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EDCD Method for Discovering Connectivity Disruption in WSN

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Abstract: ***Wireless Sensor Networks (WSNs) frequently part from interrupt connectivity caused by its several aspects such as restricted battery power of a node and unattended operation helpless to aggressive damage. The interruption of connectivity, frequently denoted as network fall, leads to unknown routing decisions, waste of resources and loss of data. Wireless sensor network can get spitted into multiple linked components in line for the crash of some of its nodes, which is referred as a "cut". Complications like unfit for dynamic network re-arrangement, Single path routing method occur in existing scenario. So we propose Extended Distributed Cut Detection known as a distributed source split of detection algorithm that allows all nodes to supervise the topology of the graph and identify if any cut occurs.***

Keywords: Wireless sensor networks; cut detection; energy efficiency

1. Introduction

Wireless Sensor Networks, consisting of massive numbers of low-cost and low-power wireless nodes, have recently been employed in many applications: disaster response [1], military surveillance [2], and medical care [3] among others. The inherent nature of WSNs such as incomplete task or operation, critical situations and battery-powered nodes are the vital issues and one among the challenge is to confirm that the network is connected. The connectivity of the network an easily be interrupted due to random wireless channels, early reduction of node's energy, and natural damage by hostile users.

Failure of a node will decrease the availability of multi-hop paths in the network and that disconnection can cause sub nodes which have not lost connection and to become disconnected from the remaining task, results in a "cut". This cut or failure is the reason for nodes get disconnected from the network that results the disconnected nodes where it cannot receive the data from the source.

Network failure, normally referred as a *network cut*, which brings number of problems. Like the conventional cut detection issue, our proposed method attempts to detect a network cut between a source node and destination node. The proposed Estimated Cut Detection allows a source node to detect a cut in order to any destination node. In this method, the boundary of a cut is compactly denoted as a set of linear line in between nodes. The efficient illustration of a cut allows the data on present cuts to be effective distributed entire network with small cost. A source node, using the scattered data, finds out whether any possible destination is achievable.

2. Problem Study

The disadvantage of previous cut detection algorithm is that they take account only the direct cuts, which cannot detect unintentionally shaped failure. Main objective of the study is to consider the problem of detecting cuts by the nodes of a wireless network. A node may fail for various reasons such as automatic or electronic defects, battery exhaustion, or hostile damage. The usual cut detection problem, we try to explore a network cut between a sender node and destination node.

3. Review of Literature

Wireless Multimedia Sensor Networks has several tasks such as wireless media type and multimedia data communication. As a result, traditional system for network layers is no longer applicable for these networks. Wireless sensor network can get divided into multiple connected components due to the crash of some of its nodes, which is called a "cut. Sensor networks may function in aggressive situations and schemes to detect damage should be built into the design. Problem of detecting cuts is considered by the nodes of a wireless network. It assumed that there is specific designed node in the network, which is denoted as the source node. Meanwhile a cut may or may not split a node from the source node, we differentiate between two dissimilar outcomes of a cut for a specific node.

Many investigators have anxious the need of network partition monitoring problem[4][5] and it take into account the problem as a security problem, indicating that cuts can be deliberately created in a adverse environment, and nodes must find them. The cut detection problem was first measured in a bound network [6]. The concept of cut was introduced, which is referred as a network partition of nodes, which aims to reduce the number of sentinels based on the hypothesis that in sensor networks, direct-shaped cuts are more possible to occur, instead than the cut with independent edge disconnects.

The drawbacks of their cut detection algorithm are that they take account only the direct cuts, which unable to detect randomly shaped failure. Moreover the algorithm is a centralized process, which needs global hierarchical information. It also addresses the complications of existing cut detection methods. The Distributed Source Separation Detection method is fully distributed and detects randomly shaped cuts.

A clear scalar value, referred state, is maintained by each node. The state or situation of each node is updated depending on the circumstances of its adjacent nodes. If a node is linked to a sink, its state merges to some positive value, else it state drops to zero. The DSSD algorithm lacks due to control message overhead, meanwhile the algorithmic repetition for convergence based on the extent of the network. An energy efficient key that reduces the duplication count for convergence, thereby minimizing the control message overhead. The main theme is to execute on the overlay network containing of a minimum number of illustrative nodes. The overlay network's count is at most 4, allowing the optimal convergence rate. However, these algorithms detect cuts to a single sink node which extends the cut detection algorithm to the cases with too many sinks, and even extended for any destination node.

4. Methodology

In order to make the concept understand easier, one node of the network is referred as the "source node". The algorithm holds of all node make up to date the local state regularly by sharing with its nearest neighbors. The state of a node comes from different points to a positive value in the lack of a cut. If a node is declared as separated from the source node as a result of a cut, its state come together or meet to 0. By supervising its situation, therefore, a node can find out if it has been disconnected from the source node. Additionally, the nodes that are still in connection with the source are able to find that, (1) a cut has happened somewhere in the network, and (2) they are still engaged to the source node. It is referred as the Distributed Source Split-up. If a component that is separated because of a cut gets again connected later, the nodes can find such reconnection from their situations.

