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The Novel Approach for Efficient Routing Based On Fuzzy Ant Colony Optimization in Wireless Sensor Network

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***Abstract*— Wireless sensor networks are used in many domains. The main element of the WSN are the sensor nodes, the main purpose of sensor node is to collect information from the network after collecting this information it transfer to base station for further processing the main problem in WSN is the life time of network due to which the performance of WSN decreases. For increasing the working lifetime of WSN we Proposed Fuzzy Ant Colony optimization Algorithm for efficient transmission in network by using FACO optimization problem will be solved.. The proposed Algorithm has been proved to be better as compared to the ACO algorithm the proposed approach outperforms in terms of Packet Delivery of the system, the number of packets transmitted to the base station and the stability period of the system**

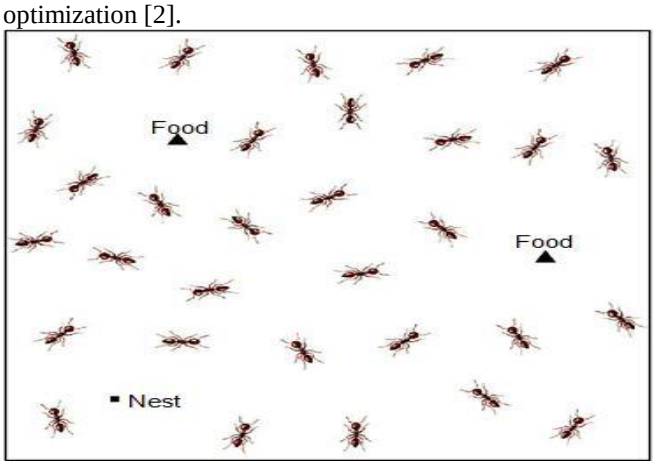
***Index Terms*— WSN, ACO, FACO**

I. INTRODUCTION

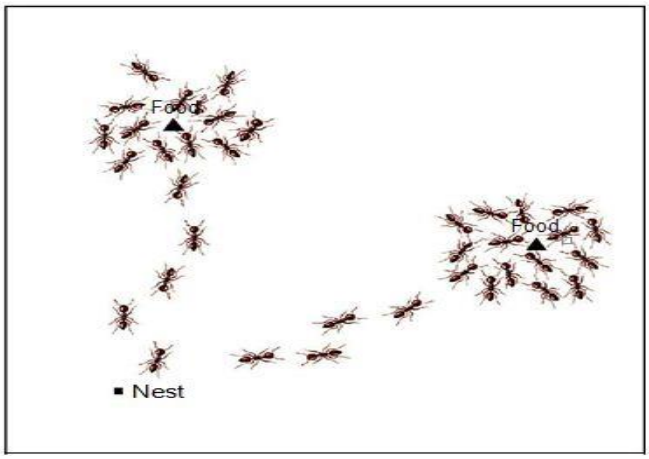
WSN has become an emerging field in research and development due to the large number of applications that can become significantly beneficial from such systems and has led to the development of cost effective, not-reusable, tiny, cheap and self-contained battery powered computers, also called sensor nodes. These sensor nodes can accept input from an attached sensor and process the input data gathered from the sensor nodes. After that the process data wirelessly transmits the results to transit network. WSNs are highly dispersed networks of lightweight and small wireless nodes, deployed in huge numbers, to monitor the system or environment by the measurement of physical parameters like pressure, temperature, or relative humidity[3].

The ACO algorithm with simulating nature ant is regarded an effective means for solving combinatorial optimization problems, and it gradually becomes the hot spot in the field of the intelligent optimization algorithms. Because the ACO algorithm has the positive feedback mechanism, distributed computing, greedy search characteristics and robustness, parallel processing and so on, it has been widely applied in combinatorial optimization problems. And it has achieved good effect in traveling salesman problem [1].

The optimization process does not depend on rigorous mathematical properties of optimization problem in itself and has the potential parallelism. Research on ant colony algorithm has shown that superiority of the algorithm for solving complex optimization problems. Because the ant colony optimization algorithm is essentially a kind of discrete optimization ideas, so the study of the optimization algorithm is mainly aimed at the problems of discrete domain optimization [2].



(a) Ant colony position distribution in the initial moment



(b) Ant colony position distribution after a period of time

II. RELATED WORK

A. Senthil Kumar, S. Velmurugan , Dr. E. Logashanmugam (2015), A data discovery and dissemination protocol for wireless sensor networks (WSNs) is responsible for updating configuration parameters of, and distributing management commands to, the sensor nodes. All existing data discovery and dissemination protocols suffer from two drawbacks. First, they are based on the centralized approach; only the base station can distribute data item. Such an approach is not suitable for emergent multi-owner-multi-user WSNs [4].

