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Routing Protocol Simulation In A Big Data Environment

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Abstract: In this study, the proposedrouting protocol can be improved further by formulating amechanism to help nodes gain further knowledge of othersinside the network. Without exchanging further message andextra processing burden on nodes, the primary challenge wasto enhance the routing protocol, but always kept an eye onavoiding any alteration to the well-designed routing protocoland trying the best not to cause extra overhead that preventsthe enhancement from achieving its goal. Overall, we canconclude that simulation for MD-AODV shows the correctimplementation of the algorithm and the performance metricresults proves the success of the implementation. Thesimulation result also shows previous two that MD-AODVwill cause a slight increase in route discovery. However, itleads to a better End-to-End delay during data transmission.

1. INTRODUCTION

People want to join and leave networks as they want and donot require sophisticated processes applied by serviceproviders and. It can be a good alternative when theseproviders are down during disasters or war [1]. The advancementin wireless devices and the increase of data exchange speed,real time applications become a central source forcommunication among people.Data exchange in MANET requires routes that it should beestablished before transmission and nodes participating information of the network have to cooperate and use some of its uses different type of routing protocols that can be classifiedin different ways.The main classification relies on the route discovery policy [2, 3].Proactive or static routing protocols require routes to beestablished between all nodes during the formation of thenetwork as in (OLSR and DSDV). Routing tables used to storepaths to all nodes inside the network and they are updatedperiodically. These routing protocols have the advantage ofroute availability when needed and the disadvantage saw inlarge networks as it causes overhead and consume resources.While reactive or dynamic routing protocols establishes pathwhen any node have data want to send as in (AODV andDSR) [4]. The advantage of this type is the small size of routingtable, as nodes do not require storing information about wholenetwork the disadvantage comes from the delay time neededfor route discovery and the delay caused by link break andrepair process that leads to further packet retransmission.(Abdul Jalil et al., 2021; Mohd Noh et al., 2021; Mustafa et al., 2021; Roszi et al., 2021; Tumisah et al., 2021). If it is managed well, various problems can be avoided (Irma et al., 2021; Suzana et al., 2021; Rohanida et al., 2021; Nazrah et al., 2021; Shahrulliza et al., 2021).

Combinations of both previous types create a hybrid type ofprotocols to reduce overhead caused by the two differenttypes. This type usually suits large network in which it isdivided to smaller groups called (clusters, zones….etc.)inter-group communication conducted in a proactive mannerwhile inner-group communication conducted reactively, the disadvantage of these protocols come from the larger memoryrequirement.All aspects require effective leadership and management (Mohd Arafat et al., 2021; Sumaiyah et al., 2021; Hifzan et al., 2021; Shahrul et al., 2021; Helme et al., 2021).

Generally, nodes in MANET have limited informationabout others beyond transmission range. On the other hand,QoS provisioning require routes that can guarantee servicesand for this needs to share nodes capability with others insidethe discovered path. Sharing knowledge about other nodecapabilities require the exchange of extra messages thatcauses overhead and consume resource. Therefore, it isimportant to use routing protocols that have limited support toQoS. Accordingly, routing protocols messages have to beenhanced to carry extra information about QoS parametersand shared it among nodes residing inside the path [5]. The proposed enhancement modifies the routing protocoland the shortest path concept that relies on number of hopsand adds the processing delay of the nodes.The success of something depends on good and efficient management (Mohd Ali et al., 2021; Parimala et al., 2021; SitiJamilah et al., 2021; Nor Fauziyana et al., 2021; Noel et al., 2021).

