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Dynamic Bat Algorithm Based on Node Failure Recovery in Wireless Sensor Actor Networks

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Abstract:- Objectives: Swarm intelligence is a very powerful technique appropriate to optimization. In this paper, we present a new swarm intelligence algorithm, which is based on the bat algorithm. Improvement: In this paper we generate number of nodes and deployed randomly. I explore the possibly by using node in the form of bat movements .Bats node use vision to navigate for long distance. Due to random setting there will be no loss in the energy and also many increase delivery data and reduce the failure node

Keywords: **Swam intelligence, bat algorithm, shortest path, node recovery, dynamic bat**

I. Introduction

In recent years wireless sensor and actor networks gaining growing interest due to their suitableness for the applications in remote and harsh areas where human intervention is risky. Samples of these applications include disaster management, search and rescue, fire observance, field intelligence operation, space exploration, coast and border protection, etc. WSANs comprised of varied miniaturized stationary sensors and fewer mobile actors. The sensors acts as data acquisition devices for the powerful actor nodes that analyses the sensor readings and gives an appropriate response to achieve predefined application mission. For example, sensors could detect a high temperature and trigger a response from an actor that will activate air conditioner. Robots and pilotless vehicles are example actors in observe. Actors work autonomously and collaboratively to attain the appliance mission. For the cooperative actors operation, a powerfully connected inter-actor configuration would be needed at all times. Failure of one or more nodes could partition the inter-actor network into disjoint blocks. Consequently, associate inter-actor interaction will fail and the network would not be able to deliver a timely response to a significant event. Therefore, recovery from associate actor failure has the most importance in this scenario. The remote setup during which WSANs usually serve makes the readying of extra resources to switch failing actors impractical, and emplacement of nodes becomes the simplest recovery possibility. The nodes in WSAN operate in a distributed way, making it difficult to control the sensing objects, patterns, and the starting time for cooperative communication in a global view. The nodes can also lead to frequent communication conflicts that may cause high energy consumption, low reliability, and large delays.

There are two types of nodes in WSANs:

1) *Sensors* and 2) *Actors*.

Actors are have more on board energy when compared to sensors and they are richer in computation and communication resources. Whereas sensors are highly constrained in energy and are inexpensive. The transmission range of actors is finite.

In this paper we generate n number of nodes randomly. I explore the possibility by using node in the form of bat movements. Bat node use vision to navigate, especially for long distance when beyond the range echolocation. The parameter setting has been done based on the timing because of the frequency of

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travel. Due to the random setting there will be no loss in the energy and also may increase delivery data and reduce the failure node.

2. Proposed System

The proposed architecture give the recovery for detecting

Failure node using bat movements. This architecture contains the following components.

1.Node construction
2.Shortest path Identification
3.Sense neighbor node distance
4.Dynamic Bat using motion
5. Node recovery

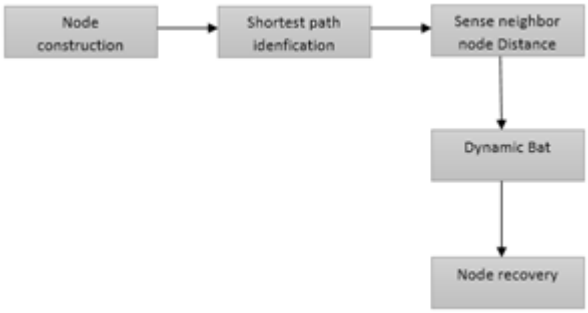

Figure 1. Architecture Diagram

1. Node Construction

In this paper we generate n number of nodes randomly. I explore the possibility by using node in the form of bat movements. Bat use vision to navigate, especially for long distance when beyond the range echolocation. The parameters' setting has been done based in the timing because of the frequency of travel. Due to the random setting there will be no loss in the energy and also may increase delivery data and reduce the failure node.

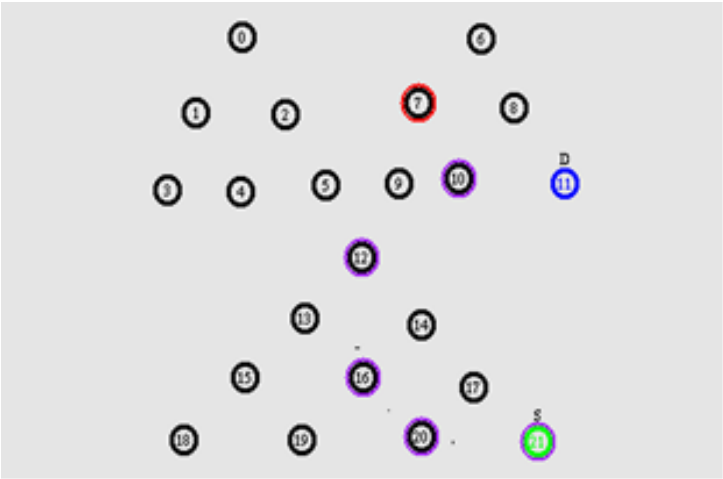

Figure 2. Node construction

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2. Shortest path Identification

Once node has been constructed then which node is shortest node that has been identified based on the Algorithm.

