

**SOFTWARE LAB**

**EEP 702**

## **Assignment 10**

# **Land-Water Discrimination using Java**

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April 8, 2014

# Contents

<b>1</b>	<b>Problem Statement</b>	<b>3</b>
<b>2</b>	<b>Abstract</b>	<b>4</b>
<b>3</b>	<b>Specification And Assumption</b>	<b>5</b>
3.1	Specification . . . . .	5
3.2	Assumptions . . . . .	5
3.3	Execution Method . . . . .	6
<b>4</b>	<b>Flow Chart</b>	<b>7</b>
<b>5</b>	<b>Logic Implementation</b>	<b>8</b>
<b>6</b>	<b>Result And Conclusion</b>	<b>9</b>

# 1 Problem Statement

Develop an Java program which can accomplish following tasks:

1. There is a mass of land containing some finites number of water bodies. Let the piece of land be represented by a 2-D matrix, whose each cell represents a unit area. Value '0' of a cell denotes that it comes under land area and '1' denotes that it comes under water body. If the cells connected by a 4-point connectivity forms a single water body, find the total number of water bodies.
2. If the cells connected by a 8-point connectivity forms a single water body, find the total number of water bodies.
3. Label the water bodies so that if user specifies a cell (m,n), the program must tell whether it comes under a water body.

## 2 Abstract

The problem seems to have been designed to provide hand on experience with the concepts of Java. Java is the most used OOP language and was used to solve the given problem

## **3 Specification And Assumption**

### **3.1 Specification**

The specifications of the variables and functions in the program are described below:

1. A matrix simulates a map of pixels.
2. Each pixel has value either 0 or 1.
3. 1 represents water in a map and 0 represents land.
4. Five point theory defines waterbody in first case and nine point theory defines it in another. Theory is given above in abstract.
5. One point immediately left or right or up or down to a waterbody comes in its domain and is also a part of it.
6. A map dimensions are programmable and can have any dimensional value.

### **3.2 Assumptions**

1. There is finite dimensional values of map.
2. 0 marked as land are used as separator of waterbodies.
3. user input is read from file

### **3.3 Execution Method**

1. write the size of matrix as input in file.
2. then write the input matrix on the file
- 3.

## 4 Flow Chart

The basic algorithm that is implemented is shown through the flow chart given below.

