ISSN:0975-9646

Improved Bees Hybrid Sensor Coverage Algorithm

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Abstract – **In sensor networks, actual movement takes only when sensors determine their final locations. An application of mobile sensor networks which provides appropriate coverage of their deployment region. A mobile sensor networks has least coverage. The mobile sensor networks only have inadequate mobility and density. Density should be increased to provide maximum coverage within the network. Mobile sensor requires local information in order to optimally relocate itself. The Push reliable algorithm increases the density of the hybrid sensor mobile networks. But the current problem is the searching time between static sensors to mobile sensor.**

For this network structure, we prove that reduce searching time can be achievable using this Improved Bees Algorithm. The algorithm performs a kind of neighbourhood search combined with random search for both Combinatorial and functional optimization. The main purpose of this algorithm is to reduce search space and provide quality of communication within the nodes.

Keywords: **Improved Bees Algorithm, Combinatorial Optimization, Function Optimisation, Swarm Intelligence, Hybrid sensor searching.**

INTRODUCTION

A new population based search algorithm called the Improved Bees Algorithm [IBA] is presented. The algorithm mimics the food foraging behaviour of swarms of honey bees. Experimental results indicate that the proposed approach is very effective for large-scale problems.

The bees can be chosen directly according to the fitnesses connected with the sites they are visiting. Instead, the fitness values are used to determine the probability of the bees being selected. Searches in the neighbourhood of the most excellent sites which signify more capable solutions are made more detailed by recruiting more bees to follow them and then the other selected bees. Together with scouting, this differential recruitment is a key operation of the Bees Algorithm.

I. FORAGING OF BEE'S ALGORITHM

The algorithm conducts searches in the neighbourhood of the selected sites, assigning more bees to search near to the best sites.

Thus this paper is used to describe the first application of the Bees Algorithm to multi-objective optimization problems and all mobile networks can provide coverage with an independent of network size.

A computer can be set up to calculate the results of different settings on a manufacturing process. More computing authority is then dedicated to searching approximately the most successful settings, in the same way as more bees are sent to the most promising flower patches. The proposed approach is based on a new optimization technique called the Improved Bees Algorithm to facilitate mimics the food foraging behaviour of honey bees.

The foraging process begins in a colony by scout bees being sent to hunt for capable flower patches. Scout bees move randomly from one patch to another. During the harvesting period, a colony continues its exploration, keeping a percentage of the population as scout bees.

II. THE HYBRID SENSORS SEARCHING PROBLEM

The HSS problem can be formulated by using an M x N machine-part incidence matrix, $A = [a_{ij}]$, where a_{ij} is a binary variable that takes the value of 1 if part j requires searching on mobile sensor i, and 0 otherwise. The problem is equivalent to decomposing A into a number of transverse blocks of sub matrices, where each diagonal block represents a mobile node. The effectiveness of the decomposition can be determined by a normalised bond energy measure denoted as α in

$$\alpha = \frac{\sum_{i=1}^{M} \sum_{j=1}^{N-1} a_{ij} a_{i,j+1} + \sum_{i=1}^{M-1} \sum_{j=1}^{N} a_{ij} a_{i+1,j}}{\sum_{i}^{M} \sum_{j}^{N} a_{ij}}$$

The objective is to provide bond energy for searching and provides quality of communication within the nodes, so as to maximize the energy measure of the frequency matrix. In the next section, a new method to solve the HSS optimization trouble is described.

The new method adopts the Bees Algorithm as it has proved to have a more robust performance than further intelligent optimization method for a range of complex problems.

A. HYBRID SENSORS USING THE BEES ALGORITHM

The ability of the Bees Algorithm is to search for the appropriate groups of network nodes such that the bond energy metric α (Equation) is maximized.

The Basic steps of BHSC algorithm are described in detail below.

1. Initialize population with arbitrary solutions.
2. Estimate fitness of the population.
3. While (stopping condition not met) //Forming new population in the network. Repeat step 4 and 5.
4. Selecting the sites for searching their neighbourhood nodes.
5. Recruiting the packets for selecting sites (more packets for the best *e* sites) to evaluate the fitnesses of the node.
6. Select the fittest packets from each site.
7. Assign the remaining packets to deliver for additional node to search randomly and evaluate their fitnesses.

