ISSN: 2454 – 6119
International Journal of Multidisciplinary Research and Modern Education
Impact Factor 7.315, Special Issue, February 2019 - Conference Proceedings
International Conference on Management 4.0: Disruptions in Business and Millennials at the Workplace (KRUPACON 2018) On 12th & 13th October 2018 Organized By
Krupanidhi Group of Institutions, Bangalore, Karnataka

A FUZZY LOGIC METHOD FOR ENERGY EFFICIENT WSN SYSTEM

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Cite This Article: Roshini B & Chithra S, "A Fuzzy Logic Method for Energy Efficient WSN System", International Journal of Multidisciplinary Research and Modern Education, Special Issue, February, Page Number 8-10, 2019.

Abstract:

In certain real-time systems, wireless sensor networks are used. Availability of energy is limited in WSN as the sensor node is restricted by the life of the battery. The Rumor Routing (RR) has benefits to conserve resources by using two features in full: the clustering structure and the next-generation scheme. With the WSN Rumor Routing algorithm, database sources can disperse the source that helps to obtain the query message in time but energy efficiency is enhanced by clustering forming using a hierarchical system, which reduces energy conservation by the required cluster head collection. Therefore we have flouted logic as the approach suggested based on three characteristics: centrality, energy and distance. This approach is used to improve network productivity by the mobile coordinator. Fuzzy logic thus easily avoids RR problems and makes for more energy-efficient routing routes. Simulations can test the output between fuzzy logic with mobile coordinator and RR. The findings of this simulation show that the fumigation logic will save energy usage improve the direction and improve the distribution efficiency in contrast to RR.

Key Words: WSN, RR, Mobile coordinator, fuzzy logic.

Introduction:

WSN uses several sensor networks to senses physical phenomena like pressure, moisture and fire detection in the trees, etc. The nodes of the sensor are weak, fail-prone instruments. Typical problems with these sensor knots are power limitations, reduced capacity and several times during radio contacts the sensor knots are inaccurate. When the network is generated and identified, sensor nodes transmit information to other nodes or base stations. The device will start detecting events. In certain situations the closest sensor nodes receive the same knowledge that the network is unsuccessful from the base station. The most critical target in WSNs is therefore effective power consumption. Clustering is one of the best ways to spread nodes easily across the sensors and maximize the existence of the network. The sensor nodes in this clustering protocol are separated into numbers and each group is known as a cluster. In any cluster that is called the cluster head, a group leader is chosen. The data aggregation of the leading node is received, which will send messages to the mobile dynamic coordinator who transfers it to BS further. The WSN clustering device model is as shown in Figure 1.

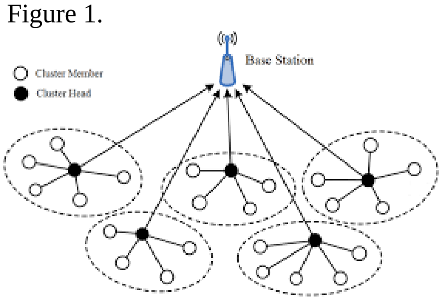

Figure 1: WSN System model based on clustering

Literature Review:

The literature addresses almost well know hierarchical protocols for choosing energy sensitive cluster heads. W. R. Heinzelmann suggested the LEACH, a hierarchical protocol [1] which randomly rotates the cluster-heads and network data fusion to dissipate energy equally in all sensor nodes. LEACH is not suitable for wide scope applications as more power is used in applications which transmit data packets to the sink node far away from sink node. The data aggregation is used to prevent fragmentation and to increase the energy efficiency of the network. The literature has suggested various routing protocols with several different approaches for an effective network [7]. The routing protocol between the sensor and sink nodes requires a multi hop protocol [5]. The protocol for object cluster ensures that only the object head sends overall data to the drop-down node. To address this issue, it is not possible to adjust any cluster heads with enough energy at a set changing cluster time [9]. RR protocol attempts to retransmit, abandon, or flood the query if the query node originates found that the query has not reached a destination. The retransmission is a possibility but, depending on the number of transmissions, the probability of distribution is exponential. There will just have to be a very minimal number of questions [3, 4]. When an incident is detected, the network gets flooded, the probabilistic flooding becomes impossible to enforce. This becomes effective as the number of incidents is limited relative to the number of queries [2].

Background Theory:

We address the routing algorithm where rumor routing involves the supply of queries to network events and the high cost of flooding queries.

A. Sensor Networks:

The sensor network is formed by connecting a vast number of sensor nodes together. There are many sensor networks positioned in a certain region of interest in which relevant information for further study can be jointly sensed in the field of interest at a central location. After deployment, the application source network themselves coordinate radio transmission paths into the drain. The sensor devices have low power with microcontroller for processing data, a computer chip and a radio

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communications antenna as well as sensors for measuring local physical parameters such as temperature, humidity, light intensity etc. The key parts of a data collecting network consist of node of sensing devices, area of the sensing devices, sink where all the data is dumped and a manager to complete the task.

Any sensor network implementations are

- Tactical uses such as target detection, in order to detect the motion of enemy vehicles, using multiple small sensors in a geographical field.
- Protection software such as fire and smoke detectors can sense smoke or gases in a large building and identify the source of fire in the building. This will serve to enhance the rehabilitation and rescue efforts.

