Hybrid Optimization Based On Genetic Routing And Scheduling Scheme With Robust Transmission In Wireless Networks

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Abstract - In this work, it used an effective proposed scheme, named as Hybrid Optimization System (HOS), for efficient and routing and transmission for wireless networks. This Hybrid scheme consist of many techniques such as, Dynamic Opportunistic Routing, Multipath Scheduling Scheme and Robust Transmission in networks to overcome above limitations in networks. The proposed scheme which maximizes end-to-end connectivity in the network and minimizes faults at link or/and node level. A set of multiple paths are established from source to multicast destinations using energy efficient neighbor node selection mechanism. It provides load balancing at the node and finds a stable path between the source and destination meeting the delay requirement. Results, that the proposed protocol outperforms in terms of packet delivery ratio, throughput, routing overhead and average end to end delay.

Keywords—HOS, clustering, fuzzy, WSN

I. INTRODUCTION

Wireless sensor network (WSN) is made up of a group of sensor nodes that work together in a group other to carry out an assigned task (e.g. surroundings supervision, target follow-up, etc.) then informs the gathered data via a wireless medium to a base station or sink node. WSN can be illustrated by a group of collaborating nodes having sensing, logic as well as wireless communication abilities. The sensor nodes gather as well as send data to the distant base station from there the end user can get back the required data [1]. The data are then transmitted to the end users each from time to time otherwise on-demand via the sinks or a higher order node; the base station [2]. There are wide varieties of applications of Wireless sensor network like from civil, healthcare and environmental to the armed forces. Different types of applications consist of target follow-up in war, habitat supervision, civil work supervision, surroundings supervision and plant repairing. Because of the employment of a huge quantity of sensor nodes in unrestrained environments, it is common that some malicious nodes may enter into the network and can hamper mainstream functioning, decrease the energy efficiency [3] as well as can effect processing within the cluster.

II. RELATED WORK

In [4], in depth introduction to WSNs as well as their characteristics has been explained. In past years many techniques have been proposed for prolongation of network lifetime, one of them is choosing cluster head depending on distance [5]. Many techniques found in the literature survey focuses on malicious node detection and prevention like in [6] blackhole affects on network parameters are measured and as well as the methods of prevention and detection for blackhole attack in WSN is explained. In [7], based on the exponential trust method a technique has been discussed to identify malicious nodes .In the past, various computational techniques based cluster selection techniques have been proposed like Cluster Head selection protocol, by employing Fuzzy Logic (CHFL) [8]. The same concept of applying Fuzzy Logic was also implemented in Cluster Head Election mechanism (CHEF) [9] protocol. Finally, to find out potential of nodes lots of work has been done for example ACE algorithm [10] assesses every node’s potential individually for each for cluster head selection.

III. EXISTING WORK

In the Wireless sensor network (WSN) clustering is one of the most important tasks in which any one of the nodes from a collection of nodes is chosen to be a cluster head and cluster head takes care of mainstream functioning as well as dealing with the other nodes within the cluster. Also in the wireless sensor network (WSN), malicious node detection is the crucial task, so that the malicious node can never become the cluster head. Further, as the number malicious node increases, then the possibility of becoming a malicious node as cluster head also increases. So as to detect malicious node as well as to select a high potential node for cluster head, a PSO based malicious node detection and cluster head selection technique. The proposed algorithm determines a potential worth for all nodes thereafter a high potential node is chosen as a cluster head. This algorithm also reduces cluster overlapping with spatial allotment of cluster heads as well as removing malicious nodes specifically not permits malicious nodes to become cluster heads with overall improvement in energy efficiency.
IV. PROPOSED WORK

In this work, we used an effective proposed scheme, named as Hybrid Optimization System (HOS), for efficient and routing and transmission for wireless networks. Hybrid scheme consist of many techniques such as, Dynamic Opportunistic Routing, Multipath Scheduling Scheme and Robust Transmission in networks to overcome above limitations in networks. Proposed scheme which maximizes end-to-end connectivity in the network and minimizes faults at link or/and node level. A set of multiple paths are established from source to multicast destinations using energy efficient neighbor node selection mechanism. It provides load balancing at the node and finds a stable path between the source and destination meeting the delay requirement. Results, that the proposed protocol outperforms in terms of packet delivery ratio, throughput, routing overhead and average end to end delay.

ADVANTAGES PROPOSED WORK:

- The outperforms proposed in terms of packet delivery ratio, normalized routing overhead, throughput and average end to end delay.

- Here obtained motion parameters i.e. velocity, direction of the nodes. Based on these parameters the network selects the path to transmit the data packets between the nodes.

- This approach is that best path can be chosen during the routing based on all these factors. Also the battery level of the nodes can be taken care in the network. This results in network’s good throughput and high efficiency.

PROPOSED ALGORITHM: Genetic Algorithms

Genetic algorithm works in five stages.

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<th>Population, Chromosomes and Genes</th>
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<td>Fig.1 Population, Chromosomes and Genes</td>
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A. Initial Population

The process begins with a set of individuals which is called a Population. Each individual is a solution to the problem you want to solve. An individual is characterized by a set of parameters (variables) known as Genes. Genes are joined into a string to form a Chromosome (solution). In a genetic algorithm, the set of genes of an individual is represented using a string, in terms of an alphabet. Usually, binary values are used (string of 1s and 0s). It say that we encode the genes in a chromosome.

B. Fitness Function

The fitness function determines how fit an individual is (the ability of an individual to compete with other individuals). It gives a fitness score to each individual. The probability that an individual will be selected for reproduction is based on its fitness score. The fitness value of a node is calculated based on the distance of the node to the base station.

