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Fault Node Recovery Algorithm for a Wireless Sensor Network

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Abstract *– This paper intend a fault node recovery (FNR) algorithm rule to boost the lifetime of a wireless sensor network (WSN) while several of the sensor node close, either as they no longer have battery energy or they have reached their operational threshold. Therefore, it's necessary that network failures are detected earlier and applicable measures are taken to sustain network operation. The algorithmic rule relies on the grade diffusion algorithmic rule combined with the genetic algorithmic program. This paper proposes a fault node recovery algorithmic rule for WSN based on the grade diffusion algorithmic rule combined with a genetic algorithmic program. The FNR algorithmic rule needs replacement few numbers of sensor nodes and reuses the most routing paths, increasing the WSN lifetime and reducing the replacement cost.*
Keywords*: Grade diffusion (GD) algorithm, wireless sensor networks (WSN), Genetic algorithm.*

I. Introduction

Wireless sensing element networks have varied applications in Health-care observation, Air-pollution observation, Landslide detection, water quality monitoring and industrial observation. These sensing element networks have enhanced processing, wireless communication and recognition ability. Wireless sensing element networks contain large number of heterogeneous sensing element node devices spread over a large field. The main task of a sensing element node in an exceedingly sensing element field is to detect events, perform quick local data processing, and so transmit the information. In sensing element networks, each sensor node has restricted wireless computational power to process and transfer the live data to the base station or data collection center.Recent advances in micro processing, wireless and battery technology, and smart sensors have enhanced processing , wireless communication, and detection capability. In sensing element networks, each sensing element node has restricted wireless computational power to process and transfer the live data to the base station or data set center.Therefore, to amplify the sensor area and therefore the transmission area [1], [12], the wireless sensor network typically contains many sensing element nodes. Generally, each sensing element node contains a low level of battery power that can't be replenished.

The traditional approaches to sensing element network routing include the directed diffusion (DD) [9] algorithmic rule and therefore the grade diffusion (GD) Algorithmic rule. The algorithmic rule proposed in this paper relies on the GD algorithmic rule, with the goal of replacing fewer sensor nodes that are out of use or have tired batteries, and of reusing the maximum number of routing paths. These optimizations will ultimately enhance the WSN lifetime and reduce sensing element node cost.

I.1. Directed Diffusion Algorithm

In current years in classify to make WSN efficient, several algorithms have been proposed. In this proposed the Directed Diffusion (DD) algorithm. Directed Diffusion is planned for robustness, scaling and energy effectiveness. It is data centric. Directed diffusion consists of some elements: interests, data messages, gradients, and reinforcements. The DD algorithm is a query driven communication procedure. The collected data are transmitted only if they fit the inquiry from the go under node, thereby reducing the power consumption from data transmission. First, the sink node provides concerned queries in the form of attribute-value pairs to the other sensor nodes by broadcasting the interested query packet to the entire network. consequently, the sensor nodes only send the collected data back to the sink node if they fit the involved query. In DD, all of the sensor nodes are bound to a route when broadcasting the interested queries, even if the way is such that it will

never be used. In addition, several circle routes, which are built simultaneously when distribution the queries, result in wasted power consumption and storage. In the real world, the number of the sensor nodes in a structure is in the hundreds or still thousands. Such a waste of power consumption and storage becomes poorer and the circle way problem becomes more serious with larger-sized systems.

II. Literature Review

Hong-Chi Shih et. al. [1] "Fault Node Recovery Algorithm for a Wireless Sensor Network", in this paper the sensing element nodes use battery power supplies and therefore have limited energy resources. additionally to the routing, it's important to research the optimisation of sensing element node replacement, reducing the replacement cost, and reusing the most routing ways when some detector nodes are nonfunctional. This paper proposes a fault node recovery algorithmic rule for WSN based on the grade diffusion algorithmic rule combined with a genetic algorithmic rule. The FNR algorithmic rule needs replacement fewer sensing element nodes and reuses the most routing methods, increasing the WSN lifetime and reducing the replacement cost.

