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Detecting Cut Vertices and Cut Area in Wireless Sensor Network

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ABSTRACT

Node failure creates cut in wireless sensor network. The main cause of node failure are the limited power consumption and harsh environmental conditions where sensor nodes are being deployed. Cut forms partitions in wireless sensor network and divides it into various regions. In this research paper, we are presenting our algorithm of detecting cut vertices and cut area. The algorithm describes the concept of activation state of each node. The activation state of each node will be examined to check the status of each node. Hence, the value of activation state will determine that whether node is active or not. this algorithm successfully finds the cut vertex as well as cut area in wireless sensor network.

Keywords : Wireless Sensor Network, Harsh Environmental Conditions, Edge Detection

I. INTRODUCTION

Now-a-days wireless sensor network is facing the problem of node failure, which creates partitions of wireless sensor network into various regions of connected sensor nodes. Network disconnection blocks the data transfer to destination as well as communication of some sensor nodes with base station. The disruption of communication due to cut in network causes base station cannot communicate those nodes which have been failed as well as those nodes which are active and near to cut vertices.

Various algorithms and techniques implemented by the researchers suffers the problem of time delay and energy efficiency. But our algorithm overcomes the limitations of existing techniques as it checks the status of each node in wireless sensor network. Hence, our algorithm is efficient than other existing algorithms as it find out the total number of cut vertices and cut area in wireless sensor network in minimum time as compared to other algorithms.

This research paper is divided into two sections. Section 1 contains algorithm and its description. Section-2 contains the output of algorithm and diagram showing overall process of algorithm. Rest of the paper describes conclusion and future work, acknowledgement and references.

II. METHODS AND MATERIAL

ALGORITHM for Detect Cut Vertices and Cut Area Operation

// Finding cut vertices and cut area //

INPUT:
state[]={1,1,0,1,1,1,1};

OUTPUT:
1. Number of cut vertices
2. Cut Area

Description of Algorithm: the algorithm takes the concept of activation state to find out cut in wireless sensor network. it takes single dimensional array state[]={1,1,0,1,1,1,1} as input. We assumed that the activation state having two values [0, 1]. It means each node has value of activation state either 0 or 1. We assumed that the node having activation state 1 will be the active node and node having activation state 0 will

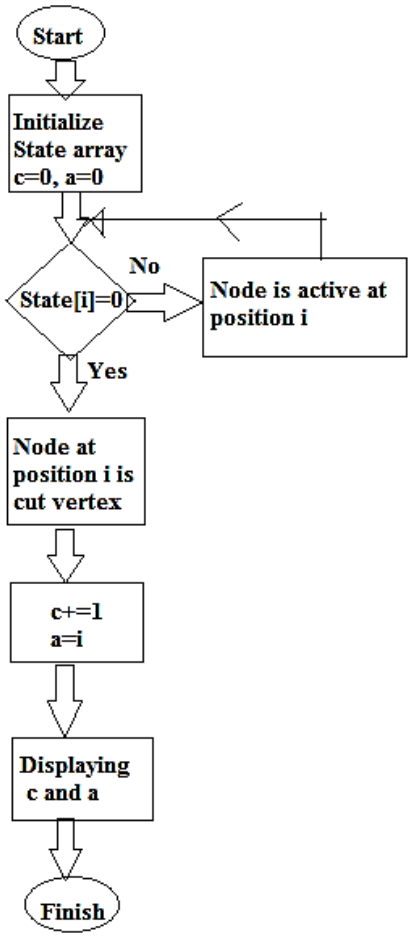
be the inactive node. The variable c has taken in algorithm to count the total number of cut vertices, variable a has taken to compute the cut area. The procedure begins by displaying the single dimentional array elements and then checking the activation state of each node in for loop. In loop, a conditional statement occurs by examining the value of activation state of each node. If value of activation state is 0, then the node is declared as the cut vertex and displays node failure occurs at position with its index value. c is incremented by 1 and the value of index is assigned to a. If the activation state of node is 1, then it shows no cut occurs at position with its index value.

After completion of for loop, a conditional statement occurs by checking the value of c. two cases will be arise:

1. If c=0, then total number of cut vertices is 0. No cut has been occured in wireless sensor network.
2. If c>0, then cut occured in wireless sensor network. the total number of cut vertices are displayed by value of c and cut area value is shown by a which displays the position of node failure in wireless sensor network.

The cut vertices and cut area will be the output of this algorithm. The ouptut of this algorithm will be the value of c and value of a.

