Automatic Topology Generation in Wireless Networks using Artificial Intelligencen

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Abstract:**The wireless devices are capable to govern transmission in portable mode. The development of effective networking techniques requires additional protocol stacks of network research, which is the heart of the network model. In this work, we reviewed our previously designed algorithm TEAM for the generation of topologies automatically using artificial intelligence for present and future wireless networks. We conclude this study with the future challenges of applying AI to Wireless 5G networks. Artificial intelligence algorithm is based on a design that best routing solution involves changes in the environment, it is very likely that it is simply spending some time will be in the study. The proposed algorithm is tested in MATLAB by varying the iteration and number of nodes in a network. Our algorithm is flexible so that its cost in the sense of topology generation reduces gradually as the number of nodes in the wireless environment will increase.**

I. INTRODUCTION

The development of effective algorithms and techniques using artificial intelligence is required to fulfil the needs of future wireless networks like 5G. Now a day's these new techniques are based on a perception of knowledge and geographical distribution. Perception is taken on the basis of wireless node behaviour using AI-based network resources. The efficiency of the network is then based on these AI techniques [1]. The wireless devices are capable to govern transmission in portable mode. Using an available communication link, each mobile or portable device is capable to send packets of data and messages to the other devices in a network. In the area of wireless networks, the major problem is the routing in a network [2, 3]. This is important because mobile devices use these routes to send packets in a network. As the network topology gets changed suddenly in a wireless system, the routing decision will also change for keeping communication on. Due to this sudden change, the entire routing table will change accordingly and new routing paths need to be quickly found. These all things mainly depend on the routing algorithm being used [4]. The overall structure of the paper includes an introduction followed by the problem statement. We have covered a few relevant past studies in the literature review section and discussed our research methodology in the methodology and material section. Then we discussed the results of our proposed research methodology. We concluded our research in the conclusion section and also discussed some future research opportunities.

Problem Statement

Our statement of the problem can be described as: performance and generation of topology must inspire by AI. In a wireless network environment, AI agents can discover all nodes along with their paths between source and destination.

II. LITERATURE REVIEW

An agent is learned or trained in this field of artificial intelligence. At the end of reinforcement learning, feedback is offered to check the learning ability of an agent. When positive feedback is received then the task is considered successful and complete. After this, all the feedback tracks of an agent are recorded for all discrete states based on each visit [5]. Different variations may also be used in this process to check the perceived power of an AI agent. As the reinforcement is high the topology generation process of the 5 G wireless network will also be high. This approach of reinforcement learning is also used for swarm intelligence and efficient network routing algorithms. The network is considered to be efficient and intelligent if the learning of the routing knowledge get increase as the iteration is increased. This will end with an overall reduction in the round-trip time of a network [6]. In another research, each layer is used to share information, named as CogNet [7,8]. As a result, this architecture has saved the ability to temporal and spatial characteristics with information from different layers and using the repository, can in the experience and advice will use assigned collected [9].

An AI-based algorithm named "TEAM" was designed, It is expected to contribute to the existing knowledge on how to enhance the throughput of a network using an AI routing mechanism. In this work, the special focus is on intelligence-based routing that aims to overcome the congestion problem in any given network. The work has a positive contribution to the area of nature-inspired engineering. The tool to implement

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the "TEAM" algorithm was MATLAB. In results, the network throughput and enhancement of network traffic were checked [10].

III. MATERIAL AND METHODOLOGY

In the telecommunication sector, different challenges are briefly described as the AI and integrated services of multimedia getting famous within the 5G community. The common challenges are to implement the intelligent routing algorithms for 5G network topology generation automatically according to the number of nodes. To address these challenges, we reviewed our previously designed algorithm TEAM for the generation of topologies automatically using artificial intelligence for present and future wireless networks. In the TEAM algorithm, the number of nodes can be flexible and automatically adjusted with the possible routes among them. The large number of nodes in a network can increase the overall routing cost and lower the throughput, but the mean value will remain low. If the number of visits/iterations is large, then the mean cost value will decrease. However, a large number of nodes can provide more number of routes, and the algorithm becomes more efficient in finding better routes for transmission.

We are sure that the costs of routing algorithms for communication are easy to manage in both control overhead and the bandwidth ratio. Which is the best combination in both cases, can be determined by the situation of the network topology and the routing algorithm. However, there is a need of designing links between the nodes and the other destinations. After designing the characteristics of the given topology and the entries of the routing tables the cost is associated with the size of the routing tables.

