

An Effective Energy Management of Nodes in MANET based Swarm Intelligence with Feature Selection Methods



S.S.Kokila, C.L.Brindha Devi

Abstract: Now-a-days constraints of hardware and resource efficient routing are very important for construct at Mobile Ad-hoc Network. Previous works describe the ABC and WO based energy efficiency. The proposal paradigm intends to reach a particular quality requirement for MANET. A novel Swarm Intelligence and Feature selection methods are developed to new routing algorithm for managing high energy. The protocol grouped together based on their structure, energy, computational complexity and path establishment. To evaluated and compares MANET routing protocols for wireless sensor network. Swarm intelligent found that not only energy as well as has the performance in both routing and Quality of Packet delivering. To using Feature selection method is to find optimal route which from feasible route. This method is to improve the quality of MANET and find intrinsic properties of energy management. The new proposal Improved Swarm Intelligence Routing Algorithm (ISRA) to have standard simulation and performance metrics for comparing different protocol using NS2 based simulator and discover the efficiency.

Keywords: MANET, Routing Algorithm, Energy Management, Performance Metrics, Simulation.

I. INTRODUCTION

Wireless communication used to exchange the information through wireless links when network of disconnected. Within particular range, nodes are communicated by these links. A MANET used to provide such kind of service to manage route in wireless sensor network. Most of the research and companies attentive to bring the interaction between collaborated nodes which consist of wireless network with human. In wireless sensor network, each nodes are portable and have various characteristics of region. Each sensing areas are difficult to reach by human. The sensors are placed by robots or sprayed from the air. To design an efficient protocol for energy management is an important issue [1]. The network construction, to adding and removing node done without manual works. Nobody involving nodes are finish the task. These sensor nodes are long trivial and they reduce of small processing unit while computing work.

Mobile Ad-hoc networks are wireless networks grouping of wireless nodes which fully connect with multi hop communication paths. MANET formed with multi hop networks are portable or Dynamic. MANETs efficiency evaluated by their energy. Energy management depend nodes routing capabilities. Energy management is paramount impotence and general strategies for saving power need to be addressed. Recently home or office networks interconnected with laptop, PDA, Mobile phone, and Smart TV are communicated with wireless. Energy management is also an important criterion for MANET Protocols. MANETs are categorizing higher error rates of the wireless medium, low bandwidth and small power computation power of each node. Energy preservation is also an important consideration in the prototype design of MANET.

Routing protocol between any nodes within an ad-hoc network can be difficult because the portable nodes can move dynamically and connect or disconnect the network. MANET s have more advantages such as easily set up and destroy depends upon flexibility as the nodes. MANET has continued to provide potential capacity including hypo of spectrum, stable infrastructure and requirements [2,3].

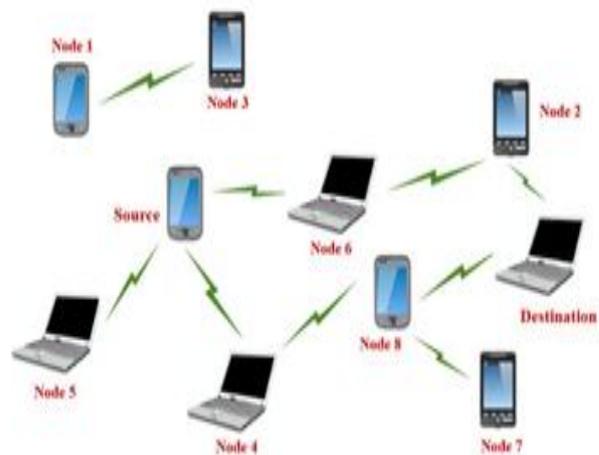


Figure 1: MANET

This work considers the trust parameters of every sensor node such as energy backup, packet forwarding rate and loyalty. The routes are detected and the most optimal route is selected by clubbing the Swarm Intelligent using Feature selection methods. This proposal used to choosing the best optimal route for every data transmission and ensures security, energy efficiency. The main objective of this proposal is given below.