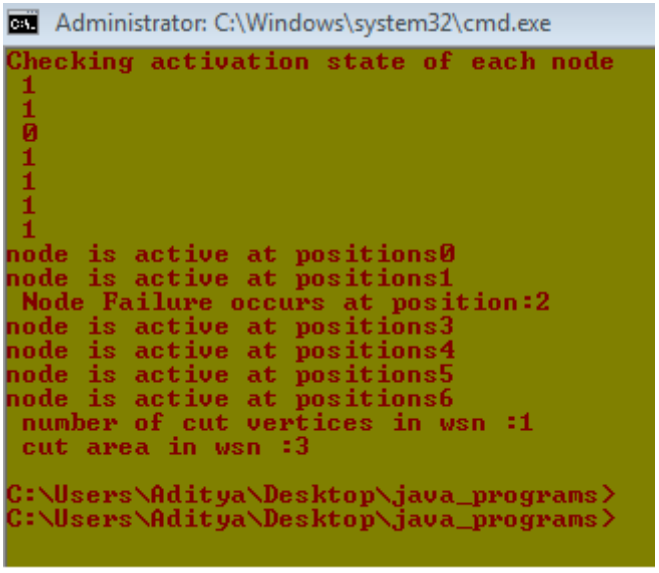
The overall process can be shown with the help of flowchart given in next page:



Flowchart 1. Process of detection of cut vertices and cut area

III. RESULTS AND DISCUSSION

OUTPUT OF ALGORITHM:



Steps of working in sequence of detection of cut vertices and cut area operation is given below:

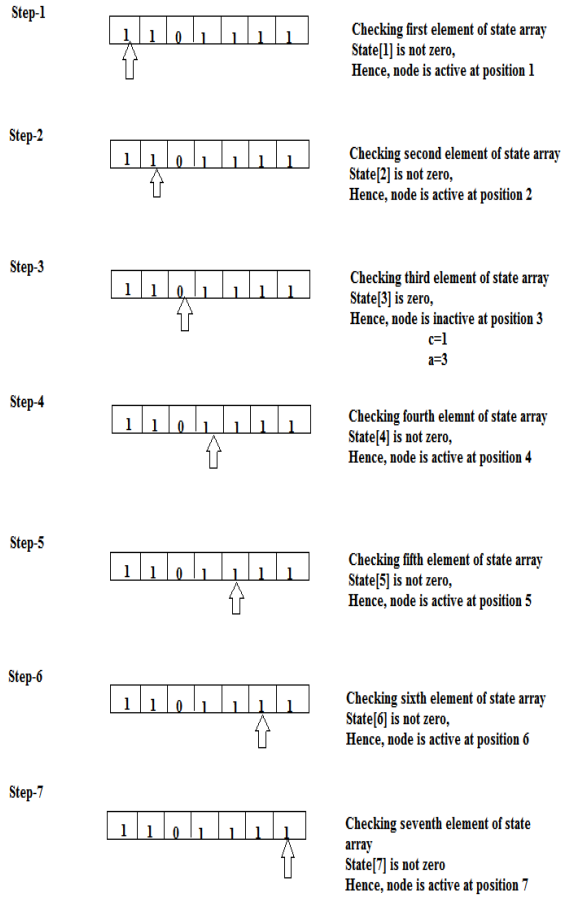


Figure 1. Process of examining the state of each node

Description of diagram: In the above diagram, checking of state of each node is performed at each iteration. In each iteration, the pointer in diagram points towards the current element of state array. If the value of state of node satisfy the conditional statement

(if(State[i]==0))

It means that activation state of node is zero. Node at position i is a failed node because at state zero, node does not performs its normal function as it is in its deactivation state. As a result, it will not pass data to other nodes, unable to communicate with other nodes in network.

Activation state of node must be equal to one as it decides the working of node. If activation state is one, node performs its normal function such as communication, data passing to other nodes, etc.

In the above diagram, only one node is declared as cut vertex as its state is zero. So, c=1 and a=3 will be displayed as the output.

IV. CONCLUSION AND FUTURE WORK

We have presented an efficient algorithm to detect cut in wireless sensor network. The status of each node has been checked by the value of activation state of each node. We have taken the values either 0 or 1 of activation state. Hence each element of single dimentional array has either value 0 or 1. By examining the value of each node with the value of state array variables, the status of each node can be detected. The process diagram shows the overall process of algorithm in series of steps. We concluded that our approach minimizes the time delay factor. In this research paper, we have detected the number of cut vertices and cut area. Informing source node and destination node about cut by sending messages through algorithm is a part of our future work.

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VI. REFERENCES

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