Saahirabanu Ahamed and Ananthi Sheshasaayee (2015), secure reprogramming is an important issue in Wireless Sensor Networks (WSN) to suit the sensor nodes for different

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applications. Reprogramming is the process of uploading a new code or changing the functionality of existing code. It enables users to extend or correct functionality of a sensor network after deployment at a low cost. The mobile sink is most widely used for the sensor programming [5].

Kanchan Verma 2015, Wireless sensor network comprises of a set of sensor nodes that communicate among each other using wireless links and work in an open and distributed manner because of less number of resources on the nodes. The sensor nodes sense information about an event from the ambiance and then the information is forwarded to a sink node for further processing and analyzing. The sensed information can be forwarded in many ways, earlier uni cast routing was there to a single sink node, but due to the wide variety of WSN applications the presence of multiple sinks is realized [6].

Gao Weimin and Zhu Lingzhi (2015), the techniques of distributed data storage in wireless senor networks. Firstly, the challenge and the need for such techniques were summarized; Secondly, some representative distributed data storage and retrieval schemes were introduced in detail; finally, the future research directions and open issues were pointed out [7].

Sneha Ghormare,Vaishali Saharel, Anil Jaiswal 2015,In Wireless Sensor Network, the security of data and confidentiality of data is an important aspect. Hence the data cannot be interrupted by the intruder. For updating configuration parameters and distributing management commands, data discovery and dissemination protocol for wireless sensor network is responsible. But, it has drawback is that, some protocols were not designed with security [8].

Jisha Mary Jose, Jomina John2014, Wireless sensor networks (WSN) are basically distributed networks or a collection of sensor nodes which collect information which are used to analyze physical or environmental conditions. WSNs are usually setup in remote and hostile areas and work in extreme conditions. Applications of WSN include habitat monitoring, industrial applications, battlefield surveillance, smart homes etc. is introduced based on simple cryptographic techniques which prevents pollution and DoS attacks and at the same time achieves fastness using the technique of network coding.[9]

Ms. V. Savitha M.E., Mr. E.U. Iniyan M.E.2015, Wireless Sensor networks are a new class of distributed system that is an integral part of the physical space they inhabit. Unlike most computers which work primarily with data created by humans, sensor networks reason about the state of world that embodies them. The network consists of numerous sensor nodes with sensing, wireless communications and computing capabilities. [10]

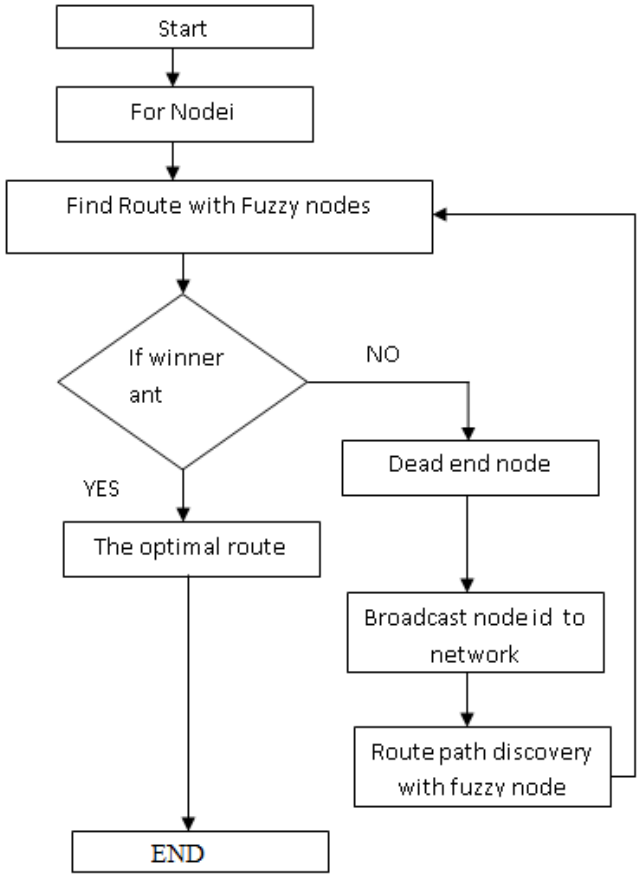
III. PROPOSED METHODOLOGY

To Proposed methodology focus in discovering the optimal route in WSNs from the sources node to the Base Station. The intelligent ants are implemented that have some knowledge in the fuzzy logic called FACO algorithm.(fuzzy Ant colony). the optimal path is found among all paths that may exist from the source to Base Station. In the first step, the source node sends ants to all neighbors; then each ant tries to find a route to Base Station. The ants will calculate the fuzzy amounts for their neighbors and the next hop based on these fuzzy amounts will be selected. This step will continue until the ants are able to find a route to Base Station. If an ant could not find this route in determined time, it kills itself. After that, the Base Station makes final decisions and determines the winner ant. The winner ant returns to its route and updates the routing table and some more information for all nodes on its route. The RREQ and RREP messages for modeling our ants. The simulation results show that this proposal reduces the number of packets needed to find the routes. The Proposed Algorithm will reduce the network bandwidth usage and decrease the amount of Energy consumption because each node needs energy to send the packets. The Proposed algorithm will be able to find optimal route and this route saves the network energy Due to the shortest path selection. Furthermore, our algorithm also decreases the end-to-end delay time for sending and receiving packets. Giving attention to the above context, the network lifetime Will increase.