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- Efficient energy management is important issues faced by the sensor network.
- Invention of new prototype for energy management based on swarm intelligent using feature selection methods. ISRA routing protocol that selectively optimizes the information acquired from layers. Swarm intelligent routing protocol initiate the process of routing and feature selection methods optimally select the route. The Performance of the new proposal is compared with the exiting approach in terms of standard performance metrics such as PDR, Average Latency, Energy efficient and Network life time.

The organization of the study is follows I. Literature Reviews, II. Proposed Routing Algorithm, III. Results and Discussion Finally concluded.

II. REVIEW OF LITERATURE

In this chapter, discuss recent work which is related to the routing algorithms for Mobile Ad hoc Network. Particle Swarm Optimization based MAC scheduling mechanism for data transmission. ACO-AODV routing protocol for multi-hop environment. Utilize the work both ACO and PSO algorithm to solve the problem. The optimum routes are performance to increases [3]. Routing protocol is used to transmit data among the sensor nodes. This is connected together radio frequency. Multi hops communication method is proposed in M-LEACH protocol. It has been proven to consume less energy. The Use TDMA is specify the timeframe for transmission and allows nodes to the cluster data collision free with other nodes [4].

Routing protocol is Wireless Sensor Network is recently very challenging task for protocol designers. SIBRP depend on the biological behavior to provide a natural model for distributive solving without extra central control of coordination. Swarm based routing are classified into ant based, slime based and bee based [5]. MANET comes from link break which caused network performance degradation and quality of service (QOS). A Multi Power efficient JEER by modifying AOVD and DSR protocol. JEER to prevent link break and increase the throughput in the overloaded network scenario [6].

In [7], a new routing approach based on fuzzy pertinent and any system is proposed for MANET. This work employs fuzzy synchronized pertinent for modeling the routing framework. The ant system is utilized for detecting the solution for uncertainly problems. The performance of the work is tested in terms of packet delivery rate, throughput and end- to – end delay. A partially distributed dynamic model to achieve secure and reliable routing for MANET is proposed in [8]. This work employs a partially distributed dynamic model on all the sensor nodes to improve the security of the network. The misbehaviors of sensor nodes in the network. Hence, the decision making process of the work is dynamic as the route is chosen by considering the misbehavior of the nodes.

A hybrid algorithm filtered using vote algorithm with information grain. Combines to probability based on learners in order to select the important features that positively affect

the accuracy [9]. This work forms a temporary file to keep the identity and route information of nodes for a specific period of time. The mobile sensors detect routes and perform data transmission. In [10] Modern society utilizes computer networks continuously for all purpose. Feature selection is the technique which is selecting a subset of features. Feature selection can be considered an important asset in building classification models as large number of useless features. MANET using effective classification based on cross validation of tuned classifiers. It employs relied on better accuracy by PSO, it generates weigh to enable best classifier. Energy efficient routing algorithms for WSN based on Improved HS algorithms [11]. It employs convergence speed of routing algorithm and improvisation of New Harmony has been improved. Produce better performance energy consumption and save. This proposal aims to efficient management of energy, secure, Swarm intelligent based routing protocol with feature selection method.

III. PROPOSED SYSTEM

A. Energy management

To reduce energy consumption in either transmission or suggesting a different routing approach. In this proposal found a new technique for efficient energy management. Routing algorithm is an important role in MANET. The energy consumption depends on routing efficiency. If suppose nodes are taking time to route for communication between source and destination. The energy will be loss. The complete network area is divided into equal areas and encloses the sensor nodes being present in that specific area. The main life source of the sensor of the sensor node and hence it is one of the most important trust metrics. This proposal chooses the best available route that ranges from the source and destination. This work clubs the Swarm with Feature selection methods. The constraint of energy strictly that sensor node deployed in real environment and powered by battery. It is important to balance the usage of energy of network for depends routing algorithm efficiency. That is life time of network belongs routing efficiency.

