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INTEGRATING AN APPROPRIATE FITNESS FUNCTION IN WIRELESS SENSOR NETWORK THROUGH ADAPTIVE METHODOLOGY

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ABSTRACT

Wireless Sensor network is an organisation of self restricted multihop count network which consists of wide range of sensor nodes. The two essential functionalities of a sensor are sense the surrounding region and communication between the nodes. Integration and Energy efficiency of nodes are two major obstacles in a wireless network design; integrated amount of information for a node is collected and measured the data for particular application. Wireless sensor networks have been rapidly increasing day by day at pace in hostile environment for data assembling. The most two important factors regarding the sensor network are minimizing bandwidth constraint and maximize the network lifetime. The goal of the paper is to find the prime mode of the sensor at each and every point so that requirements of an application should met at an explicit level and consumption of the network can be minimized. Network's lifetime must be protracted; it is an important phenomenon in wireless design. In this paper, we proposed the fitness function based procedure and scheduling of a network through an adaptive methodology. The phase of scheduling is required to expand the efficiency and network's lifetime's fitness procedure is used to optimize the energy efficiency and data transmission.

KEYWORDS: Wireless sensor network, fitness function, adaptive methodology, Scheduling, Network optimization

INTRODUCTION

Wireless sensor network is a pool, which is classified into the number of small nodes with refined mode and processed through a signal, having mobility interface and finite battery power efficiency. The network designed in such a way that each sensor has the capability to sense the region which is present in surrounding area and convey the information to the central node of network. A node present in sensor network called as a sensor node, is used to gather sensory information and interfacing with other connected node in the network. Wireless sensor network are distributed in abundant manner, autonomous sensor to supervise substantial or ecological state [1].Wireless sensor have a large number of sensor nodes in the network which is reasonable, small in size and adaptable to make a communication over short distances. Their structure depends on the requirements of application explicit.WSN's have been enacted in nasty environment such as in the polar areas, extensive deep sea and treacherous zone. The main source of sensor node is battery effectiveness, as the battery of a sensor is impossible to recharge. Specifically wind and solar energy are used to recharge the batteries instead of other equipments but these energy's are not reliable. Activity of sensing in Scheduling means when to operate a sensor node for sensing, this activity known as active mode and the sensing activity is idle it called as sleep mode. The size and the cost restraints on the sensor node may lead to the cause of restraints on memory, power, bandwidth and velocity. These obstructions must be circumspect while designing a sensor network. Various methods have been implemented to improve the network lifetime. Now a day's wireless sensor plays an important role in military and civilian application. They are developing quickly and widely used in some application such as tracking the target, surveillance and for the security problem [2]. Additionally, the sensors have some classified characteristics i.e. small in size, having light-weight, tethered less and have limited energy.

Some of the protocol like Geographic random forwarding focuses on the performance of multihop.It calculated the average quantity of hops to reach the terminal [3].In the geographic random protocol each and every sensor node is familiar with the surrounding region to check the collision in the network. Generally it splits the forwarding area of different region and forwards the data packet on the basis of their priorities variation. But the performance of energy and remission is yet to be critical issues while practically designed.

In another routing protocol it addressed to the shortest path algorithm which is organized by a forward path implied on the network [4].Elitism method is used to attain the energy efficient routing by reducing the length of the path and protract the life of the network in genetic algorithm. The major concerned factor of wireless sensor network is preservation of energy. The network's lifetime can be widening through energy consumption via scheduling scheme and fitness function has been proposed.

Energy consumption by scheduling scheme

A most common feature of WSN is its energy consistence. In the wireless network, small batteries are disposed off by the sensors as they are impossible to change or recharge to get the additional power supply. In accordance with these conditions, chief factor is to develop dedicated protocol which can be communicated easily and handle the sensory data information in a prudent manner. Coverage of an area in wireless is an important factor to prolong the lifetime of the network. It is used to examine the procedures where active sensor node is to be selected through the base station.

PROPOSED METHODOLOGY

ADAPTIVE METHODOLOGY

Adaptive methodology is basically an evolutionary technique generally referred as genetic algorithm which is implied with help of natural selection and genetics .An algorithm of genetic phase consists a variation of adaptive parameter. Genetic phase is an optimization process, which can be expanded on the basis of best, fit and optimal node. In the network design, every node is initialized as bit in concatenate way. The adaptive method starts with stemmed point called as population in an initial phase. The fitness function is highly responsible for the quality of node as it helps in the extension of lifetime of the network. In a wireless design at an initial phase, the sensor node draws a transmission radius inch which population is to be pegged. Higher the fitness value of a node has the superior possibility to sustain within the network design.