2. METHODOLOGY

The proposed modification to AODV routing protocolconsists of modification of the RREP process and source node,route selection. Therefore, the RREQ process was executed in thesame manner as in normal AODV. While the RREP process,contains the following change:

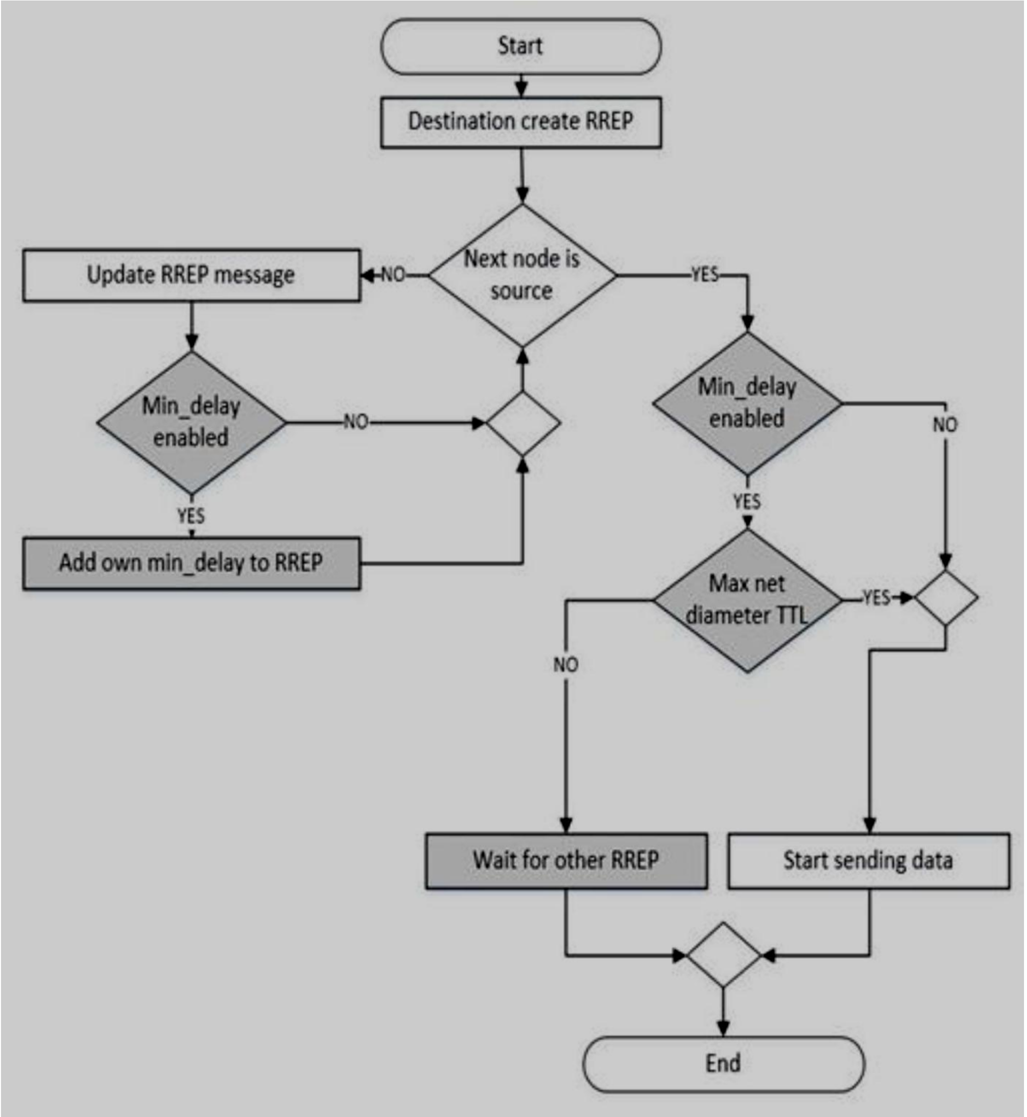
1- A 32 bit filed added to the RREP message to store theaccumulative value of the Minimum processingdelay.

2- Starting with the destination every node processes theRREP message insert its own processing delay andforward back the RREP message.

3- When the source receives the RREP message it delaysthe data transmission to allow other RREP messageto arrive until maximum net diameter time expires.

4- Then the source compares the minimum delay of eachpath and the no of hops to select the path. In which isused for data transmission.