Chaitrali Brahme et. al. [2] "Fault Node Recovery Algorithm for a Wireless Sensor Network", in this real wireless sensing element networks, the sensing element nodes battery power provides and therefore have limited energy resources. Additionally to the routing, it's important to research the optimisation of sensor node replacement cost. Our system proposes a faulty node recovery and replacement algorithmic rule for WSN based on the grade diffusion algorithmic rule combined with genetic algorithmic rule. The FNR algorithmic rule needs exchange fewer sensor nodes and reuses the most routing paths, increasing the WSN lifetime and reducing the replacement cost. in the simulation, the projected algorithmic rule will increase the amount of active nodes reduces the rate of energy consumption.

Tzung-Pei Hong et. al. [3] "An Improved Weighted Clustering Algorithm for Determination of Application Nodes in Heterogeneous Sensor Networks", In this n wireless sensing element networks, power consumption is an important issue for network lifetime. In this paper, in this paper projected an improved clustering algorithmic rule based on the weighted clustering algorithmic rule with additional constraints for selection of cluster heads in mobile wireless sensing element networks. The characteristics of sensing element nodes including the power energy and also the transmission rate are considered in the projected algorithmic rule. The cluster heads chosen will act as the application nodes in a two-tired wireless sensing element network and will change in different time intervals. after a hard and fast interval of time, the projected algorithmic rule is re-run again to seek out new applications nodes specified the system period of time will be expected to last longer. Associate example has also been given to illustrate the projected algorithmic program in details. Experimental results have shown the projected algorithmic rule behaves better than Chatterjee's on wireless sensing element networks for long system lifetime. In the future, we will consider using other effective clustering approaches to the problem [21][26]. We'll also attempt to extend the projected approach to solving more complicated problems in wireless sensing element networks.

Tian-hua Liu et. al. [4] "A Fault Management Protocol for Low-Energy and Efficient Wireless Sensor Networks", in this paper new fault management protocol LPS-FMP based on Distributed hierarchical wireless sensor network architecture. using LPS-FMP, failure information can be obtained in 2 ways: Management sends out queries, or Agent uploads information using Inform. Compared with traditional WSN fault detection mechanism, in this paper add gateway devices, which may locate and analyze failures. This greatly improves the efficiency of network maintenance and fault repairs. Finally, in this implement a hardware platform and software system for fault management protocol based on distributed hierarchical architecture. If some module fails in Agent, we are able to still take some actions to deal with this emergency.

D.Suguna et. al. [5] "Fault Node Recovery Algorithm to Enhance the Lifetime of A Wireless Sensor Network", in this paper projected algorithmic rule requires a minimal number of communications over the network and provides tunable parameters to maximise performance for various network topologies. We provide a powerful technique for algorithmic rule the various topologies and data clustering. For topologies with very distinct clusters of wireless sensor node, it becomes increasingly difficult to accurately contain random sample because of the inability of random walk} process to quickly reach all clusters. The Goal charter tell the wok for the fault node recovery algorithmic rule is also enhanced to precise fault node, which at the present several difficulties due to the use of unstructured wireless sensing element network instead of a strutted one and also due to congestion, high latency and difficulty posed while frequently joining or leaving the network without prior data. The Fault node recovery algorithmic rule model used in decrease the cost, which is one among the major considerations compared to accuracy.

III. Method

A fault node recovery (FNR) algorithm rule for WSNs based on the grade diffusion algorithm combined with the genetic algorithm rule. The flow chart is shown in Fig. 1. The FNR algorithm rule creates the grade value,

routing table,
Neighbor nodes and load value for each sensor node using the grade diffusion algorithm. In the FNR algorithm, the number of nonfunctioning sensor nodes is considered during the wireless sensor network operation, and the parameter Bth is calculated. The grade diffusion algorithm is in use to route path for data relay and transmission in wireless sensor networks, reducing both power use and processing time to make the routing table and simultaneously avoiding the generation of circle route. Moreover, to make sure the safety and reliability of data transmission, grade diffusion algorithm provides support routes to keep away from wasted power and processing time when rebuilding the routing table in case part of sensor nodes are missing.

The algorithm rule create the grade value, routing table, a set of neighbor nodes, and payload value for each sensor node, use grade diffusion algorithm rule. The sensor nodes the event data to the sink node according to the gd algorithm when events appear. Algorithm goal is to replace few sensor nodes that are not functioning and have low battery power and repetitively using the routing path. The above approach will ultimately increase the life time and deduce the cost of node replacement.