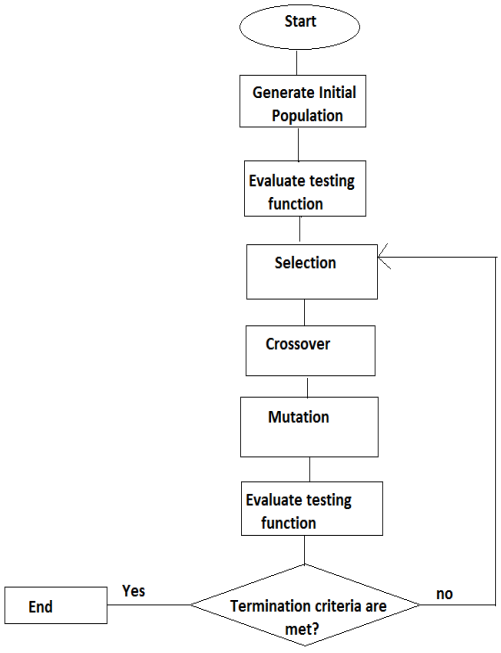

Figure1.1. Flowchart of Genetic Algorithm

The three process has been take place respectively to perform the genetic activity. A **Selection phase** is used to select randomly two nodes as parent node which is used to produce the next generation. After selection, the next phase called **Crossover phase**, which involves transfer of genetic information between the two nodes which is previously selected. After these two processes, **Mutation phase** has been performed for the calculation of fitness value. In this phase, a node has been chosen from the best node which is obtained in the previous generation. The two phases i.e. crossover and mutation an extension to exploration provided by selection, contrast with the exploitation provided by selection. The effectiveness of adaptive technology depends on the tradeoff between

exploitation and exploration. The adaptive phase is lingered to find the optimal node until the termination phase doesn't meet. Adaptive Methodology is an escalation technique to find the fit node to route the packet. Thus the data packet sends in an optimized direction to the base station by underrating the usage of other node and the network's lifetime has been increased.

Fitness Function

Fitness function is used to extend the network efficiency and lifetime through an adaptive methodology. Fitness value is responsible for the packet transmission and it can be calculated with the help of scheduling of a network and genetic algorithm. The new proposed phase introduced here i.e. scheduling. As the fitness function includes categorizing the nodes on the network and after that commencing of the hop count to all the nodes. After then the event has been identified and the nodes gathers the information from neighboring nodes within the transmission radius. The fit nodes are to be selected among the various nodes present in the network with the help of adaptive phase and after that the packet sends to destination address.

INITIALIZATION PHASE

In adaptive techniques the first phase is evolve called as initialization phase.Hop count is a computation that is used to show the distance of the base station. Whenever a message is received by node it reserve the place of hop count and it increments the hop count by 1.

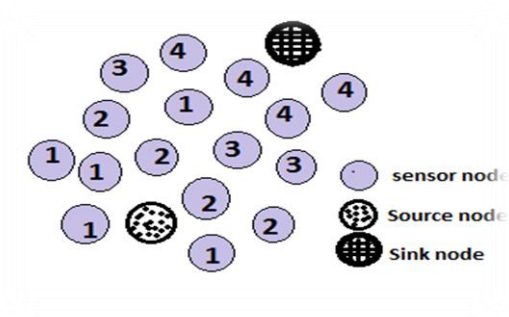

Figure 1.2. Initialization of Nodes

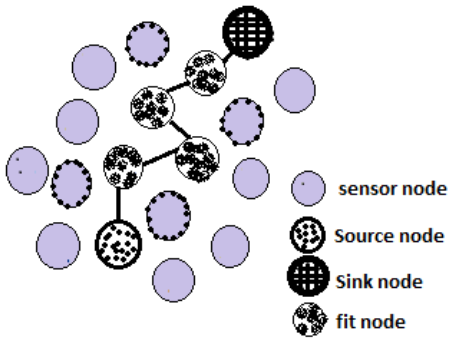

Figure 1.3. Packet Routing

SCHEDULING

Scheduling is an activity used to perform the multitasking and multiplexing. It is a method to assemble the data packet, optimizing and controlling the work and balance the workload in wireless network. The scheduling phase is used to set the coverage problem of an area to determine set of active nodes through a central control.