Rumor Routing:

The rumor routing algorithm is used to occupy the spectrum between question floods to case floods. This is only true if the number of instances is between the two crossroads relative to the query numbers. The sensing device network involves the dissemination of questions to sensor device network that have detected remarkable episodes by a modern and very capable process. The network is packed together and consisting of cluster of three that indicate the message cannot be transmitted for a given time frame, which indicates wait when a single node in a cluster malfunctions. These nodes store specific occurrences and can transfer questions to a node that saved a specific case with the appropriate application. Standard nodes may also be called sinks if output signals are postponed before appropriately sensed information is applied to the sinks. Therefore sinks are often referred to as data collection points [1]. The networking model initially generates a set of nodes on a network as rumor is routed. And the devices are arbitrarily located in a system that produces the information to be communicated to the sink node. The trust value is created in the trust model by two separate processes of value production:

The Direct Trust Model that monitors the node by neighbors from the same space. This is measured by devices such as the degree of vigor of nodes and the amount of high sequences. The hacker node still displays high energy levels and high data transfer sequence numbers. Direct faith will be built on the basis of these values, and the Indirect Trust Model will launch an indirect call to all devices after discovering the path. It displays the neighboring nodes upgrading their neighbors' confidence value, and moving this value to the application source network. The root node then gets the confidence value of both direct and indirect trust values models in the Trust Value Analyzer. Centered on these principles of faith it's going to decide. The hacker node is eventually removed by the source node. It will not pick an itinerary that has a node hacker. It chooses an alternative path for data transmission. It constantly watches hacker info. The Routing of Route Discovery

- Select the data transfer path
- Initially submit data transfer path request
- The path data is transmitted to the identical route after locating it.

  In the energy model update:
- Nodes shares the energy level on a daily basis
- The energy supply is modified and is compared to the high residual energy path.

After comparing the amount of energy residual, the source chooses a separate path for data transmission that continues up to the end of the connection.

System Model:

The number of sensors in the field of concern is taken into consideration. The network is split and participants send their event information to the section head of the cluster of each segment. CHs process data and transmit aggregated data to the commonly accessible sink node or BS. There are some hypotheses regarding the proposed methodology of clustering:

- Sensor nodes are stationary.
- Network is uniform.
- Base station is located external to the region of concern.
- Distance is planned on the basis of RSS.

Proposed Protocol:

For human decision-making and knowledge, fuzzy logic is used. It can also deal with real-time systems uncertainties more specifically than the probabilistic paradigm. We use a flimsy logic to deal with the uncertainties of the election of the CH.

A. System Assumption:

The model suggested considers that sensor nodes be positioned in the region of concern for environmental monitoring.

- Every sensor node is static.
- Homogeneous networks were known to have equal energy for all the sensor nodes.
- The distance from the node to the ground station could be determined by the signal intensity obtained.

B. System Method:

In this suggested clustering system cluster the sensor node is formed and chosen as the cluster head, which has more energy than other nodes. The node selected as the CH has the clear signal. In order to improve the energy usage the mobile coordinator is used. This algorithm for cluster forming was established to make sure that the cluster no. is k, per round. For example, if N nodes are distributed in M area and cluster No. are presumed to be distributed in round k, N/k nodes are generated by cluster (one CH and (N/k)-1) which are no cluster head nodes. By receiving the signal, each CH dissipates energy, adds it and sends the medium signal to BS. The sensor nodes are assumed to submit data after the observation of an interesting occurrence. CH gathers aggregates and transfers this information to the ground station. The residual energy, distance and centrality are also assumed: the three fuzzy descriptors are configured to quantify the chance to act as the mobile coordinator who sends a message to BS. In any round, the degree of CH is reduced such that energy is called metric. Centrality is another significant parameter, since it reflects on the Mobile coordinator's position, how centrally it is located with CHs. Distance shows the BS distance.

C. Fuzzy Logic Model:

In this model, three fuzzy entry variables were considered for the purpose of selecting the mobile coordinator. The three input variable have three input functionalities, with each parameter having the low, medium and high linguistic variables for fuse.

D. Rule base in Fuzzy Logic

There are rules in the fuzzy inference. If A, B, C then F is the form of the law. A stands for the remaining power, B stands for distance, C for central power and F for fuzzy power. Equation 1 extracts the law.

$$\text{Chance} = (\text{Energy-1}) + \text{Distance} + \text{Centrality} \quad (1)$$

The energy left behind in the equation (energy power 1) is treated as having a certain amount of energy in each device and the energy outstanding is considered in every cycle for the next one. Distance and centrality is believed to represent a supplementary element, as it is centered on the increasing or decreasing distance of the mobile coordinator from base station with regard to base station movement.

Simulation Results and Analysis:

A. Experimental Setup:

We have taken 20 nodes over the area of x=500, y=500 with BS position into account in this experiment (x=155, y=220). Three clusters are believed. The channel's bandwidth is 50 Kbps. There are 500 bytes in each data message; 1 byte in the header packet. Here's the use of a basic energy model. The simulation time is 50s. Energy is initially equal to 100 nodes and the idle energy is 0.5. Since the simulation has been executed thoroughly, the alternative approach is seen to do well.

Findings and Discussions:

Here in order to test the suggested process, we present experimental results achieved from simulations. When the nodes are regrouped in RR and the data to BS are accepted for CH. However if a certain CH expires in a cluster, the data will not be sent until the other CH indicates delay.

Conclusion:

Energy saving is one of the most complicated problems of WSN. We suggested a clustering approach for this purpose. This technique is measured and compared to Rumor Routing. It was found that the fuzzy method is stronger than Rumor Routing. The overhead for the upcoming job has to be minimized and energy usage should also be improved.

Acknowledgement:

The authors express gratitude towards the assistance provided by The Management, Krupanidhi Group of Institutions (KGI) and Krupanidhi Research Incubation Centre, KGI in completing the research. We also thank our Research Mentors who guided us throughout the research and helped us in achieving the desired results.

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