**CS G526 – Advanced Algorithms and Complexity**

**Lab-1**

**Problem-1**: Suppose you are given an NxN matrix with positive integers where each entry represents the pixel value. Given a pixel (x,y) and a value c, your goal is to replace the value at (x,y) and all connected adjacent pixels with the same value as in (x,y) with c.

|  |  |  |  |
| --- | --- | --- | --- |
| 1 | 1 | 4 | 5 |
| 3 | 4 | 4 | 6 |
| 4 | 4 | 5 | 6 |
| 4 | 3 | 3 | 2 |

Example: x=1, y=2, c=4

|  |  |  |  |
| --- | --- | --- | --- |
| 1 | 1 | 2 | 5 |
| 3 | 2 | 2 | 6 |
| 2 | 2 | 5 | 6 |
| 2 | 3 | 3 | 2 |

Write a C++/python program to solve this problem.

<https://www.geeksforgeeks.org/breadth-first-traversal-bfs-on-a-2d-array/>

<https://www.geeksforgeeks.org/implementation-of-bfs-using-adjacency-matrix/>

<https://www.tutorialspoint.com/breadth-first-search-on-matrix-in-cplusplus>

**Problem-2**: Given a Boolean 2D matrix of size n\*m, find the number of island where a group of connected 1s forms an island.

Example:

|  |  |  |  |
| --- | --- | --- | --- |
| 1 | 1 | 0 | 1 |
| 1 | 1 | 0 | 1 |
| 0 | 0 | 0 | 1 |
| 1 | 1 | 1 | 1 |

Output: 2.

Write a C++/python program to solve this problem.