Hough Transform

COMP 3301 — Assignment 4

Due: November15, 2020 (Sunday) 11:59 PM

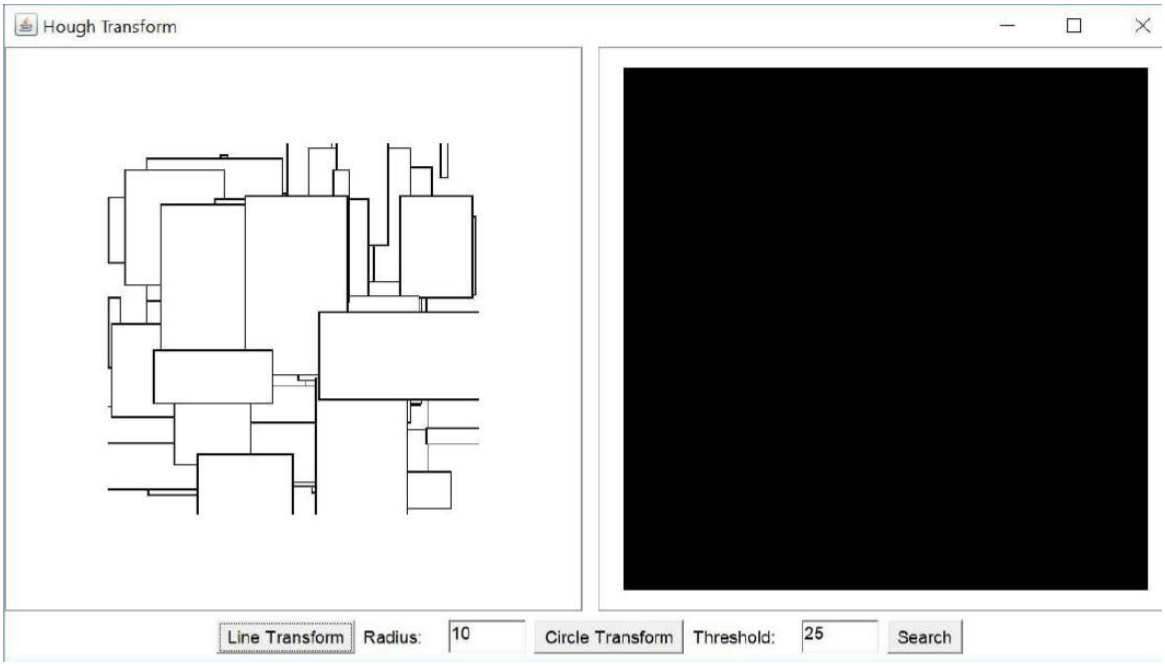
Groups Self-Enrollment Expiry Deadline: November 9, 2020 (Monday) 11:59 PM

Objectives:

In this assignment you will implement the straight-line and circle Hough transforms discussed in class. The goal is to give you a further understanding of Hough transform, as well as the straight-line and circle detection problems.

Your Task:

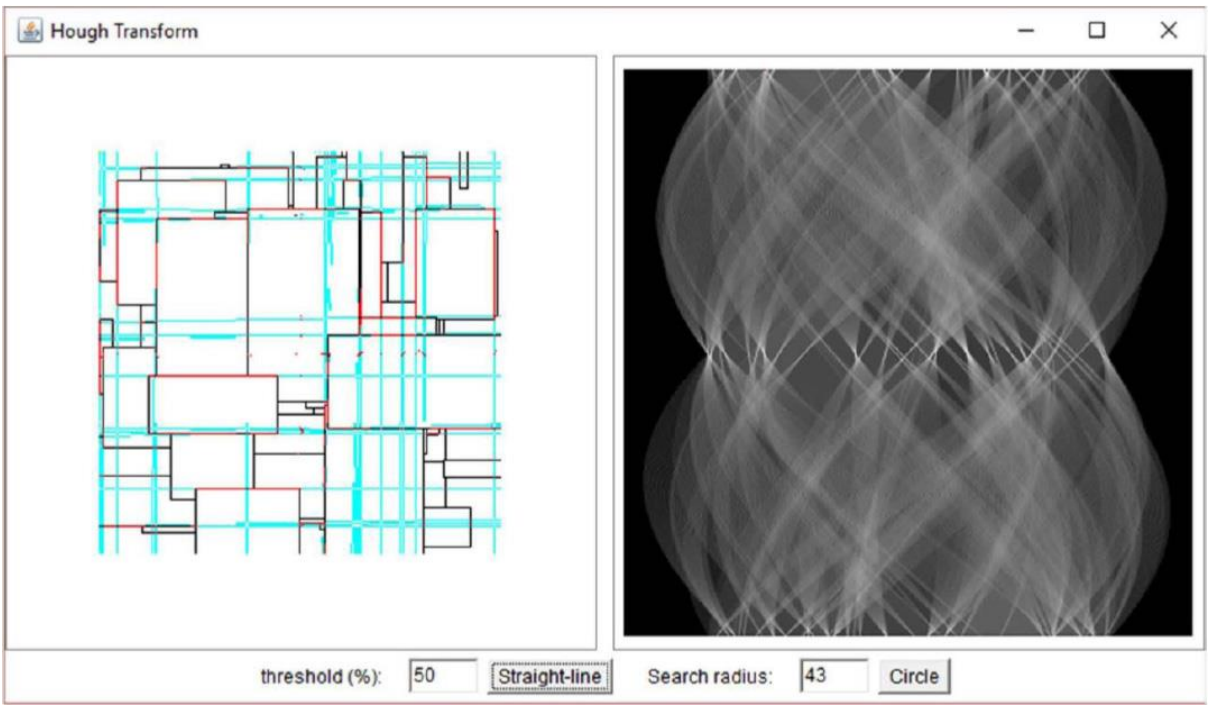
You need to implement both straight line and circle Hough transforms. For straight-line Hough transform, the polar parameter space should be used. For circle Hough transform, you only need to search for circles with a known radius, which is given by the user through a text field. Show detected lines and circles under user-specified threshold through plotting the corresponding shapes on the input image.