B. PROPOSED BEES ALGORITHM FOR COMBINATORIAL PROBLEMS

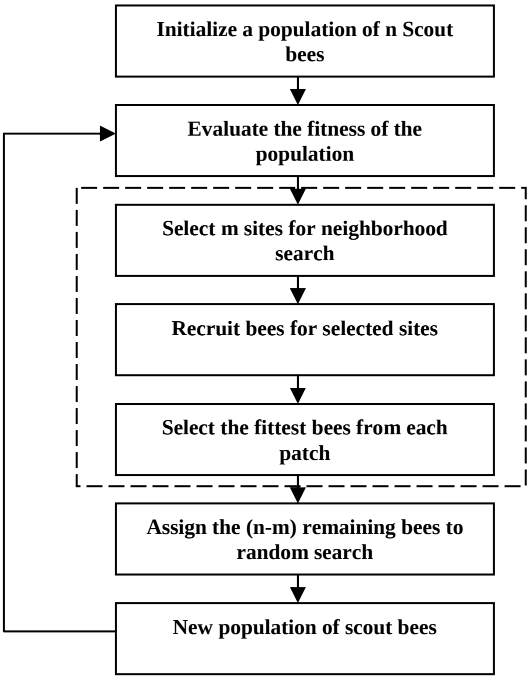

Figure1: Proposed Bees Algorithm for Combinatorial Problems

C. BASIC STEPS OF THE IMPROVED BEES-ALGORITHM

The proposed algorithm requires a amount of parameters to be set, namely, number of scout bees (*n*), number of sites elected for neighbourhood search (out of *n* visited nodes) (*m*), number of top-rated (best) nodes among *m* selected nodes (*e*), number of bees recruited for the best *e* nodes (*nep*), number of bees recruited for the other (*m-e*) selected nodes (*nsp*), and the stopping condition. In this algorithm starts with an original population of *n* scout bees.

In step 2, the fitness computation process is passed out for each node visited by a bee by calculates the bond energy measure α.

In step 4, the *m* nodes with the highest fitnesses are designated as "selected nodes" and chosen for neighbourhood search.

In the next steps 5 and 6, the algorithm conducts search around the selected nodes, assigning more bees to search in the vicinity of the best *e nodes*. Selection of the best nodes can be made directly according to the fitnesses associated among them. Instead, the fitness value are used to determine the probability of the nodes being selected. Searches in the neighbourhood of the best *e* nodes which represent the most promising solutions are made more detailed by recruiting more bees for the best *e nodes* than for the other selected nodes. Together with scouting, this differential recruitment is a key operation of the Improved Bees Algorithm.

In step 6, for each patch only the bee with the highest fitness will be selected to form the next bee population. In nature, there is no such a limit. In this restriction is introduced here to reduce the number of points to be projected.

In the final step, the left behind bees in the population are assigned randomly around the search space to scout for new possible solutions. By the end of each solution, the colony will have two parts to its new population: representatives from the chosen patches, and the scout bees assigned to conduct random searches. Steps 4-7 are repeated until either the best fitness value has stabilized or the specified maximum number of iterations has been reached.

III. IMPLEMENTATION AND RESULTS

The following parameters have been simulated using ns2

1. Channel: WirelessChannel
2. Propagation: TwoRayGround
3. Phy: WirelessPhy
4. Mac: 802_11
5. CMUPriQueue: Interface Queue Type
6. LL - LinkLayer
7. Antenna - OmniAntenna
8. DSR - Routing Protocol
9. Energy Mode - Initial Energy
10. Radio Model - Transmission Model

A. PACKET DELIVERY RATIO FOR PROPOSED SYSTEM

The packet delivery ratio in figure shows the Proposed system for BHSC, searching time will be shown in this figure and existing system shows the searching time is how efficient to delivering the packets to the node.

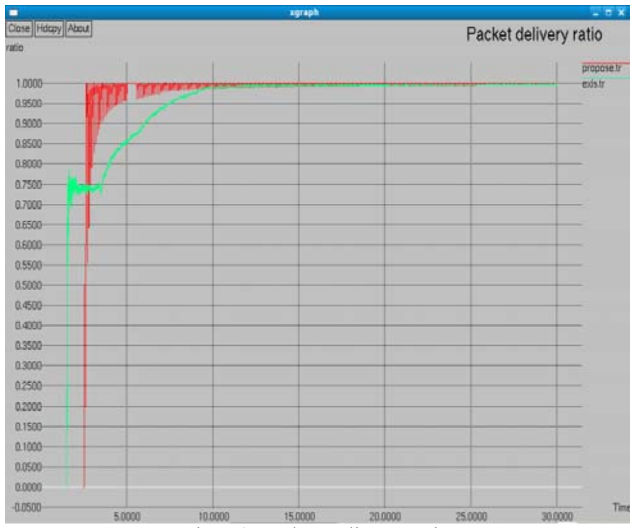

Figure2: Packet Delivery Ratio

IV. CONCLUSION

This paper has presented a new way of approach for reducing searching time of both static and mobile sensors.

This approach is based on the Improved Bees Algorithm, which is capable of performing local and global search simultaneously. Experimental results on a set of benchmark Hybrid Sensors Searching Problem obtained from the literature have indicated that the proposed algorithm is very effective in generating best optimal solutions for the design of Implementation of Coverage by Mobile Sensor Networks Using Bee's Algorithm.

ACKNOWLEDGMENT

We thank our beloved Chairman Dr. P. Appukutty and our Principal Dr. T. Manigandan for their support and guidance to deliver this article and also we thank our research friends and my colleagues

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