The sensor nodes broadcast routing nearby sensor nodes. The sensor node replies routing request-replay itself while target reached. The deployment of nodes is dependent and affects the performance of the routing protocol. To create an infrastructure of wireless sensor network in ad-hoc manner and orange to establish to path route connectivity and energy efficient. Locate the sensor is a great challenge in dynamic networks. The routing protocols are primarily designed for MANET have lot of challenges like scalability and robustness. All the routes before they are actually needed, and routes are stored in table format that is maintain routing table. Each node has information about on their routes. Another method compute route when they are need. To find the route and create routing table. The energy cost is calculated in each node.

$$TC_{Np,Nq} = cost(Np) + Metric(Np,Nq) \quad (1)$$

For using decision making on the path of propagation energy of node needed.

$$P_{Np,Nq} = \frac{1/C_{Np,Nq}}{\sum_{k \in FTp} 1/C_{Np,Nq}} \quad (2)$$

B. Swarm Intelligent Based Routing Algorithms

Researcher analysis the behavior of Swarm and it implements for find a solution. The colony optimization emerges to consequence of way to solve complex problems. Swarm intelligence based routing protocols are depend behavior of biological species (Insects, Bee, Ant). The basic idea of swarm intelligence and receives its motivation from behavior of ants. The Ant colony Optimization is depend ant route selection source to destination. It explores distributed network without centralized control or the provision of a global model. The ability of ant colony to find optimal routing through indirect communication between the sensor nodes. Swarm intelligent routing algorithm based on social nature of ant to context of ad hoc network. The concept of optimal routes, stigmergy emerge without the system dissemination of connectivity information. The hop distances the metric to determining routes. The packets are towards strong pheromone to current network status, exponential pheromone decay is adopted as the negative feedback. A pheromone tables track the amount of energy sensor node. The routing probability computed by the composition of the pheromone values and local heuristic values

$$P_{x,y,d} = \frac{[\tau_{x,y,d}]^\alpha [\eta_{x,y}]^\beta}{\sum_{i \in N_x} [\tau_{x,y,d}]^\alpha [\eta_{x,y}]^\beta} \quad (3)$$

$\eta_{x,y}$ is the heuristic value is calculate of congestion in a node. The routing computation makes incorporating the heuristic values. The probabilistic routing table, data traffic will be distributed according to the probabilities for each neighbor in the routing table. The swarm intelligent routing exhibits load balancing behavior. Sensor nodes with a large number of packets in the buffer are avoided. Routing in MANET is reliable may be not stable. Because of the dynamic nature of mobile sensor nodes and existing layered protocols designed to improve network reliability.

C. Improved Swarm Intelligent Routing algorithm (ISRA)

An Improved Swarm Intelligent Routing Algorithm, which imitates the original Social biological behavior of Swarms. In this proposal mainly focus the Ant nature. There are basic components of ACO algorithm used in MANET; As the ISRA is employed as the fitness value, the selected route enjoys the highest fitness value. This makes sense that the most feasible route is chosen as the route for packet transmission. As the route is chosen on the basis of route table, route is secure and energy efficient. Network prototype is changed, nodes are updates route table in periodically. In order to ensure using the best path for packet transmission, the sensor node will retain previous path information. The main objective as indicated by the algorithm for the packets. It advances the data packets in view of the pheromone data, which guarantees its routing by the best courses.

