Agent Based Learning Using Improvised Artificial Bee Colony Algorithm on Network Routing

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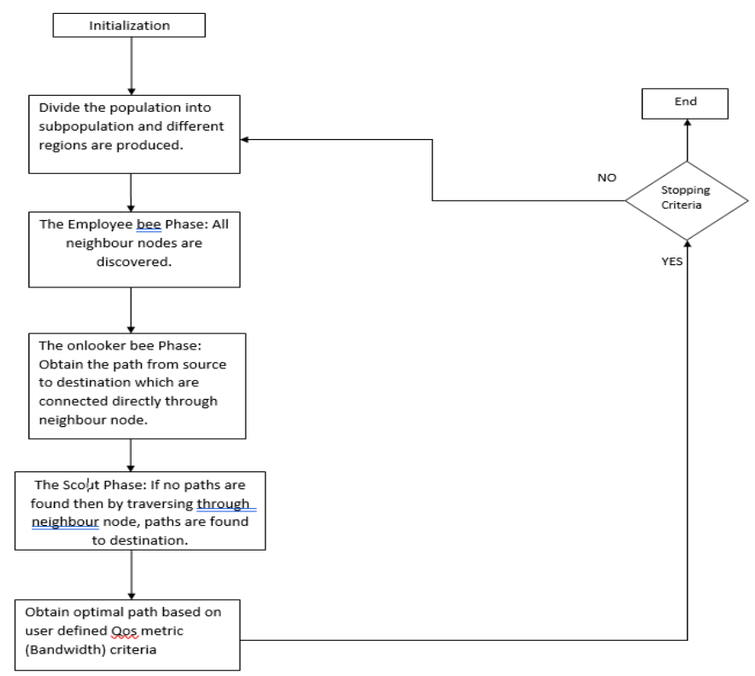
ABSTRACT

The aim of the project is to find the shortest and the most optimal path in network routing, by using one of the Swarm Intelligence algorithms - Artificial Bee Colony(ABC) Algorithm. This project overcomes the defects of native ABC algorithm by implementing a prior learning and Information Learning on the native ABC algorithm. The technique of Information learning incorporated here is Multi population strategy, which along with a prior learning on QoS metrics are applied to get the most optimized source to destination paths. This implementation depicts that the improvised ABC algorithm improves the efficiency by finding better and optimized results than the existing ABC algorithm.

INTRODUCTION

Routing is the process of selecting paths in a given network along which to send the traffic. It is one of the important aspects of network communication which plays a major role in affecting the performance of any network. Swarm intelligence (SI) is defined as the collective behaviour of decentralized and self-organized swarms. The Artificial Bee Colony (ABC) algorithm is a swarm based meta-heuristic algorithm for optimizing numerical problems inspired by the intelligent foraging behaviour of honey bees. In ABC, the colony always tends to maximize exploitation and restricting exploration. Since exploration is also one of the important features of ABC algorithm, there exist a need to improvise the existing ABC algorithm to balance between Exploration and Exploitation processes to obtain better .Hence implementing multi population technique and agent based learning helps to improvise this algorithm.

IMPLEMENTATION



THE NODE INITIALIZATION MODULE

This is a very vital aspect of any networking project. In this module, initialization of nodes take place. Node details like node name, port number, bandwidth distance and range are all set.

THE NEIGHBOUR DISCOVERY MODULE

Every node in the region starts discovering other nodes based on the distance and range of the neighboring nodes. The discovery mechanism is based on the Euclidian formula.

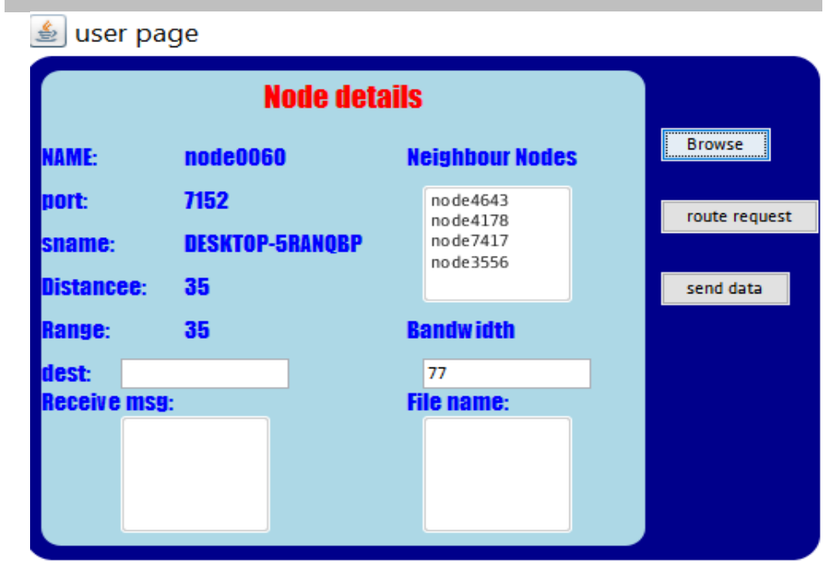
THE PATH DISCOVERY MODULE

All possible routes between source and destination are identified after neighbor discovery and this information is sent back to the source node. If the source is direct neighbor of the destination then Onlookers will come into action, else the scout bee will find the next connected node to the destination.

THE DATA TRANSFER MODULE

In this module, based on the learning technique which has been implemented, the data is been transferred from source to destination. The learning is implemented in a manner in which the path having the highest bandwidth is been chosen to transfer the data.

RESULTS



The implementation of our proposed algorithm, Improvised ABC using agent based learning involves two main concepts : Multipopulation Strategy and QoS metric learning Routing between regions is the next level of search that is executed. This eliminates a global search that may be performed even if the routing needed is local. The QoS metric taken under consideration here is the bandwidth. The path with the maximum available bandwidth is chosen as the preferred path and the data packets are sent along that route. This is how native ABC is improvised by our proposed algorithm.

CONCLUSION

The original ABC Algorithm performs the exploration process well, but is not so efficient in the exploitation of the resources. This is handled by the Artificial Bee Colony Algorithm with Information Learning. Information Learning on Artificial Bee Colony implements the multipopulation strategy by dividing the population into many subpopulations or regions. The learning within a subpopulation and between subpopulations is based on the QoS metrics of choice. This optimal solution can be obtained by implementing the learning prior to ABC algorithm where all the paths satisfying the threshold value defined by the user based on the QoS constraints are satisfied. This reduces the load on the ABC algorithm as few routes have already been eliminated based on the QoS constraint. So ABC algorithm is then run on fewer nodes to find the optimal paths in a lesser duration and in a more efficient manner.