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Bio Inspired Technique to Improve the Performance of VANETS

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Abstract: *The Vehicular Ad-Hoc Network, or VANET, is an expertise that usages moving cars as nodes in a network to generate a moveable network. VANET turns each contributing car into a wireless router or node, permitting cars roughly 100 to 300 meters of each other to associate and, consecutively, form a network with an extensive range. Since vehicular ad hoc networks require the transmission of the safety related messages most of the times, it signifies that the successful dissemination of these messages is very important. Thus, this paper aims to improve the performance of the network by improving the delivery rate of the packets by using the concept of ant colony optimization combined with firefly algorithm. The proposed scheme has been implemented in NS2.35 and the performance has been measured using packet delivery ratio, throughput and routing overhead. These parameters showed an improvement over the existing scheme.*

Keywords: VANETS, ACO, Firefly, Throughput, Overhead.

I. INTRODUCTION

With the Internet becoming a progressively important portion of our lives, the vision of a WiFi-empowered city is becoming nearer and nearer to realism. One of the interruptions to that vision, however, is the great router necessity; for wireless internet to blanket a city, thousands of wireless routers must be deliberately positioned to guarantee continuous reporting. The researchers came up with the vehicular ad hoc networks. The Vehicular Ad-Hoc Network, or VANET, is an expertise that usages moving cars as nodes in a network to generate a moveable network. VANET turns each contributing car into a wireless router or node, permitting cars roughly 100 to 300 meters of each other to associate [9] and, consecutively, form a network with an extensive range. As cars tumble out of the signal range and drop out of the network, additional cars can link in, joining vehicles to one another consequently, a moveable Internet is created.

VANET proposes innumerable assistances to administrations of any extent. Vehicle great-speed Internet access would convert the vehicle's onboard processor from a nifty device to an indispensable output instrument, building nearly any web technology obtainable in the car. Though such a network does pose definite security apprehensions, this does not bound VANET's potential as an output instrument. A traveler can turn a roadblock into a creative work time by having his email downloaded and recite to him by the onboard processor, or if traffic decelerates to a standstill, read it himself. While waiting in the car to pick up a colleague or family member, one can surf the Internet. Even GPS systems can profit, as they can be combined with traffic news to deliver the fastest road to work. Finally, it would permit free, VoIP amenities, for example, Google Talk or Skype amid workers, dropping telecommunications prices.

Since vehicular ad hoc networks require the transmission of the safety related messages most of the times, it signifies that the successful dissemination of these messages is very important. If the objective of the successful message dissemination is not achieved, it defeats the purpose of the vehicular ad hoc networks. Thus, this paper aims to improve the performance of the network by improving the delivery rate of the packets by using the concept of ant colony optimization combined with firefly algorithm.

II. LITERATURE SURVEY

The authors in [1] present a bio-motivated unicast routing procedure for vehicular Ad Hoc Networks, which practices the cellular attractor choosing method to hand-pick subsequent hops. The projected unicast routing procedure centered on attractor selecting (URAS) is an opportunistic routing procedure, which is capable to adjust himself adaptively to the difficult and active situations by routing feedback messages. This paper additionally uses a multi-characteristic administrative approach, the Technique for Order Preference by Similarity to an Ideal Solution (TOPSIS), to decrease the amount of terminated contenders for subsequent-hop selection, to augment the performance of attractor selection method. As soon as the routing route is established, URAS upholds the current route or discovers additional improved route adaptively centered on the performance of present route, viz., it can self-develop

till the finest routing route is found. The simulation matches the suggested solution with the contemporary systems, and demonstrates the healthiness and efficiency of the suggested routing procedure and the noteworthy performance enhancement, in terms of packet delivery, end-to-end delay, and congestion, over the orthodox technique.

This paper [2] demonstrates the scheme of an improved multipath routing, which is centered on learning automata and leapfrog method (LA-MPRLF). Particle Swarm Optimization (PSO) technique is exploited to decide the improved accessible routes. Learning automata are used to decide the quantity of numerous routes that can be used for communication. Leapfrog algorithm is used to rearrange the route disruptions in the network. The proposed tables validate that LA-MPRLF shows enhanced performance in contrast with heritage schemes with respect to the QoS factors — packet delivery ratio and throughput.

