3rd Exercise – Med3 2019-20

Questions:

1. Explain the following concepts: structuring element, hit, fit, erosion, dilation, opening, closing.

Answer: Erosion means an object gets smaller as the surrounding pixels corrects the image. Dilation mean the objects border gets larger as the object's pixel corrects the image.

Structuring element is used to check if the given shape is on the given image. From there the other operations can be used on either the shape or images.

Hit is an operation that are checking on a binary image where the pixel's value is 0(black) or 255(white). With this operation, it can be used to find edges on the elements. This is get called when any of the pixels on given structure or image is turned on.

Fit is when hit detects all the pixel is turned on in the given structure or image.

Opening is like erosion, but it is less destructive in the pixels of the region of the foreground. So it will try to keep the same shape while remove noise near the object's edge.

Closing is an operation that uses dilation followed by erosion to fill out small graps in the structure.

2. Explain the following concepts: BLOB, connectivity, recursive grassfire algorithm, sequential grass-fire algorithm

Answer: BLOB is binary large object and describes the object in an image which are detected. Connectivity is how the objects are connected as there may be more than one, but also how they relate to each other.

Recursive is when you check the right pixel and then go in a clockwise direction to check the rest of the neighbouring pixels, regarding checking the pixels to find elements of an object, this means that is checks from the start all the way to the right, then all the way down the object, then all the way back left of the object (in relation to the area it is connected to, then back up until everything is filled out.

Sequential is similar, but here it saves a list of each pixel from the starting point and works its way down the list of the explored pixels related to the object, on the list it saves the coordinates of the pixel, and when the first pixel is detected it checks the neighbouring pixels moving right, then down, left and finally up.

3. How many BLOBs are present in Fig. 1 when 4-connectivity is applied?

Answer: 7

4. How many BLOBs are present in Fig. 1 when 8-connectivity is applied?

Answer: 4

5. In which order are the different pixels in Fig. 1 labeled when a recursive grass-fire algorithm with 4-connectivity is applied?
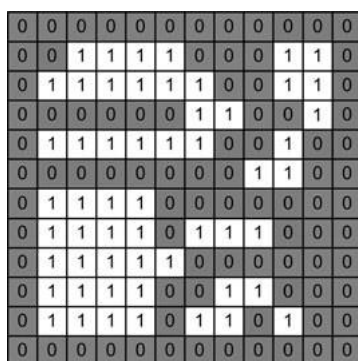

Figure 1: Object pixels are white (1). Background pixels are gray (0)

Answer: By rule it names the first pixel of a detected object 1, it then goes from the checked pixel to the right and if there is a pixel that is a part of the object it is named 2 but is still a part of the first object, when there are no more elements of the object to the right it checks if there are any element of the object down if there are not it goes back as it will be able to detect it moving backwards from where it came from and it will then check of there are any elements of the object connected to that pixel in the downwards or upwards direction until there are no more pixels that define the object. So, it goes from left to right then down, left and finally up until every element of the object is found within the parameters of the 4-connecticity system. then down, then left, then up until there are no more pixels that define the object.

Programming:

1. Center of mass (or center of gravity or centroid) of a physical object is the location on the object where you should place your finger in order to balance the object. The center of mass for a binary image is similar. Write a sketch in Processing where you are trying to find the center of mass of a binary image of your choice.

Upload a document (word or pdf) in which you have answered all the questions and you have the code of the programming question (with some basic at least comments), as well as screenshots of the images.