DATA ASSEMBLING

Source node detects an event, and draws the transmission radius and makes a connection with the neighboring nodes by count the hop. It act as an acknowledgement phase, when a node receives any request message from the adjacent node i.e. the sender node it send the requested information to the sender node

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FITNESS COMPUTATION

When a node received the requested message, the source node chooses the next node to transmit the data packet. Fitness value is responsible for the selection of node which later extends the network lifetime .Adaptive methodology is used to calculate the fitness of the nodes. The fitness of a node is basically based on the actual distance of the node to the sink node or the base station.

Fitness of node =distance (p, t) + distance (t, si)

The two node's distance can be measured by using the formula:

$$\text{Distance (p, t)} = \sqrt{(x2 - x1)^2 + (y2 - y1)^2}$$

Where p,t is parent nodes ,si is sink node or base station

PACKET ROUTING

When the overall information has been collected, the packet routing phase has been beginning. Initially the source node sends the data packet to the node which is previously selected. The process repeat itself after some time from the data assembling phase until the data packet does not reaches to the destination node.

SIMULATION AND RESULTS

The proposed fitness evaluation has been carried out on MATLAB software .On the proposed method to find the effective value of node; some traffic congestion has been formed. While minimizing the traffic congestion the total distance also have been decreased after each generation. As in the simulation it shows the decreased in the number of traffic heads as well as the distance between the two nodes also reduces so that nodes can communicate very easily. While concluding we can say that that after each phase of the generation the energy consumption must be decreased.

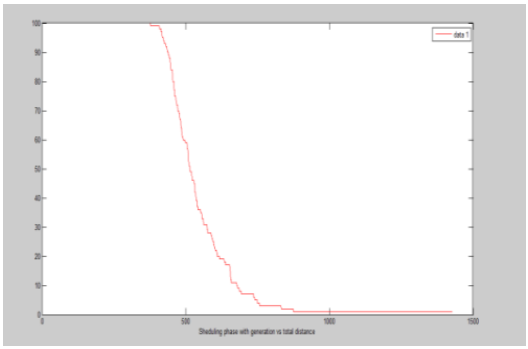

Figure 1.4. Consumption of Energy

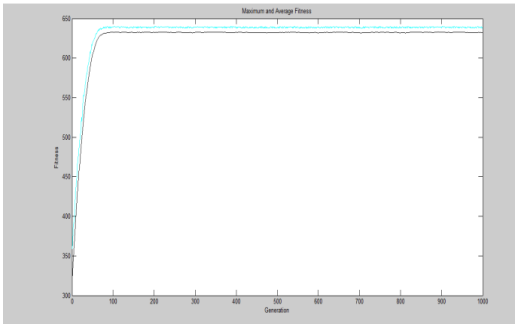

Figure 1.5. Fitness Vs Generation

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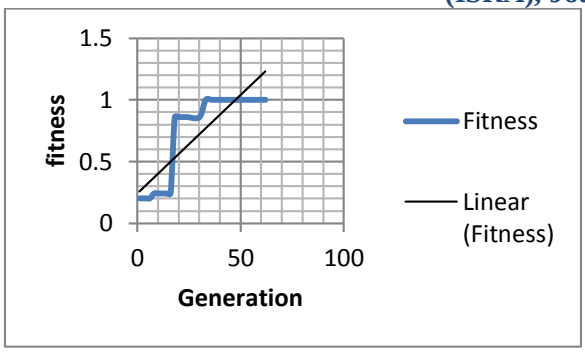

Figure 1.6. Linear Graph between fitness and generation

In the figure 1.6 it shows the total amount of fitness function after each phase of generation. As we can see after each phase of generation it will expands the amount of fitness and we can see in the simulation after 60 hop count it will reach to maximum height. When a sensor nodes detects an event, it need some time to sense the information, but at the same time the round of sensing increases the data traffic and hence the cause of data loss. The presented scenario allows running for fitness procedure.

CONCLUSION

There is a large variance of adaptive technology which is used to determine the standard solution at the higher degree. The adaptive procedure employed the node population data in each generation and adaptively adjusts the amount of probabilities in the activity of genetic. The fitness value of solution which is calculated is highly dependent on the adjustment made by genetic phase. The scheduling technique is used to cleave the entire group of sensor into disjoint sensor subsets and cover needs by each sensor to fulfill coverage restraints. In this paper an

The future intensification should be based for security purpose, as security plays a significance role to run the multiple applications. Implement and execute some cryptographic technique, it may lead to secure the data packets to reach the base station without any interposition.

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