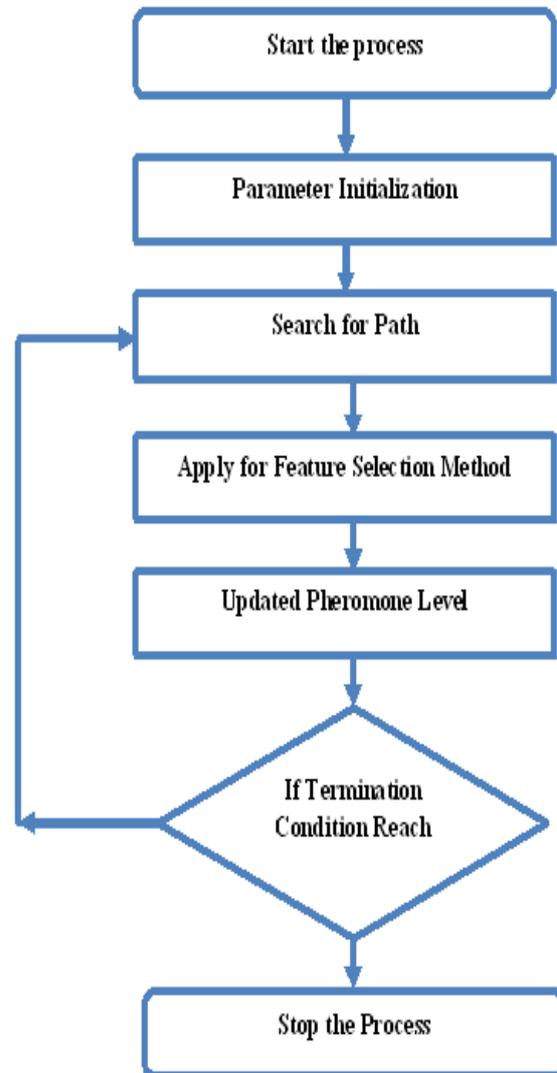


Fig 2: Flow Chart of the ISRA

The above figure describes the overview of proposal work. The nature of ant search for their food, first find the path and leave a chemical substance which is called Pheromone on the way. Other number in a Swarm will move the way according to the pheromone. Find the shortest path is found colony will accumulated that path. If there is any inconvenience on the path, the colony divided into another way at beginning. After some time ant choose optimal path. The purpose of Feature selection method is implemented for choose the optimal path. The Ant Colony optimization enhance by Feature Selection method for produce very efficient path. Using this technique to improve the quality and accuracy of Sensor node routes. Basically applied on the original feature set and divided into subset. Each subset of path ranked by based on that fitness and finally get effective route for MANET.

$$\tau_{xy} = (1 - \rho)\tau_{xy} + \left[\frac{\Delta\tau_k}{\varphi \cdot B d_k} \right] \quad (4)$$

$$\text{Ant [Fitness]} = \alpha \gamma_R(D) + \beta \frac{|R|}{|C|} \quad (5)$$

Proposed Improved Swarm Intelligent Routing Algorithm

Input: Possible Routes;

Output: Optimal Selection

Begin

For all

Step 1: Initialize the Parameter;
 Step 2: Randomly allot the food source population;
 Step 3: For each Ant of Colony
 Randomly Select an Ant for find food Source;
 Calculate fitness of path
 Post Ranking using Feature selection method;
 End For
 Step 4: Compare the food source and compute Pheromone Level
 Step 5: Apply Feature selection method and find optimal solution
 Step 6: if fitness of Path not sufficient
 Change the another way;
 Compute fitness and apply feature selection method;
 End if
 End For
 Sept 7: Stop the process
 End

IV. EXPERIMENTAL RESULTS

In this Section has been simulated and evaluated out new proposal with existing algorithms with standard performance evaluator. This proposed work is simulated in NS2.

Table No: 1
Simulation Parameters

| Parameters | Specifications |
|---------------------|-------------------|
| Network Size | 600 × 600 |
| Number of Nodes | 10/50/100/200/300 |
| Communication Range | 100 to 300 |
| Speed | 512 |
| Simulation Period | 200 PS |
| Node moving Range | 50-100 |

The performance of the proposal is analysis in terms of Packet Delivery Rate, Average Latency, Throughput, Energy Efficiency and Network life time. These experimental results of the proposed works are compared with the existing approaches such as JEER, EESTR. The number of nodes is varied and the packet delivery rate of the work is computed. Packet delivery rate starts to diminish, as the count of nodes increases. The latency of the proposed approach computed. The energy conservation is important role of routing protocol for MANET. It will also measure and compare with existing approaches. Life time of networks of the work is measured with respect to the count of active nodes in a specific simulation time.