5- A reference for other paths stored to be used in case ofcongestion or link breakage.



3. RESULTS AND DISCUSSION

During transmission routingerror occurs as a result of link break or congestion, inwhich route repair starts leading to packet drop andrequires retransmission. Simulation results showthat both protocols gradually have an increase in thepacket retransmission, which is due to increase inthe data rate as previously explained. However,we notice that MD-AODV have an average of50 packets for deferent data rates while the normalAODV have 55.The best way is to do efficient management (Ahmad Shafarin et al., 2021; Junaidah et al., 2021; Farah Adibah et al., 2021; Ahmad Shakani et al., 2021; Muhamad Amin et al., 2021). This demonstrates that the importance of something being managed well (Santibuana et al., 2021; Nor Diana et al., 2021; Zarina et al., 2021; Khairul et al., 2021; Rohani et al., 2021; Badaruddin et al. , 2021, Abdul Rasid et al., 2021).
This is another indication that a path with less delay causesfewer packets to get dropped and retransmitted again.The PDR for both protocolsshows an increase of 0.1msec on average in favoriteof MD-AODV, because of the enhancement avoids paths that contain nodes with high processing delay,which in return leads more packet drop that in resultleads to less PDR.

We notice from thesimulation result that the RDT pattern is similarto previous scenario. Theaverage RDT for AODV is 1.5msec while forMD-AODV is 2.5msec on average. This timethe differences between the two protocols areincreased to 1 msec or 0.9msec more forMD-AODV.This is due to the mobility of the nodes which forces thesource to take longer time to select a path and starttransmitting the data.

The simulation result showsa similar impact for nodes mobility on theEnd-to-End delay for both AODV versions withan increase of approximate 0.5 msec on average. Furthermore, and for thesame reason we notice that the delay increasesfor MD-AODV this time increase with data rate.Unlike the previousscenario, the PR results of this simulation showsthat the packet retransmission pattern varies fordifferent data rates, this is due to the movementof the nodes. However, we seesimilarity in the advantage of MD-AODV of7.28 packets on average. Furthermore, differentresults changed when the simulation wasrepeated several times but the pattern andadvantage of MD-AODV stayed the same onaverage.Simulation result showsa reduction in PDR which is due to packetsdrops occurs due to nodes movement, butMD-AODV still have the advantage of 0.912 to0.855 for AODV because of node processingdelay. Indeed, MANET routing protocol improvement motivatedresearchers to explore different ways to enhance its support toQoS. In this section, we explore some of these efforts andanalyze the results.A Research study evaluated different reactive routingprotocol support to QoS, and for this purpose AODV, DSRand TORA protocols considered. The review studies manydifferent parameters such as (route discovery, packet deliveryand delay).The result show different performance for eachprotocol, but overall AODV outperforms the other protocols.Load-Balancing DSR Based QoS Routing Protocol inMANETs (RTLB-DSR) is another enhanced routing protocolthat adds some QoS parameters to DSR protocol to achieveadaptability and strengthen the protocol [2]. Various policies applied to obtain flexibility for loadbalancing. The promising results obtained from differentscenarios prove that adding some of QoS metrics to routingprotocols will improve the performance and a similarapproach was adopted in our work.A different concept in another research tries to reduce theoverhead caused by link break of paths due to mobility, whichin return requires constant route discovery attempts. Theproposed method tries to minimize the broadcast messages.

CNN Keras is an open-source neural network library written in Python. It provides an API version of the neural network model making an easier way to create and train our model. In our case, we used sequential, Conv2D, call-backs API. First of all, to get image shape get_image_size function is called, this method reads the image thorough imread method and returns the shape of the image in x and y variables. In it, the Sequential model is used, and then the conv2D method is used for recognizing the pattern. And these patterns are stored in the form of filters of shape 5x5.In the starting layer, we used 32 filters with activation function relu(), our model is recognizing the edges and later part, it recognizing the final shape of the object, that together helped to classify the object in the image where we have used 128 filters of shape 5x5.

