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Wireless Networks Throughput Enhancement Using Artificial Intelligence

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Abstract

Objectives: To utilize the correct technique of artificial intelligence in multi-channel network. Multi-channel is used to reduce interference and improve performance. **Methods/Statistical Analysis**: In this work a simple method has been developed that is a positive contribution to the various solutions that already exists. Overall, the methodology adopted in this work consists of three stages. The first step is to create a model for specific wireless environment, the second step is to choose the right tool to optimize the performance and the third step is the careful selection of performance indicators for routing improvements. **Findings:** We developed an agent model that is inspired from the communication and evaluative features of a honey bee colony. The bee agents in our model have a simple behavior. As a result, the algorithm is able to take routing decisions in a decentralized and asynchronous fashion. We have conducted extensive simulations in MATLAB to show the advantages of our algorithm over existing state-of-the-art routing algorithms developed by Nature inspired routing community. The candidate algorithm is able to achieve better performance values with a simple agent model. **Application/Improvements:** The proposed protocol discovers and evaluates multiple-paths in a deterministic fashion by utilizing a variant of breadth first search. It will increase the output of our resulting routing protocol.

Keywords: Artificial Intelligence, Routing, Throughput,Wireless Networks.

1. Introduction

In the present age wireless networks have become the essential parts of the communication with the advent of devices especially mobile and portable devices. It is necessary to increase the capacity of the network for the growing demand of network resources[1]. For achieving such a goal in a wireless environment, there is a need of efficient protocols and algorithms. By using these algorithms, the throughput of the wireless network can be increased. The wireless network includes a plurality of nodes that transmit and/or receive data. The protocols are designed in such a way that the data are transmitted to the receiving node on the network in an efficient manner. These protocols are key elements of the wireless network. A constant research is being conducted to design and develop the new methods and techniques to improve the efficiency of the network that support new generation network[2].

For designing modern and advance wireless networks, there is a need to study the natural networks of different

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insects and organisms.This is because the wireless networks have a strong sense of searching and connecting the distributed users geographically. Physical condition and the environmental impact of the channel on the signal strength of the wireless network vary over long distances. This leads to the need of sending signals through areas of widely used between the node(s) for further reliable transmission from source to destination. Therefore, wireless networks are suitable for wider areas in addition to other benefits[3].

In[4] worked on the network that providing the cognitive system which observes the performance of the nodes within the network. This focuses mainly on the network capacity for self-recovery of the network elements. For this purpose, some algorithms are needed to suggest a paradigm of network by introducing key element that called KP (Knowledge Plane). In KP, the basically a distributed cognitive system provides the features of thinking and learning, as well as a system for the regulation. It is responsible for the creation and maintenance of the network model at the point of a high-level vision and it is considered that the network is capable to take decision for efficient routing in a particular condition that help in increasing the throughput of the network[5].

The knowledge plan have some advanced features of reasoning itself and ability to route information in the local as well as in global situation of knowledge based network. This knowledgeable feature is helpful in efficient routing for enhancing throughput of the network[6].

Indeed in the earlier hypotheses in which only the person who will be able to identify the concept by introducing an appropriate instructions cognitive system. This system evaluates the performance of network by understanding the specific characteristics of nodes cognition and control of the other elements. Researchers have shown that the perfect knowledge of the environment is required to build such kind of network which can give the better results[7].

Finally, it should be noted that the architecture strongly lies at the basis of sensor networks[8] and the sensor parts of the network should be inference in real time.

If the cognitive network consists of more than one unit, there must be the association required between all the elements of that network. If a cognitive problem is solved by more than one element with the help of repeated reconfiguration of various units of a network then there must be the association between all the relevant units.

The architecture is needed to be designed which is used for the design and evaluation of cognitive networks[9]. In these networks three layers cooperate with each other named network, physical and data link layer. This consideration has two propositions, one for higher layer and one for lower layers. This will helpful for cross layer optimization. Due to this approaches cognitive networks are capable to work from end to end node for each layer, that cause for optimize networks[10].

2. Material And Methodology

We aim to develop a flexible algorithm for wireless routing, in which throughput of the network is enhanced using artificial intelligence ideas. Wireless networks have many advantages like long distance information sharing between source and destination. The speed of data transmission in these networks can also be increased by choosing best path between sender and receiver. In case of busy route the packet is routed by using other shortest route. On the other hand wireless networks also have some disadvantages like interference. It is ensures that many nodes are sharing the same channel and bandwidth. If interference occurs between these routes then the transmitted information can be influenced and in result, the overall throughput of the network will be affected.

Coverage of the wide range operational environments and in the systematic fashion performance values of different parameters was the cause of motivation to design these scenarios. Three wide range categories of network engineering can be covered just by having some brainstorming in our algorithm. These categories are: Real world Applications, Hybrid Traffic engineering and the quantum traffic engineering. In order to obtain significant performance values statistics through multiple attempts, Quantum traffic engineering is the best idea which provides the repeatable patterns with abstraction. Since five experiments were performed, so the performance values obtained from those experiments are the average values of all experiments. These average values will remove any stochastic values obtained from the algorithms. Either our algorithm can handle the traffic of multimedia in the similar way or different way, this objective was also

verified in these experiments. In order to verify this, one sample per packet and parallel Voice over IP sessions with G.711 codec were utilized. To work correctly a Voice over IP session requires the speed of approximately 64 kilo bits per second. And our algorithm was successfully able to deliver those requirements, with same jitter values and packet delay.