Route duration is one of the imperative policy factors for different situations. In this paper [3], the authors have suggested a probabilistically exemplary for route duration approximation by means of highway mobility model for Two-level Hierarchical routing procedure. Though countless logical models have been displayed for diverse procedures in VANETs, a comprehensive model for VANETs is not obtainable in literature, as claimed by the authors. Precisely, the connectivity model for Highways and the urban areas has not been offered. The suggested model has been authenticated by matching logical and investigational outcomes achieved from MATLAB and ns-3.

This paper [4] suggests a cross layer method for effective distribution of disaster messages in VANETs (CL-DEM) by diminishing the message redundancy and upholding little end-to-end message deferrals. The authors suggest a system to select a one-hop neighbor node as a probable forwarder for transmitting the broadcast messages to increase the communication consistency in a section of vehicles. The relay choice metrics constitute vehicular density, vehicular speed, and the topographical position. The nominated relay controls the transmission messages with least overhead and with least bandwidth depletion. To deliver the service distinction to diverse traffic modules, they assume 802.11e MAC. The cross layer is additionally stretched to the transport layer to vigorously adjust the data communication rate grounded on the physical channel state. The widespread simulation examination showed that the projected cross-layer system efficiently broadcasts the serious transmission messages with least latency.

For human-driven along with independent vehicles, basic significant necessity is constant consciousness of the environments to identify any possible dangers (vehicles, foot-travelers, animals etc.). This necessitates constant support amid the vehicles by proficiently distributing safety info in an appropriate way. To resolve this difficulty, this paper [5] suggests a well-designed answer to proficiently share the security info amid vehicles by means of merely Basic Safety Messages (BSM), which are a portion of the current V2V criterions. Through this investigation, the vehicles are capable to rapidly and preventively classify possible dangers, in not only their nearby vicinity but also those, which are additionally besides the road by logically switching security info amid neighboring vehicles. Furthermore, the suggested design offers an everyday method of integrating the board sensor information with the V2V communications. This leads to vehicles having enhanced perceptibility and situational consciousness further outside of their one-hop coverage. Simulation consequences display that enhanced perceptibility of vehicles up to 2.6 km can be realized while placing least overhead and complication on the network.

In this paper [6], the authors have modified a VANET networking prototype and suggested a new congestion discovery and prevention arrangement for urban zones. A lightweight histogram prototype is applied to calculate the congestion for each path by means of an infrastructure based scheme. By calculating, the probability density function for each path, the suggested prototype forecasts congestion beforehand and the re-routing is started on time. For improving the re-routing approach, two dissimilar types of congestion prevention arrangement are suggested established on static and dynamic demonstrating. Numerous situations are generated in the tiny simulation setting and the efficiency of the planned procedure is examined by calculating the normal travel time. The simulation outcomes display that the planned model identifies congestion beforehand and initiates reroute strategy efficiently.

III. MOTIVATION

Since vehicular ad hoc networks require the transmission of the safety related messages most of the times, it signifies that the successful dissemination of these messages is very important. If the objective of the successful message dissemination is not achieved, it defeats the purpose of the vehicular ad hoc networks. Thus, this paper aims to improve the performance of the network by improving the delivery rate of the packets by using the concept of ant colony optimization combined with firefly algorithm.

IV. PROPOSED WORK

The aim of the study will be to optimize the path selection procedure in the vehicular network so that packets can be delivered successfully in the network. The proposed scheme starts with the normal broadcasting of the Forward Ants by the source vehicle. This will be same as route finding the behavior of the facts as described in ACO [7].

The second is the route reply phase. When the forward ants reach the destination node, the destination would generate backward ants straight away, which would trace back the path to the source node. However, in the proposed scheme, the attractiveness of the links defined by the firefly algorithm [8] will be taken into account. When the backward ants would reach the source node, the source node would sort out the paths in the order of highest pheromone value and highest attractiveness. The first path in the sorted order will be considered for data transmission while the other can be stored in the cache memory for the use in case any failure occurs in the first path.

V. RESULTS AND DISCUSSION

The network's performance was analyzed based on three parameters namely, packet delivery ratio, throughput and routing overhead. The network was simulated using ns2.35.



Fig: Routing Overhead Comparison

This figure shows the overhead obtained using proposed scheme and the existing scheme for 40 vehicles simulation. The value for proposed scheme is found to be 1.89 and for the existing scheme is found to be 1.92 approx.