To optimize our model accuracy of learning or value of parameters to maximize accuracy, we have used an optimizing algorithm known as stochastic gradient descent; it is a rectified version of gradient descent. It is a faster technique. To prevent our model from overfitting problems, we used a state of art i.e. using dropout API. To decide the epochs value to achieve certain level accuracy in the training part, instead of passing direct values, we have used a method of Keras library called as call-backs / checkpoints through which we can control various parameters like to stop training part after a certain point, to prevent overfitting, etc. automatically. For pre-processing of data, to load images we have used python libraries called pickle and converted the final training labels of the data set into a categorical format using np_utilspyhton library.

```
Epoch 00001: val_acc improved from -inf to 0.90846, saving model to cnn_model_keras2.h5
Epoch 2/20

  100/12999 [..............................] - ETA: 56s - loss: 1.4564 - acc: 0.8400
  200/12999 [..............................] - ETA: 57s - loss: 1.8081 - acc: 0.8300
  300/12999 [..............................] - ETA: 56s - loss: 1.7551 - acc: 0.8300
  400/12999 [..............................] - ETA: 57s - loss: 1.7893 - acc: 0.8175
  500/12999 [>.............................] - ETA: 57s - loss: 1.8356 - acc: 0.8120
  600/12999 [>.............................] - ETA: 56s - loss: 1.7665 - acc: 0.8183
  700/12999 [>.............................] - ETA: 55s - loss: 1.8349 - acc: 0.8114
  800/12999 [>.............................] - ETA: 55s - loss: 1.8150 - acc: 0.8162
  900/12999 [=>............................] - ETA: 54s - loss: 1.8390 - acc: 0.8200
 1000/12999 [=>............................] - ETA: 54s - loss: 1.7837 - acc: 0.8220
 1100/12999 [=>............................] - ETA: 54s - loss: 1.8146 - acc: 0.8218
```

The model that was created by the CNN Keras is loaded. The webcam starts using the VideoCapture class which saves the gesture input by the user. It is converted to the standard in which it can be compared with the gestures stored in the model. The resultant gesture is passed on to the predict() function which predicts the probability of matching the gesture with stored gestures. The stored gesture with the maximum probability is selected and the label/class corresponding to the selected gesture is returned.

The histogram created by the Setting Hand Histogram is loaded. The user is asked to enter the first operand which is read and recorded by VideoCapture class and cropped into smaller pieces i.e. images. These images are then flipped vertically by using the flip() function. For color conversion of the images, we used the function cvtColor(). The back-projection of the resultant images is calculated based on the stored histogram. The kernel used is ellipse which is obtained by getStructuingElement() which is convolved with the back projection histogram by filter2D(). The resultant image is then blurred using Gaussian and Median filter. The thresholding of the image is done to get a proper hand out of frame. Then the threshold output is converted into a greyscale image. Then the image is recognized as described in the previous paragraph. To input the operator, we have assigned the different type of operations to the numerical values, for example, 1 for Addition (+), 2 for Subtraction (-). The second operand is entered in the same way as we entered the first one. Once we are done with entering the second operand, a "confirm" symbol must be given as input to the System so that the System calculates the result based on the input and display it on the screen.

4. CONCLUSION

This research work presented in this paper shows thatrouting protocol can be improved further by formulating amechanism to help nodes gain further knowledge of othersinside the network. Without exchanging further message andextra processing burden on nodes, the primary challenge wasto enhance the routing protocol but I always kept an eye onavoiding any alteration to the well-designed routing protocoland trying the best not to cause extra overhead that preventsthe enhancement from achieving its goal. Overall, we canconclude that simulation for MD-AODV shows the correctimplementation of the algorithm and the performance metricresults proves the success of the implementation. Thesimulation result also shows previous two that MD-AODVwill cause a slight increase in route discovery. However, itleads to a better End-to-End delay during data transmission.

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