Our current findings or result are fascinating the simulation of implementation of such ideas. In the current experiment we have used a core 2 duo based hardware machine to test the Beehive in order to prove our realizable algorithm using existing hardware or software resources and still we are able to get some noticeable benefits in the real world networks. Large scale network layout on the base of algorithm will be tested in our future work.

3. Results And Discussions

We will try to elaborate some results deduced from our experiment in this section; we will discuss the both results which we have obtained in simulation and the implementing results in the real networks. Since both results have some categories as introduced earlier so we will discuss results also according to the category type. To verify the protocol performance we also designed a new framework which was tested by implementing it on MATLAB. The traffic patterns received from the MATLAB deduced that the both results work on same algorithm in the same way and generate same patterns. These same patterns were generated during the both Real networks and the Virtual machines of the Linux operating system. It provides a conclusion about the Beehive network protocol that either results of any significance, its behavior in Virtual as well as real networks is easily traceable due to similarity concepts. Different experiments were set up to utilize them for use in real world. And those experiments are the key to the implantation of new and intelligent routing protocols.

4. Experiments for Network Traffic Learning

Five experiments were conducted in order to check the enhancement and learning in network traffic throughput. In each experiment the values of different parameters were changed. We have to determine the behavior of network under saturated network load. For that we conducted the experiments and gave varying values to each parameter each time. In the varying parameters, the numbers of repetition or iteration were also changed to find the behavior in network traffic load. These experiments were also conducted in the Linux router real network as well as in the MATLAB. In these experiments, the parameters or values given were the same as corresponding to virtual machine values. The results or output that we received from the above experiments become beneficent because when we increase the number of repetition then its performance was also increased. This is the best feature of an intelligence based routing protocol that learns from the external working structure and increases the output accordingly. The output on the MATLAB with the code has been shown as Figures 1 to 6.

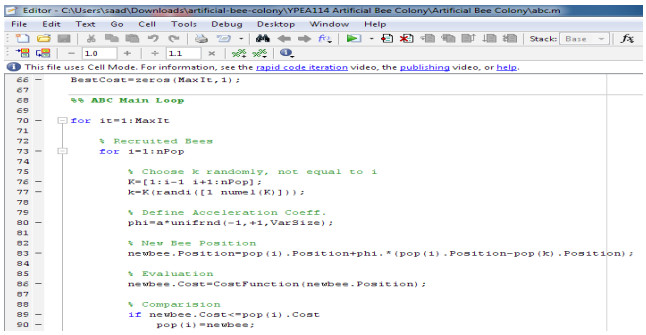

Figure 1. MATLAB Code for Candidate Algorithm Evaluation.

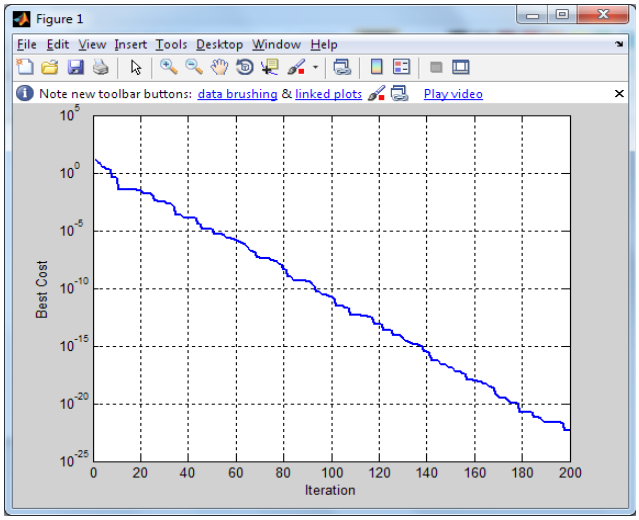

Figure 2. Results with 200 Iterations.

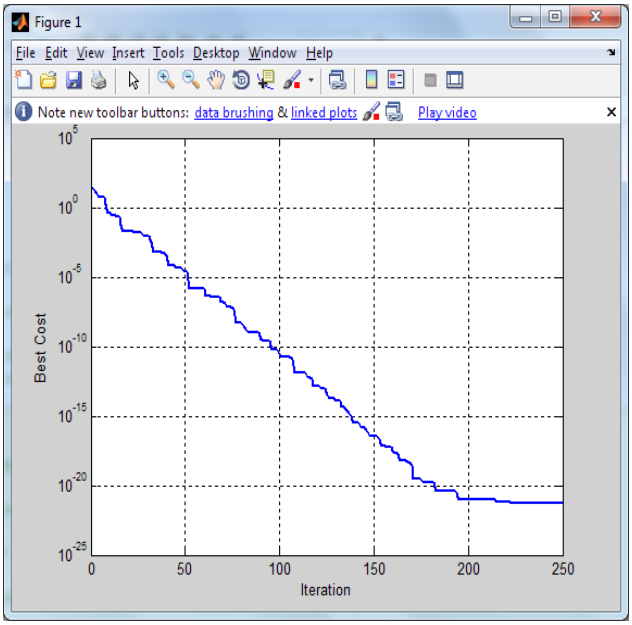

Figure 3. Results with 250 Iterations.