ALOGRITHM: Fuzzy Ant Colony

1: for time=1 to simulation time
2: for i=1:N, where N the number of Sensor Nodes in network
3: for fuzzy Ant colony nodes :
4 Find normal path
5: if Winner ant (i) arises
6: final optimal route path
7: else
8:dead node start for new path
9: end if
10: end
11: end

lgorithm Flowchart



IV. EXPERIMENTAL SETUP

The algorithms performance has been observed and analyzed on the basis of result of simulation which is performed on the NS2. The NS2 framework is initially studied and then framework has been modified along with Timestamp approach in order to analyze various algorithms. Results are observed under low and high Traffic Environment

S. No.	Parameter	Value(s)
1	Simulator used	NS 2.35
2	Simulation Time	10 Secs
3	Simulation Area	1000 X 1000
4	MAC	802.11
5	Number of nodes	55
6	Speed of Nodes	2 to 16 (m/sec)
7	Mobility Model	Random Waypoint

V. RESULT AND ANALYSIS

1. Throughput: The analysis of Throughput with Fuzzy Ant Colony and with Ant Colony for optimal route path discovery are shown in fig1 the fig1 shows that Throughput using FACO is high as compared to ACO .our proposed technique the results are better

	Throughput	
Time	ACO	FACO
0	0	0
2	0.2	0.7
4	0.8	1.0
6	1.0	1.4
8	1.2	1.5
10	1.2	1.6

Table 1 Comparison of throughput

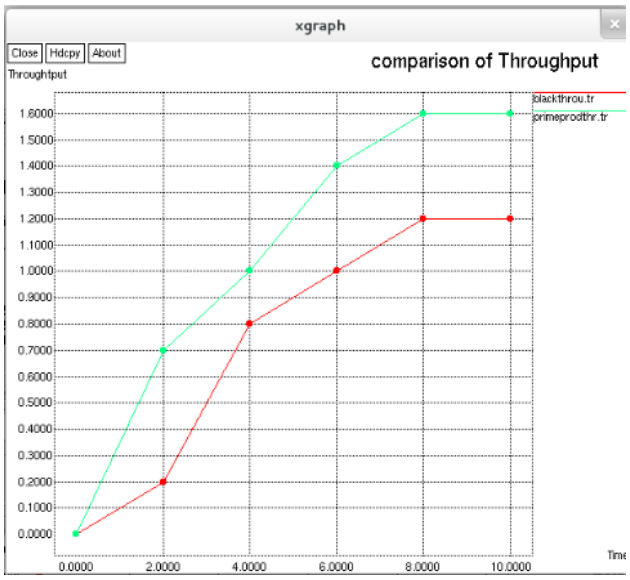


Fig1comparison of Throughput

2. Packet Delivery Ratio: The analysis of Packet Delivery ratio between FACO and ACO are shown in fig2 the shows that Delivery ratio using FACO is high as compared to ACO but in our proposed technique the results are better As compared to the previous technique ACO

	Packet Delivery Ratio	
No of Nodes	ACO	FACO
20	34000	40000
30	52000	64000
40	56000	67000
50	59000	68000
60	62000	69000

Table 2 Comparison Packet Delivery Ratio

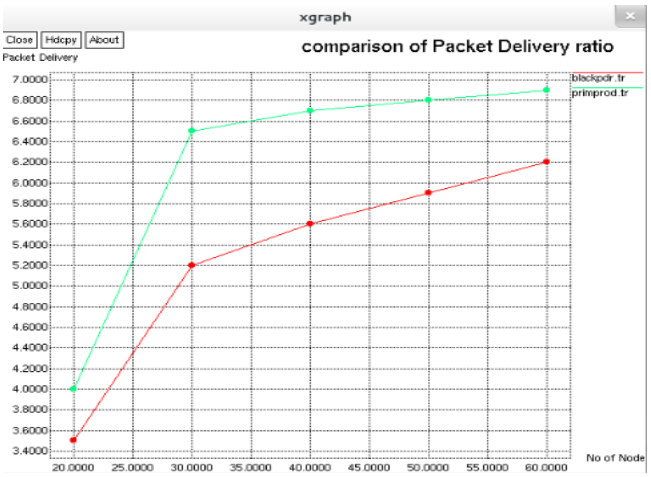


Fig 2 Comparison of packet Delivery ratio

3.End-to End Delay: The analysis of End to End delay between FACO and ACO are shown in fig3 the shows that Delivery ratio using FACO is high as compared to ACO but in our proposed technique the results are better As compared to the previous technique ACO