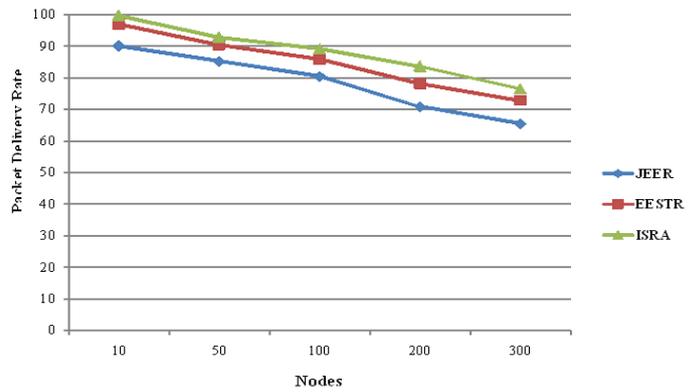


Fig 3: Packet Delivery Rate analysis

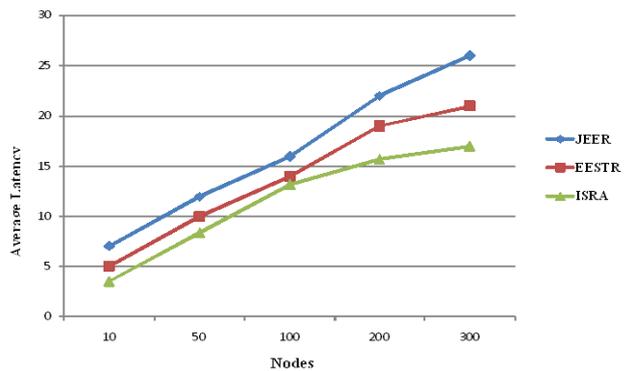


Fig 4: Average Latency Analysis

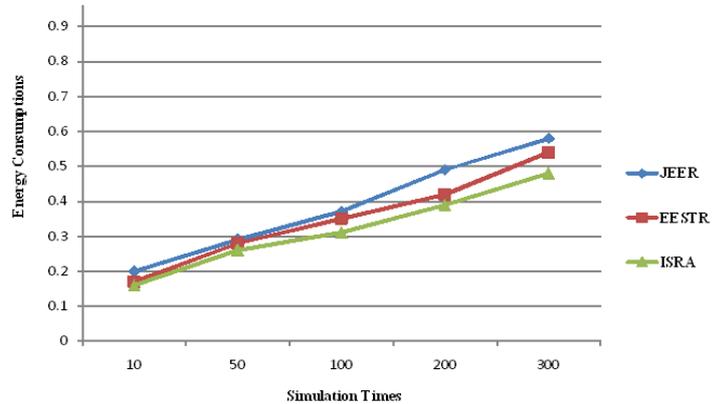


Fig 4: Energy Consumption Analysis

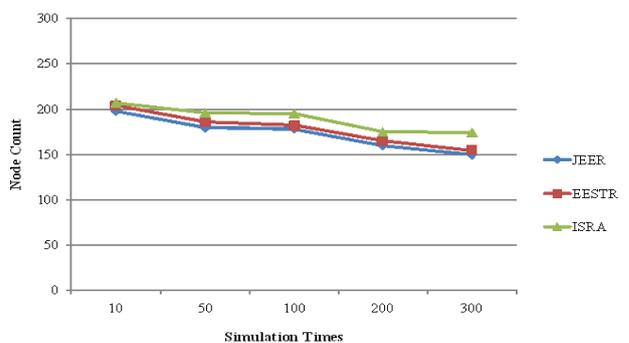


Fig 5: Network Life Time

The above analysis describes the new proposal results compared with previous works. The results is found that the proposal approach prove better than exist approach. Packet Delivery Rate of work is measured. On that analysis ISRA has better packet rate start to diminish as the count of nodes increased. The average latency with 17 seconds for node 300 and prove best performance. The energy consumption of the proposed approach is lower than previous work. The minimal energy consumption it will lead to more network life time. The network lifetime measured with respect to the count of active nodes in a specific simulation time. The proposals prove better network life time.

V. CONCLUSIONS

The proposal innovate new routing algorithm, which is proven better routing for MANET. The ISRA combined together with Ant Colony optimization algorithm with feature selection methods. Here ACO find the route and Feature selection method choose optimal route for MANET. To compute the fitness of Ant, select the best fitness. The routing tables are maintain very sensor nodes and based on that routing table route employed. The performance of proposal shows that there is better improvement and find the comparison with existing work. The proposed algorithm is evaluated form both efficient and effectiveness. It will increase best PDA and Network Life time. The energy consumption and Life time of network are indirectly correlative to each other. That mean the performance of the ISRA when compare with previous is produce more route efficiency and energy management. Future, this work can be improved by several other bio-inspired algorithms.

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