3. Node distance

This section introduce the distance between two neighbor node can be calculated then data will be sending.

Parameter	Value
Radio Propagation Model	Two-Ray Ground
Antenna Type	OmniAntenna
Transmitter gain in dB (Gt)	1.0
Receiver Gain in dB (Gr)	1.0
PathLoss	1.0
Distance b/w nodes	6 m

4. Dynamic Bat Using Motion

For the bats in simulations, we have to define the rule show their positions xi and velocities vi in a d-dimensional search space are updated. The new solutions xit and velocities vi t at time step t are given by

fi = fmin + (fmax-fmin) β,vi
t+1=vi
t+ (xi
t – x)fi,*
xi
t+1=xi
t + vi
t,

where β Є [0,1] is a random vector drawn from a uniform distribution. Where x* is a current global best location (solution) which is located after comparing all the solutions among all the n bats at each iterations t. Initially, each bat is randomly assigned a frequency which is drawn uniformly from [fmin, fmax].

5. Bat algorithm based Node Recovery

The main objective is to find out low energy node whenever it fails. The parameter setting has been done based on the time of the bat movement, the process is as below.

1. S source nodes and D destination nodes are randomly deployed in the sensor field. Each S source nodes and destination node has transmission R.
2. Each node measures its distance from each of its neighbouring node. Where actual distance is given by

Where (x, y) is location of the source node and (xi,yi) of the destination node.

3. Bat evolve the optimal location of the destination and sending data properly and minimizing the node failure

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3. Simulation Results

TABLE I: SIMULATION PARAMETERS

Chan(channel type)	Channel/Wireless Channel
Prop (radio-propagation model)	/TwoRayGround
ant (Antenna type)	Antenna/OmniAntenna
Ll (Link layer type)	LL
Ifq (Interfacequeuetype)	Queue/DropTail/PriQueue
Ifqlen (max packet in ifq)	50
Netif (network interface type)	Phy/WirelessPhy
Mac (MAC type)	Mac/802_11
adhocRouting(ad-hoc routing protocol)	AODV
nn (nodes)	50
Mobility	Hybrid Random walk

DYNAMIC BAT ALGORITHM

Algorithm for our proposed technique:
Objective function $f(x)$, x=(x1,….. xd) T
Initialize the bat population xí=(í = 1,2…n) and ví
Define Pulse frequency fí at xí
Initialize the rates rí and the loudness Aí
While (t < Max number of iterations)
Generate new solutions by adjusting frequency, by adjusting frequency, and updating velocities and locations/solutions
fi = fmin + (fmax-fmin)β,
vi
t+1=vi
t+ (xi
t – x*)fi,
xi
t+1=xi
t + vi
t,
If (rand > rí)
Select a solution among the best solutions
Generate a local solution around the selected best solution

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End if
Generate a new solution by flying randomly
If (rand < Aí & f(xí) < f(x*))
Accept the new solutions
Increase rí and reduce Aí
End if
Rank the bats and find the current best x*
End while
Post process results and visualization

fi = fmin + (fmax-fmin)β,
vi
t+1=vi
t+ (xi
t – x)fi,*
xi
t+1=xi
t + vi
t,
If (rand > rí)
Select a solution among the best solutions
Generate a local solution around the selected best solution
End if
Generate a new solution by flying randomly
If (rand < Aí & f(xi) < f(x))*
Accept the new solutions
Increase rí and reduce Aí
End if
*Rank the bats and find the current best x**
End while

Post process results and visualization

4. Performance Analysis

To implement the proposed system NS2 was used and using the NAM animator the system was simulated and all the modules of the proposed system were implemented. The system was run for various values of data, energy and path.

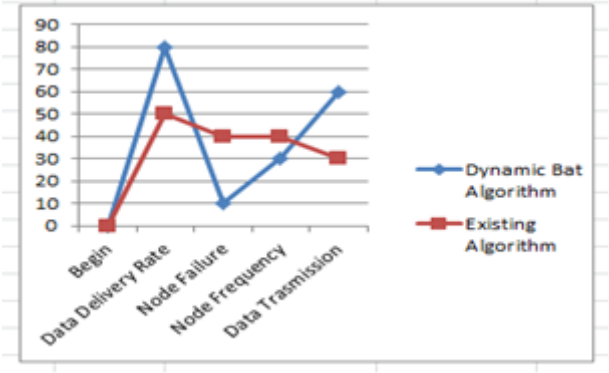

Fig.3 Performance analysis

In Fig.3 gives details of the difference between the proposed system and the existing system.

5. Conclusion

In this We are using a Dynamic Bat algorithm based on the node movement maintaining the node recovery 80% can detected .So the node failure can detected by using these techniques.

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