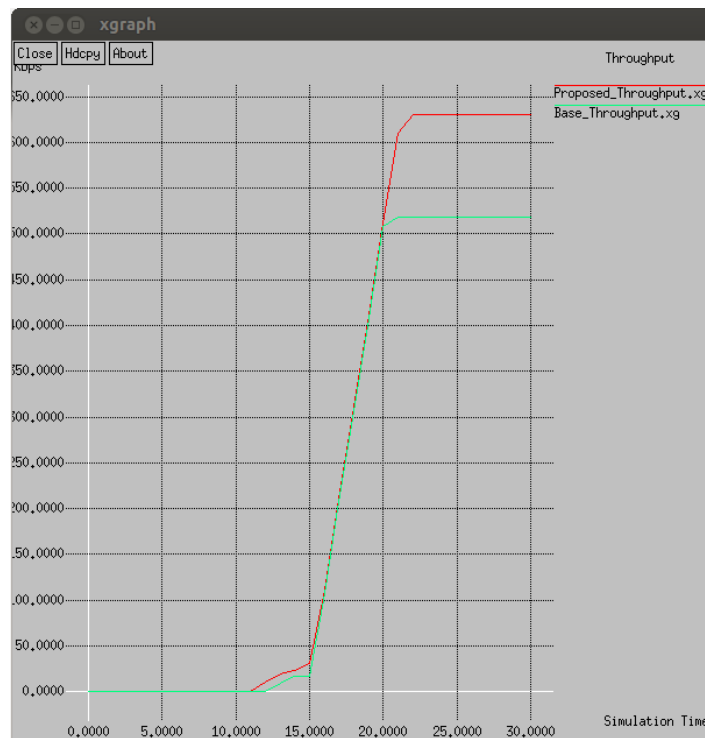


Fig: Throughput Comparison

This graph shows the value of throughput achieved in the network. This value is found to be higher for the proposed scheme at 630 Kbps as compared to 520 Kbps for the existing scheme.

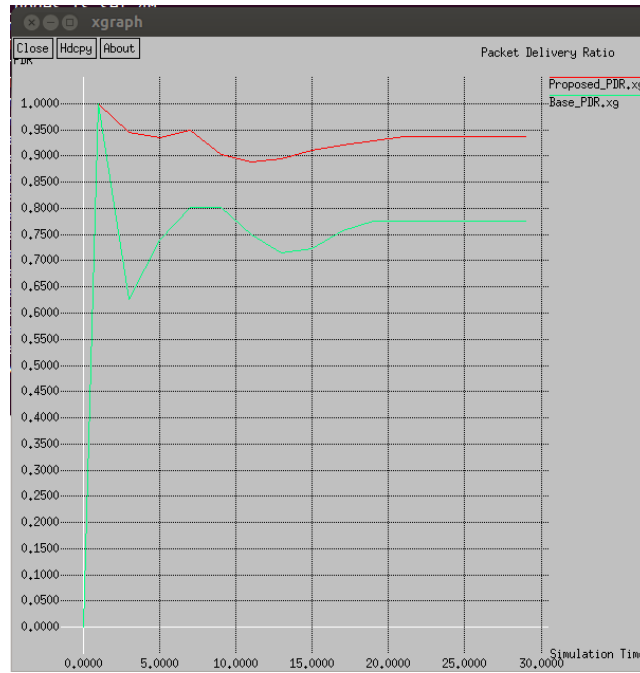


Fig: Packet Delivery Ratio Comparison

This graph shows the values for packet delivery ratio obtained for both the schemes. This value for the proposed scheme has been found to achieve better values than the existing scheme.

CONCLUSION AND FUTURE WORK

This study has focused on improving the quality of the links in the vehicular networks. The proposed scheme has taken into account attractiveness of the paths from source to destination vehicle. The higher values of the packet delivery ratio and the throughput obtained using the proposed scheme indicates that the packet, which was sent by the nodes reaches successfully at the destination. Thus, selection of the path using the attractiveness factor has helped proposed scheme outperform the existing scheme. Vehicular ad hoc networks have found the use of the driverless concept, which has been seen in many developed countries. In such kind of networks, the collision avoidance must be of very high priority. Thus, the proposed scheme can be further extended to the collision avoidance applications.

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