IV. RESULTS AND DISCUSSIONS

We have tried to elaborate on some results deduced from our experiment which we have obtained in simulation and the implementing results in the real networks. Many algorithms can be used and implemented in order to build network topology. To find the network node's routes, different techniques like Prim, BFS, DFS, Dijkstra and TEAM are used. In our artificial intelligence-based algorithm, we used a topology generator using MATLAB. The generation of topology mainly depends on node size in a network. In our algorithm, the topology building will vary as the network size got changed.

The output results from MATLAB are shown in Figure 1 and Figure 2.

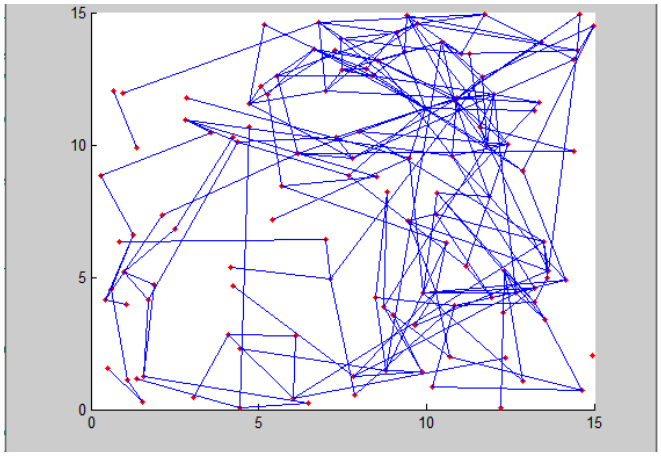

Figure 1. Result of Automatic Topology Generation with 225 Nodes

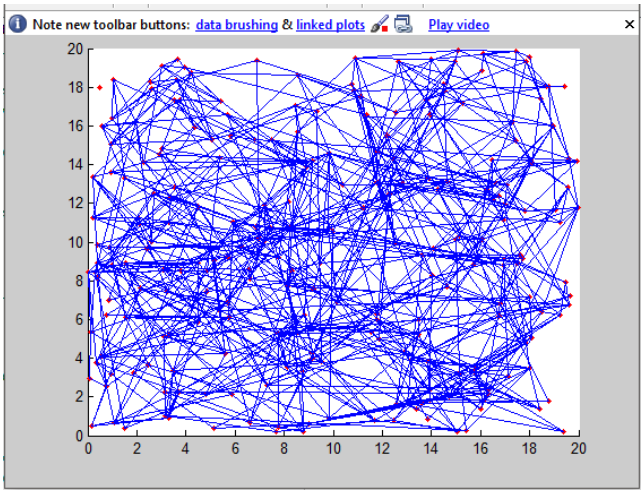

Figure 2. Result of Automatic Topology Generation with 400 Nodes

The traffic patterns received from MATLAB and the Network were so it can be deduced that both work on the same algorithm in the same way and generate the same patterns. It provides a conclusion about the Beehive network protocol that either result of any significance, its behaviour 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 the real world. And those experiments are key for the implantation of new and intelligent routing protocols as our results in the simulation then we can have intelligent protocols that are going to be the best intelligence-based routing protocols. From our current acknowledgement, it is for the first time that old mindsets have been defeated. It was

the mindset of the telecommunication industry that we cannot achieve such a high standard of intelligence-based routing protocols with the utilization of current hardware and software resources. All doubts have been proven wrong from real-world networks and virtual machine experiments. This is just the beginning our findings will help more and more to improve the performance of routing protocols in larger networks. Our current findings or result are fascinating simulations of the implementation of such ideas. For now, in order to analyze the scalability behaviour of our algorithm introduces new reference topologies that are already working and compare the behaviour of our TEAM algorithm.

V. CONCLUSION

The telecommunication sector is facing different challenges which are briefly described by keeping in view the subscribers' usage of multimedia and integrated services of wireless networks. The common challenges are to implement the intelligent routing algorithms for 5G network topology generation automatically according to the number of nodes. In this work, we reviewed our previously designed algorithm TEAM for the generation of topologies automatically using artificial intelligence for present and future wireless networks. We conclude this study with the future challenges of applying AI to Wireless 5G networks. Our current findings or result are fascinating simulations of the implementation of such ideas. For now, in order to analyze the scalability behaviour of our algorithm introduces new reference topologies that are already working and compare the behaviour of our TEAM algorithm.

VI. FUTURE WORK

There are some issues in the results of topology generation in wireless networks with different configurations. As a result, the user has to take a deep look at the examination to get the same results when using multimedia services in hybrid networks.

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