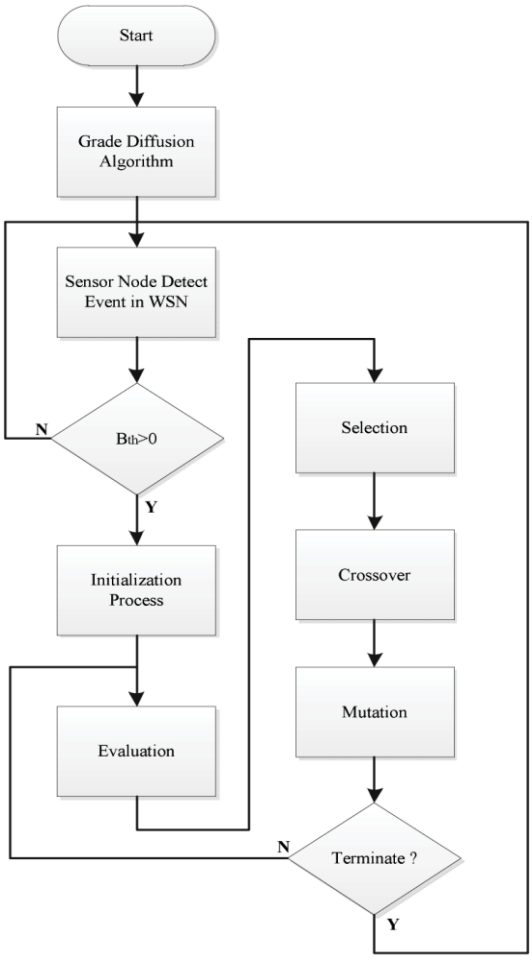

Fig.1. Fault node recovery algorithm flow chart.

III.1.Grade diffusion (GD) algorithm

Grade Diffusion (GD) algorithm rule in 2012 to get better the ladder diffusion algorithmic rule using ant colony optimization (LD-ACO) for wireless detector networks. The GD algorithmic program not solely creates the routing for every detector node however also identifies a group of neighbor nodes to reduce the transmission loading. Every sensor node will choose a sensor node from the set of neighbor nodes when its grade table lacks a node able to perform the relay. The GD algorithmic rule may also record some info relating to the information relay. Then, a sensor node will choose a node with a lighter loading or more accessible energy than the opposite nodes to perform the extra relay operation. That is, the GD algorithmic rule updates the routing path in real time, and therefore the event data is therefore send to the sink node speedily and properly. Whether the DD or the GD algorithmic rule is applied; the grade creating packages or interested query packets should 1st be broadcast. Then, the sensor nodes transfer the event information to the sink node, consistent with the algorithmic rule, when appropriate events occur. Grade diffusion algorithmic rule is projected to resolve the sensor node's transmission drawback and therefore the sensor node's loading problem in wireless sensor networks by to rearrange the sensor node's routing. Additionally to them, the sensor node can also save backup nodes to scale back the energy consumption for the re-looking routing by during this planned algorithmic rule just in case the sensor node's routing is broken. Within the simulation, the grade diffusion algorithmic rule will save 29.5% energy and rise 80.39% time than the convention algorithm rule for sensor node. Moreover, during this projected algorithmic rule has the less information package transmission loss and therefore the hop count than the tradition algorithms in our simulate setting. Hence, additionally to balance the sensor nodes are loading and reduce the energy consumption; our algorithmic rule will send the info package to destination node quickly and properly.

IV. Conclusion

In this paper proposed the sensor nodes use battery power supplies and thus have limited energy resources. In addition to the routing, it is essential to research the optimization of sensor node replacement, reducing the replacement cost, and reuse the most routing path when some sensor nodes are nonfunctional. A fault node recovery algorithm to enhance the duration of a wireless sensor network when some of the sensor nodes shut down. This algorithm is based on the grade diffusion algorithm mutual with the genetic algorithm. The algorithm can result in fewer replacements of sensor nodes and more reused routing paths. In this planned

algorithm increases the number of active nodes up to 8.7 times, reduces the rate of data defeat by just about 98.8%, and reduces the rate of energy consumption by approximately 31.1%.

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