**Fitness** = \( \text{dist}(i, j) + \text{dist}(j, bs) \)

The distance between two nodes or node to the base station is calculated using the formula

\[ \text{dist}(i, j) = \sqrt{(x_1 - x)^2 + (y_1 - y)^2} \]

Where, \( i, j \) are parent nodes, bs is the base station.

C. Selection

The idea of selection phase is to select the fittest individuals and let them pass their genes to the next generation. Two pairs of individuals (parents) are selected based on their fitness scores. Individuals with high fitness have more chance to be selected for reproduction.

D. Crossover

Crossover is the most significant phase in a genetic algorithm. For each pair of parents to be mated, a crossover point is chosen at random from within the genes. For example, consider the crossover point to be 3 as shown below.
The new offspring are added to the population.

E. Mutation

In certain new offspring formed, some of their genes can be subjected to a mutation with a low random probability. This implies that some of the bits in the bit string can be flipped.

![Mutation: Before and After](image)

The algorithm terminates if the population has converged (does not produce offspring which are significantly different from the previous generation). Then it is said that the genetic algorithm has provided a set of solutions to problem.

**Genetic Algorithm Steps:**

1. Determine the number of chromosomes, generation, and mutation rate and crossover rate value
2. Generate chromosome-chromosome number of the population, and the initialization value of the genes chromosome-chromosome with a random value
3. Process steps 4-7 until the number of generations is met
4. Evaluation of fitness value of chromosomes by calculating objective function
5. Chromosomes selection
6. Crossover
7. Mutation
8. Solution (Best Chromosomes)

**V. METHODOLOGIES**

1. **Initialization**

Protocol Initialization: Dynamic source routing (DSR) is an on-demand reactive routing protocol designed to restrict the bandwidth consumed by control packets, by eliminating the periodic table update messages required in the table driven proactive approach. It uses source routing instead of relying on the routing table at each intermediate node. DSR is beaconless and hence does not require periodic hello packet transmissions.

Node Stability: The stable nodes are necessary in forwarding group to provide better packet delivery services. Node stability in terms of movement around its current position gives us an idea of stationary property of node.

2. **Balanced Multipath Routing & Scheduling**

Stable multicast routes are constructed with the help of neighbor node selection mechanism in which next node is selected based on residual energy and density. In the following section, it discusses the RQ and RP packet format, process of request and reply phase, route establishment process and route maintenance in detail.

3. **Robust Route Selection – Genetic Optimization**

Genetic Algorithm is an evolutionary algorithm based on the evolutionary ideas of natural selection and genetics. Optimization is the process in which GA selects the best, fit or optimal node for data transmission. The Genetic Algorithm is
an optimization technique which includes the process like initial population creation, fitness evaluation, selection, crossover and mutation. The algorithm ends when it meets the termination criteria. Every node in the network is referred as sequence of bits. The Genetic algorithm starts with the initial points called as Initial Population. The sensor nodes within the transmission radius are selected for the initial population. The Fitness function determines the quality of the node in extending the network lifetime. The fitness function is calculated for the nodes based on the distance and the residual energy. The node with higher fitness value has the better chance of survival in the network. Then the Selection process starts which selects two nodes as parent nodes to produce the next generation. There are different types of selection methods exist.

4 Route Maintenance

Route Maintenance is the mechanism by which node S is able to detect, while using a source route to D, if the network topology has changed such that it can no longer use its route to D because a link along the route no longer works.
causes drops in the PDR value. However we have reasonable PDR achieved for this case by considering nodes with higher remaining battery (i.e higher energy level) for route establishment. If energy spent by node on transmission and receiving of a packet and/or control information is low then as per precise mathematical energy model, the computed residual energy remains high.

![Fig 8: End-to-End Delay](image)

Fig 8. End-to-End Delay compares the proposed low delay ratio comparing to existing frameworks.

![Fig 9: Packet Delivery Ratio](image)

Fig 9. Packet Delivery Ratio compares the proposed high delivery ratio comparing to existing frameworks.

![Fig 10: Average Throughput](image)

Fig 10. Modification life time ratio increased comparing to existing and proposed methods.

![Fig 11: Energy Consumption](image)

CONCLUSION

In this work, it used an effective proposed scheme, named as Dominant Optimization System (DOS), for efficient routing and transmission for wireless networks. Dominant scheme consist of many techniques such as, Accomplished Capable Routing, Manifold Coordinate Scheme and Secure Transmission in networks to overcome above limitations in networks. Proposed scheme which maximizes end-to-end connectivity in the network and minimizes faults at link or/and node level.

A set of multiple paths are established from source to multicast destinations using energy efficient neighbor node selection mechanism. It provides load balancing at the node and finds a stable path between the source and destination meeting the delay requirement. Results, that the proposed protocol outperforms in terms of packet delivery ratio, throughput, routing overhead and average end to end delay.

The proposed a novel security and trust routing scheme based on active detection, and it has the following excellent properties:

1. High successful routing probability, security and scalability. The Trust scheme can quickly detect the nodal trust and then avoid suspicious nodes to quickly achieve a
nearly 100% successful routing probability.

(2) High energy efficiency. The Trust scheme fully uses residue energy to construct multiple detection routes.

The theoretical analysis and experimental results have shown that scheme improves the successful routing probability by more than 3 times, up to 10 times in some cases. Further, scheme improves both the energy efficiency and the network security performance. It has important significance for wireless sensor network security.

REFERENCES