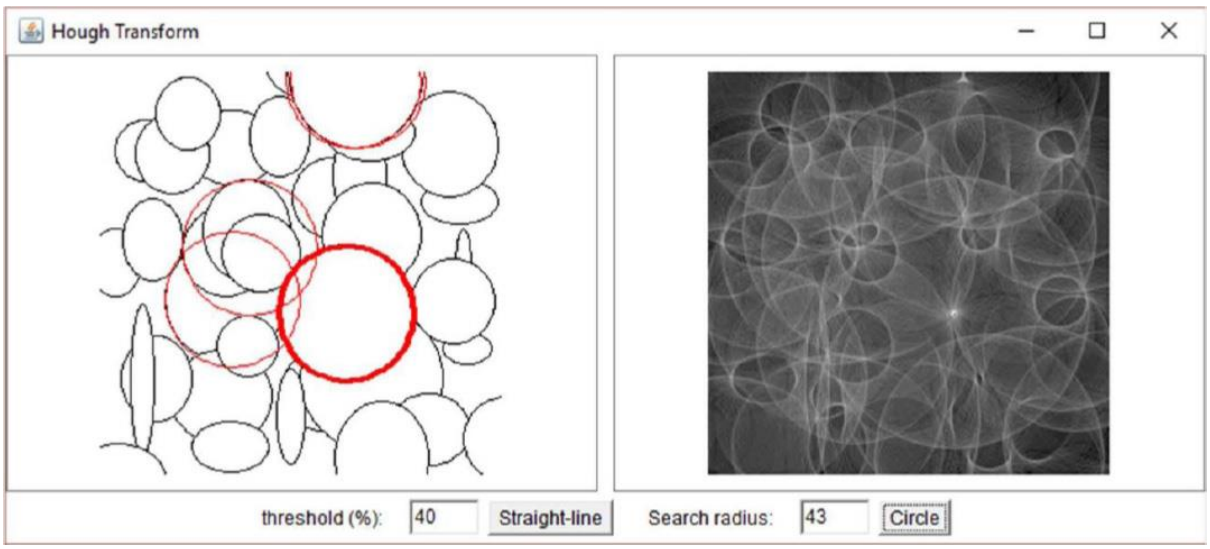


Output of the skeletal program

Getting Started:

A skeletal program is supplied to get you started, which you are required to use as the basis of your implementation. To run the skeletal program, you need to put the testing images in the same folder. The program opens a window that contains two panels, and displays the input image in both panels. It also contains code for displaying blank transformation results. The test images in this assignment are already images that are showing mainly the edges, that is, you can imagine they were already preprocessed through some edge-detection algorithm, or that they actually contain lines and circles.





Output of sample solutions

Grading:

Your program will be tested and graded using a standard Java environment. The grade will be based on your program's functionality (whether or not it works under different settings), as well as the efficiency of your implementation. The weights for different components are as follows:

- Correct Hough transformation results for straight-lines 35%
- Display detected straight-lines on the input image 15%
- Correct Hough transformation for circles under different radius settings 35%
- Display detected circles on the input image 15%
- Extra Marks: Draw the line segments at exact start and end locations of the source 5%
- Extra Marks: Take any image and use it as input, doing edge detection using a library 5%

· Extra Alternative: Take a regular image and do your own edge detection 15%

Some foreseeable deductions are:

- Failure to include helper source files: -10%
- If the documentation mentioned below is missing or incomplete, anywhere from 10% to 20% will be deducted.
- If essential source files (.java) are missing, anywhere from 50% to 100% will be deducted, depending on how much is missing.
- If the TA cannot execute your program or your program crashes without the TA being able to evaluate your submission, but you did write and submit an original solution, 80% will be deducted.

What and How to Hand in:

You are handing in the source of your program (source code is essential), as well as any data files required for running your program. Your source code must contain sufficient internal documentation to facilitate grading. This includes names & student numbers of all contributing members of the group, a brief description of each member's individual contributions, an explanation of what the programs do, and a listing of known bugs and features and things that are not working, if any. This can be included either in the dropbox comments window, and/or in an additional text file.

Send in your source program through the Direct2Learn's Dropbox as a single .zip file. No late submission is allowed.

If you have members of the group that did not contribute to the assignment in a fair way, or not to the degree to which it was previously agreed, please indicate this in the documentation, and indicate the percentage of the assignment grade that the non-contributing member deserves. Note that this does not increase the grade of an incomplete submission, but rather prevents non-contributing group members from benefitting unfairly from the work of others.

Verify your submission:

Since late submissions are not allowed, you should be careful to make sure each of your submissions has been properly done. Once you have placed your assignment into the Assignment's Dropbox, click on the link that indicates our submission has been done, download it, open it (preferably on a different computer), revise the contents, test that the program you have submitted actually is the one intended (not just the source files, for example), and if it does not correspond to what you want the TA to mark, you must resubmit again, until you are satisfied that the submission has all the elements that you need the marker to see. Please note that the TA will only mark the last submission with a timestamp that is prior to the indicated deadline.