In this paper, we proposed a distributed algorithm to find cuts, named the Extended *Distributed Cut Detection* (EDCD) algorithm. The algorithm allows each node and sub nodes to detect the cuts occurred. The algorithm here proposed is distributed and scattered which takes in communication between adjacent nodes, and is hard to short-term or acting connection failure between nods. A major factor of the EDCD algorithm is a distributed relevant to evolution step through which the nodes work out their potentials.

4.1 Extended Distributed Cut Detection (EDCD) Method

This algorithm is repetition, a faster merging or joining rate is necessary for it to be efficient. The merging rate of the proposed algorithm is not only reasonably quick, but is objective of the network size. As a result, the interruption between the existence of a cut and its detection by all the nodes can be made free of the network size.

The algorithm implemented in the requirement of a few nodes known as sentinels who convey with a source node either quickly or through multi-hop paths. The source node detects cuts by supervising whether it can obtain messages from the sentinels. In difference to the algorithm in the EDCD algorithm proposed in this paper is not restricted to linear cuts; it can find cuts that divide the network into multiple components of random shapes.

The EDCD algorithm include only nearest neighbor communication, which reduces the requirement of routing messages to the source node. This aspect makes the algorithm related to mobile nodes as well. Meanwhile the calculation that a node has to bring out only averaging nodes, it is particularly well fit to wireless sensor networks with nodes that have reduced formulation competence. Models are reported in that explains the ability of the algorithm to find cuts in mobile networks, and also its capability to detect occurrence of re-connection after a cut.

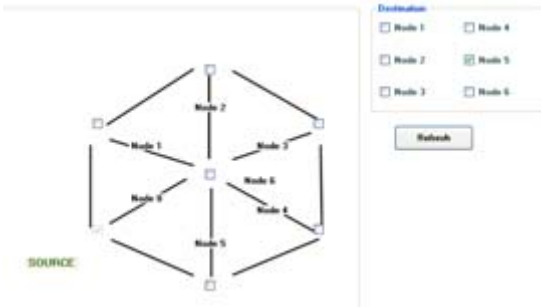

Figure 1: Selecting a node to receive file

The algorithm allows each node to detect the events like failures or cut and sub nodes to detect the nodes in communication. The algorithm proposed is separated which involves only local communication between neighboring nodes as shown in fig 1. and is strong to short-term connection failure between node pairs The convergence rate of the computation is independent of the size and structure of the network.

5. Experiment Results

The EDCD algorithm we propose here enables every node of a wireless sensor network to detect disconnection from Source nodes if they occur and it enables a sub node that experience connected, but to detect the occurrence of cut and assess the estimated spot of the cut in the form of a list of vigorous nodes that exists at the boundary of the cut/ failure.

Numerical simulations, as well as experimental evaluation on a real WSN system consisting of nodes, show that the algorithm works effectively with large classes of graphs of varying size and arrangement, without demanding changes in the limits. For certain situation, the algorithm is ensured to find communication and disconnection to the source node without bug. A crucial strength of the EDCD algorithm is that the convergence rate of the underlying repetitive scheme is quick and self-sufficient or autonomous of the size and network arrangement, which identifies easily and quickly.

If a component that is separated because of a cut gets again connected later, the nodes can find such reconnection from their situations.

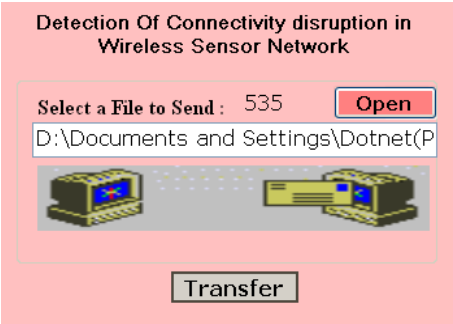

Figure 2: Server module

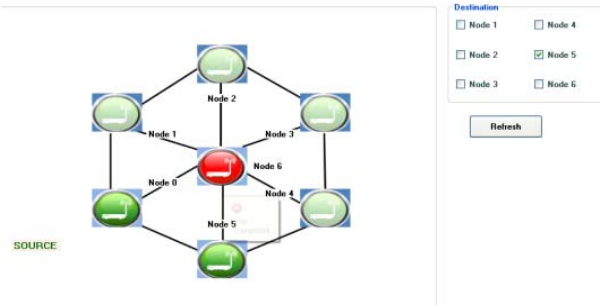

Figure 3: Router file sending path

6. Conclusion

If a node connected in WSN, disconnected because any failure or cut where the transmission cannot reach the destination and left incomplete. This made to propose a new method to examine network failure or cuts of nodes in a wireless network. It is reported that the proposed method should capable to find disconnect nodes and then re-connect after failures.

In EDCD method, every node is able to determine if any destination node is accessible or not. In this paper, proposed EDCD method here allows every node of a wireless sensor network to find disconnected or failure nodes during transmission. In future research, planned to develop a EDCD that does not rely on node locations which enables us to employ other types of routing protocols than location based and also discover node disconnect and reconnection to the source node in mobile networks.

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