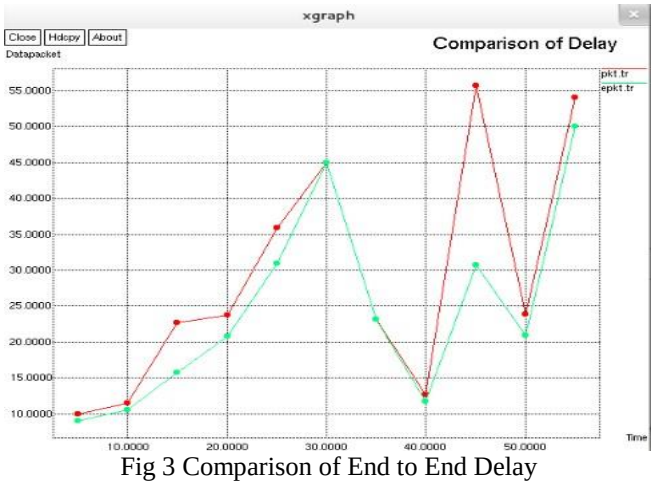


Fig 3 Comparison of End to End Delay

	Packet Delivery Ratio	
No of Nodes	ACO	FACO
10	1300	1200
20	2300	2100
30	4500	4100
40	1300	1100
50	2400	2100

Table 3 Comparison of End to End Delay

VI. CONCLUSION

The Fuzzy Ant Colony Algorithm has been proposed for optimal path transmission previous work presents an artificial ant colony approach to accomplish the joint task of surveillance and target tracking. Once the food is found, the ant will release pheromone. This method has multiple advantages but still it lacks by various ways like there is a lack of criteria for selection.so we proposed FACO Algorithm in which nodes have knowledge about forward path.in proposed algorithm there is winner ant which provides optimal route path for efficient result in route discovery .the proposed Algorithm shows better result as compared to previous algorithm

REFERENCES

[1] Ping Duan and Yong AI, "Research on an Improved Ant Colony Optimization Algorithm and its Application", International Journal of Hybrid Information Technology, vol.4, ISSN: 1738-9968, 2016, pp. 223-234.

[2] Liqiang Liu and Yuntao Dai and and Jinyu Gao, "Ant Colony Optimization Algorithm for Continuous Domains Based on Position Distribution Model of Ant Colony Foraging", e Scientific World Journal,vol.2014, Article ID 428539,2014, pp. 1-9.

[3] Pardeep Kaur and Navpreet Kaur and Nitin Bhagat, "Automatic Base Station Selection Model for Efficent Transmission in WSN", International Journal of Engineering and Technical Research (IJETR), vol.4, ISSN: 2321, March 2016, pp.161-162.

[4] A. Senthil Kumar, S.Velmurugan, Dr. E. Logashanmugam (2015), "A Secure Distributed Data Discovery and Dissemination in Wireless Sensor Networks" International Journal of Engineering & Science Research, vol. 5

[5] Saahirabanu Ahamed and Ananthi Sheshasaayee(2015),"Secure Localized Sensor Reprogramming Protocol With Mobile Sink For Wireless Sensor Networks" Middle-East Journal of Scientific Research, pp 1293-1299

[6] Kanchan Verma (2015), "Multicast Routing Protocols for Wireless Sensor Networks: A comparative study" International Journal of Computer Science and Innovation, pp 39-52

[7] Gao Weimin and Zhu Lingzhi (2015), "Distributed Data Storage in Wireless Sensor Networks" International Journal of Database Theory and Application, vol.8

[8] Sneha Ghormare ,Vaishali Saharel, Anil Jaiswal (2015), "A Survey on Data Confidentiality for Providing High Security in Wireless Sensor Network" International Journal of Advanced Research in Computer Science and Software Engineering, vol.5

[9] Jisha Mary Jose, Jomina John 2014, "Secure Data Dissemination Protocol In Wireless Sensor networks Using Xor Network Coding" International Journal of Research in Engineering and Technology, vol.3

[10] Ms. V. Savitha M.E., Mr. E.U. Iniyan M.E., Ms. M. D. Dafny Lydia(2014), "Small Data Dissipation Using Se-Drip –An Enhanced Version of Drip" International Journal of Engineering Trends and Technology,vol.18