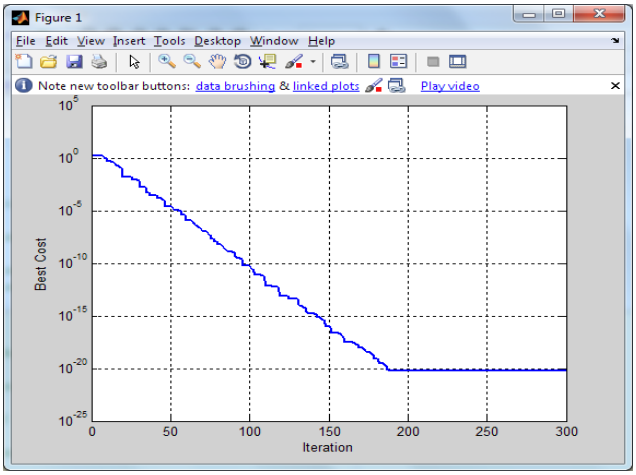

Figure 4. Results with 300 Iterations.

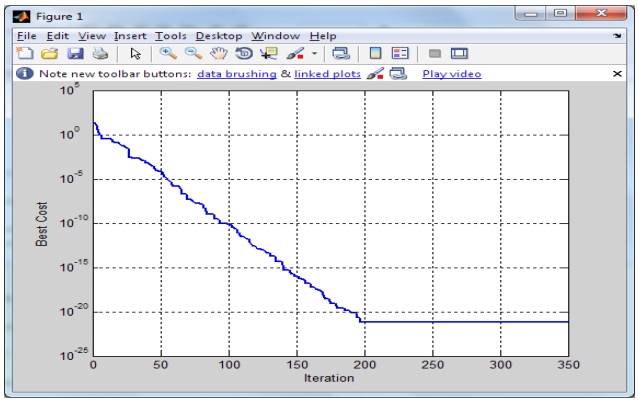

Figure 5.

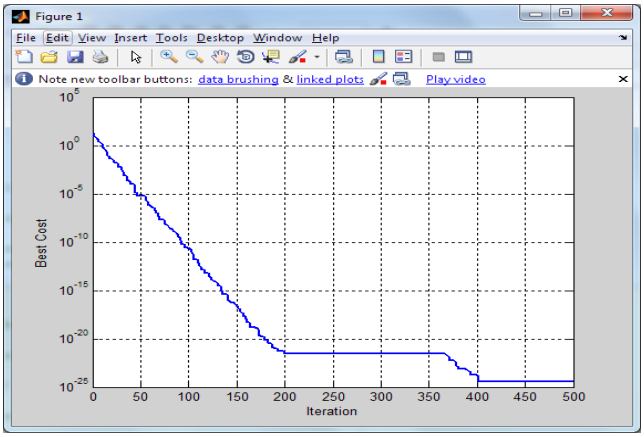

Figure 6. Results with 500 Iterations.

From the diagrams it is clear that when we increase the number of iterations or repetitions, the packets are delivered with the increase in the number of iterations. It means that algorithm will learn like intelligent baby as time passes in the wireless network. It will increase the output of our resulting routing algorithm. Some packets are delayed as a result in the queue. But this delay is due to the importance of different results in the real world networks and the simulation sessions.

5. Conclusion

This paper provides a comprehensive conclusion by emphasizing the scientific and technical contributions of our work. We then outline our vision of extensive future research that could follow the successful conclusion of our work. We put special emphasis on an intelligent and knowledgeable router. Finally, we suggest that the time has come to start a Natural Engineering program in our universities in order to successfully translate novel and cost effective Nature/Bio inspired business solutions for highly competitive markets.

We developed an agent model that is inspired from the communication and evaluative features of a honey bee colony. The bee agents in our model have a simple behavior. As a result, the algorithm is able to take routing decisions in a decentralized and asynchronous fashion. We have conducted extensive simulations in MATLAB to show the advantages of our algorithm over existing state-of-the-art routing algorithms developed by Nature inspired routing community. The candidate algorithm is able to achieve better performance values with a simple agent model. We were able to collect a

comprehensive set of performance values through our performance evaluation framework to study the behavior of a routing protocol over a vast operational landscape.

Candidate algorithm discovers and evaluates multiple-paths in a deterministic fashion by utilizing a variant of breadth first search. It does not discover all possible multiple paths. Rather only those multiple paths are utilized whose quality is above a certain threshold? However, the algorithm then spreads the data packets on multiple paths in a stochastic fashion in order to achieve better performance values. Our experience suggests that algorithm properly combines the deterministic elements with the stochastic elements in a routing algorithm.

6. References

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