

7/10/2020

ADS Lab

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3) Given boolean 2D matrix, find the number of islands.

{ 1, 1, 0, 0, 0 }

{ 0, 1, 0, 0, 1 }

{ 1, 0, 0, 1, 1 }

{ 0, 0, 0, 0, 0 }

{ 1, 0, 1, 0, 1 }

pseudocode:-

countIslands (vector of 2d a[][])

// Input: 2d matrix

// output:- No. of Islands present in 2D matrix

for $j \leftarrow 0$ to n

for $k \leftarrow 0$ to m

if $j+1 < n$ and $a[j+1][k] = 1$

do \rightarrow Union ($j * (m) + k$,
 $(j+1) * (m) + k$)

if

if $j-1 \geq 0$ and $a[j-1][k] = 1$

do \rightarrow Union ($j * (m) + k$,
 $(j-1) * (m) + k$)

if $k+1 < m$ and $a[j][k+1] = 1$

do \rightarrow Union ($j * (m) + k$,
 $(j) * (m) + k + 1$);

if $K-1 \geq 0$ and $a[j][K-1] = 1$
 des \rightarrow Union $(j * m + K,$
 $(j) * m + K - 1)$

if $j+1 < n$ and $K+1 \leq m$ and
 $a[j+1][K+1] = 1$
 des \rightarrow Union $(j * m + K,$
 $(j+1) * m + K + 1)$

if $j-1 \geq 0$ and $K+1 \leq m$ and
 $a[j-1][K+1] = 1$
 des \rightarrow Union $(j * m + K,$
 $(j-1) * m + K + 1)$

if $j-1 \geq 0$ and $K-1 \geq 0$ and
 $a[j-1][K-1] = 1$
 des \rightarrow Union $(j * m + K,$
 $(j-1) * m + K - 1)$

procedure:-

- \rightarrow We initialize the count as '0'
- \rightarrow Traverse each index in 2D array
- \rightarrow If value at index is 1, we will look for the neighbours, if neighbour is also equal to 1, we will take the union of Index & its neighbours.
- \rightarrow create array of size Row x Column to store frequencies of all sets
- \rightarrow Now, traverse the matrix again.
- \rightarrow If the frequency is '0', then increment by 1.