Depth First Search

ZPRAC-16-17-Lab10

[40 points]

A traveller arrives in a peculiar country where all cities are connected, but there is only one path from one city to another. In other words the cities form a tree like structure.

Let's consider a case of 9 cities and they are connected as shown:

It is quite clear that there is only one path between any two cities.

Now, the traveller arrives at city 0 and wants to travel to all of the cities. He devises the following travel routine:
1> From city 0 he will visit the first unvisited city 0 is connected to. (In this case, 1)
2> He will follow the same routine in every city he visits.
3> Once he exhausts all cities to be visited from a particular city A, he will go back to the city from which he came to A.
4> When he reaches city 0 and there are no more possibilities left, he will have visited all cities.

In the above example, his would visit cities in the following order.

0 -> 1 -> 3 -> 1 -> 4 -> 1 -> 5 -> 1 -> 0 -> 2 -> 6 -> 2 -> 7 -> 8 -> 7 -> 2 -> 0

Your task is to take the roadmap as input and output the order of travelling.
The map will be given as a NxN matrix of 0/1 where 1 means two cities are connected. For the above example the matrix would be:

0 1 1 0 0 0 0 0 0
1 0 0 1 1 1 0 0 0

1 0 0 0 0 0 1 1 0
0 1 0 0 0 0 0 0 0
0 1 0 0 0 0 0 0 0
0 1 0 0 0 0 0 0 0
0 0 1 0 0 0 0 0 0
0 0 1 0 0 0 0 0 1
0 0 0 0 0 0 0 1 0

INPUT FORMAT:

N --- number of cities
(NxN integers) --- matrix of 0/1 representing the map

OUTPUT FORMAT:

(list of integers) --- the travel order

EXAMPLE:

INPUT:
9
0 1 1 0 0 0 0 0 0
1 0 0 1 1 1 0 0 0
1 0 0 0 0 0 1 1 0
0 1 0 0 0 0 0 0 0
0 1 0 0 0 0 0 0 0
0 1 0 0 0 0 0 0 0
0 0 1 0 0 0 0 0 0
0 0 1 0 0 0 0 0 1
0 0 0 0 0 0 0 1 0

OUTPUT:
0 1 3 1 4 1 5 1 0 2 6 2 7 8 7 2 0