year.

Create a list of 10 customers. Do the following on the list of customers using Java Streams.

1. Find all transactions in the year 2011 and sort them by value (small to high).
2. What are all the unique cities where the customers live?
3. Find all customers from Istanbul and sort them by name.
4. Return a string of all customers' names sorted alphabetically.
5. Are any customers living in Ankara?
6. Print all transactions' values from the customers living in Istanbul.
7. What's the highest value of all the transactions?
8. Find the transaction with the smallest value.
9. Is there any transaction less than a certain value?
10. For any of the filters you used in the above queries, do it using
(i) lambda expression
(ii) creating a class that implements the interface filter is expecting and passing an object reference to the filter.

Please check the first part for deliverables.