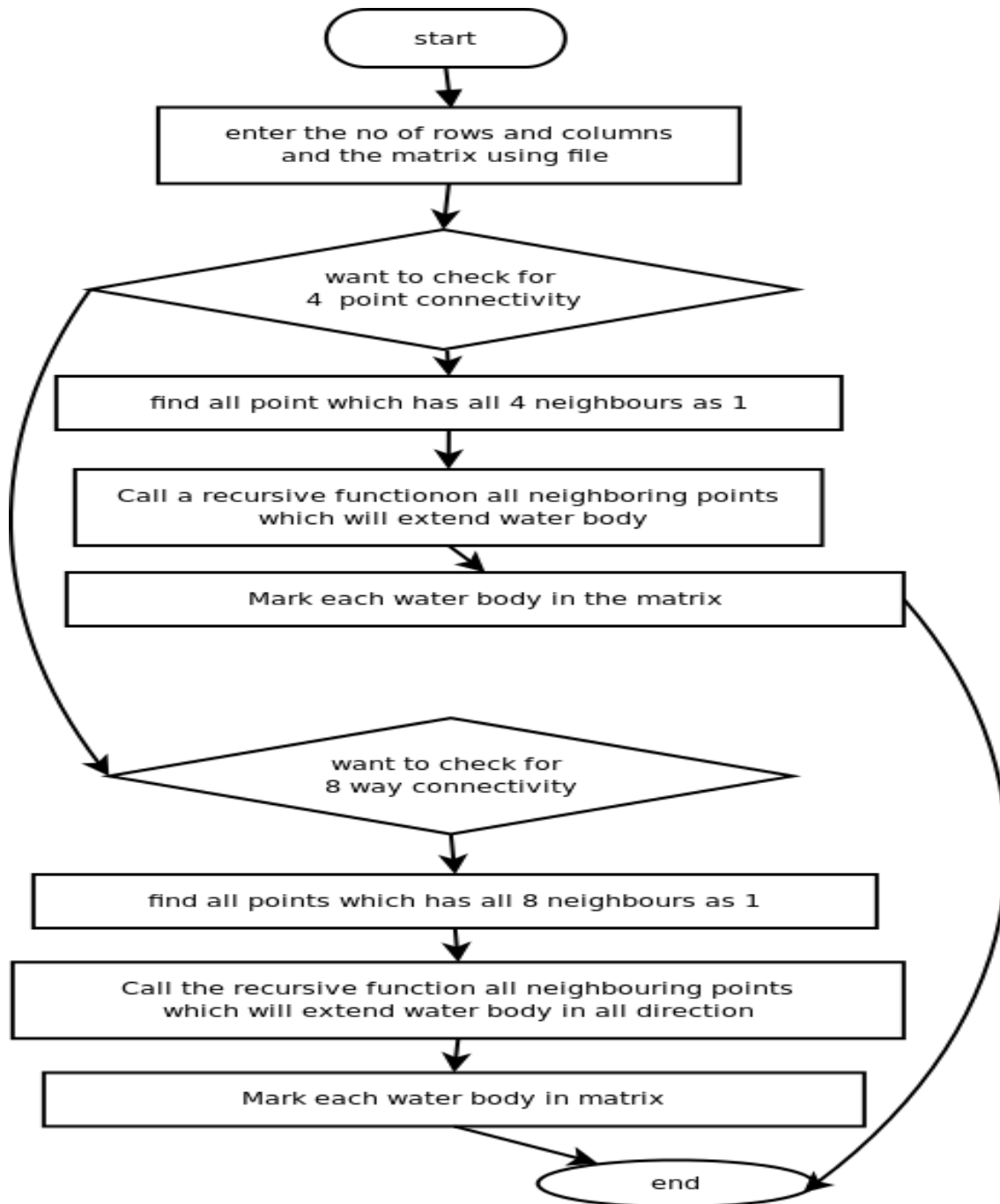


FIGURE 1: Flow Chart

## 5 Logic Implementation

The logic for Weather Forecasting is discussed below:

1. Initially a random matrix is generated using the library of python. The values of no of rows and columns are asked from the user.
2. A test is carried out on each point or each value in the matrix, to check whether that point is following adjacency criterion for 5 points or not.
3. If a point satisfies the criterion, it becomes the center of the waterbody. Now we have to expand our test points to all directions to see whether this waterbody expands or not.
4. If adjacent point is 1, it is part of waterbody, otherwise a 0 separates the waterbody from the land.
5. Control moves to next point and repeats point 2,3,4 on this point as well and so on till last point.
6. Point no 2,3,4,5, and 6 are gone through to discriminate land and water in case a waterbody's center follows 9 point adjacency.



## 6 Result And Conclusion

The conclusions drawn from the above programs are given below:

1. Both programs worked for all possible combinations .
2. Points that are 1 and are part of waterbody are marked as .
3. Points that are 1 and are not part of waterbody remains unmarked.

```

hk@hk-Dell: ~/soft_assign/assign10
File Edit View Search Terminal Help
hk@hk-Dell:~/soft_assign/assign10$ javac WaterBody1.java
hk@hk-Dell:~/soft_assign/assign10$ java WaterBody1 <in
Original Matrix 1-water and 0-land
.....
| 1 | 1 | 1 | 0 | 1 | 1 |
| 1 | 1 | 1 | 0 | 1 | 1 |
| 1 | 1 | 1 | 0 | 1 | 1 |
| 0 | 0 | 0 | 1 | 0 | 1 |
| 1 | 0 | 1 | 1 | 1 | 0 |
| 0 | 0 | 0 | 1 | 0 | 0 |
.....

Number of islands is: 2

Water bodies corresponding to matrix index
.....
|0 0 ##|0 1 ##|0 2 ##|0 3 |0 4 |0 5 |
|1 0 ##|1 1 ##|1 2 ##|1 3 |1 4 |1 5 |
|2 0 ##|2 1 ##|2 2 ##|2 3 |2 4 |2 5 |
|3 0 |3 1 |3 2 |3 3 ##|3 4 |3 5 |
|4 0 |4 1 |4 2 ##|4 3 ##|4 4 ##|4 5 |
|5 0 |5 1 |5 2 |5 3 ##|5 4 |5 5 |
.....

Output of All your Queries of points
Your point at 1 2 is inside Water Body
Your point at 4 0 is not inside Water Body
Your point at 2 5 is not inside Water Body
Your point at 3 3 is inside Water Body
hk@hk-Dell:~/soft_assign/assign10$

```