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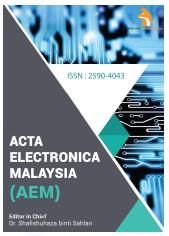

RESEARCH ARTICLE

COMPUTER NETWORK ROUTING CONFIGURATION BASED ON INTELLIGENT ALGORITHM

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ABSTRACT

With the rapid development of Internet, people are not satisfied with sharing information only on the local network; instead, they intend to maximize the use of various types of network resources in different regions in the world. Therefore, routing technology has become a crucial part of network technology, and it has become the most important network equipment. On the basis of relevant domestic and foreign theories and researches, in view of the existing problems, a computer network routing configuration method based on intelligent algorithm was proposed in this paper; meanwhile, the feasibility of the method was verified by simulation experiment.

KEYWORDS

Intelligent algorithm, Computer network, Router configuration.

1. INTRODUCTION

Hutchins in 2011 put forward that with the development of network information technology, Internet has played a more and more important role in people's life (Hutchins et al., 2011). It not only changes people's way of life, but also changes people's way of thinking. In 2013 proposed that routing protocol is an important part of network layer, which is also the core technology (Tartakovsky, et al. 2013). However, the traditional network routing protocol determines the routing by using the shortest path. This method lacks ability to adjust the parameters. At the same time, it cannot make corresponding adjustment with the change of the user's demand. In 2011 thought that the key of the communication lies in the communication between systems and necessary functions of shared data (Lin, et al. 2011).

These essential functions and the sequence of their occurrence are the basis of communication. Niewiadomska-Szynkiewicz believed that they can actually communicate only when the systems of two ends reach a consensus on the way of communication (Niewiadomska, et al. 2013). Systems of both ends must comply with the same rules and procedures in the application of obtaining the data and packing the data through the network transmission. Lin pointed out that router plays a significant role in computer network, and it is also a bridge of computer network (Lin, et al. 2011). Through it, we can not only connect different networks, but also select the path of data transmission and block the illegal access.

Based on this, according to relevant domestic and foreign theories and research results, the routing configuration of computer network is studied. Section 2 discusses the working principle and main functions of the router. Section 3 proposes computer network routing configuration method based on intelligent algorithm in order to tackle the existing problems. Section 4 analyzes the effectiveness. The research process and conclusions are summarized in section 5.

2. STATE OF THE ART

2.1 Working principle of router

Router is a network device to connect multiple networks or network segments. It is able to translate the data information between different networks or network segments to enable them to read each other's data. Meanwhile, it can select the route of information transmission at high speed. In this way, the communication speed can be remarkably enhanced, the communication load of network system can be significantly reduced, the network system resources can be obviously saved, and the flow rate of network system can be greatly improved. Finally, the network systems will be effective (Nguyen et al., 2011).

The devices in the network communicate with each other using their network addresses. IP address is the "logical" address which has nothing to do with the hardware. Router transmits data merely according to the IP address. The structure of the IP address has two parts. One part defines the network number, and the other part defines the host number in the network. At present, the subnet mask is adopted to determine the network address and host address in the IP address. Subnet mask is 32bit, which is the same as the IP address; besides, these two are totally corresponding. According to the regulation, the corresponding part of the number "1" in the subnet mask is the network number in the IP address, and the number "0" is the host number. A complete IP address is the combination of the network number and host number (Shukla, 2011).

The network number must be identical to the host IP address in the same

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network. This network is called the IP subnet. Communication can only be carried out between IP addresses with the same network number. To communicate with the other IP subnet host, it is required to get out through a router or gateway on the same network. IP address with different network number cannot directly communicate, even if they are connected. Routers have multiple ports to be used to connect multiple IP subnets. The network number of the IP address of each port is required to have the same network number as the IP subnet it connected. Different ports have different network numbers and different corresponding IP subnets. In this way, host of each subnet will send IP which requires going out to the routers through its own subnet IP address (Al et al., 2015).

2.2 Main functions of router

Routing actions include routing and forwarding. Routing determines the best path to the destination, which can be achieved through the selection of algorithm by routers. In order to determine the best path, routing must start and maintain the routing table that contains the routing information to choose algorithm. The routing information is not the same due to the routing algorithm. Routing algorithms fill in the table with different information collected. According to the table, the relationship between next-hop and destination network will be told to routers. Routers exchange information for routing upgrade. Routing table should be updated and maintained to properly reflect the topology changes of the network. Finally, the optimal path is determined by the router based on measurement (Shukla et al., 2014).

Forwarding transmits information packet by using the optimal path. Router firstly looks up in the routing table, and judges whether it knows how to send packets to the next site. If the router does not know how to send a packet, the packet is usually discarded. Otherwise, the packets are sent to the next site according to the corresponding table entries in the routing table. If the destination network is directly connected to the router, the router will send packets directly to the corresponding port. This is the Routing Forwarding Protocol. Routing Forwarding Protocol and Routing Protocol are two concepts of mutual cooperation and mutual independence. The former uses the routing table maintained by the latter. At the same time, the latter distributes routing protocol data packets based on the function provided by the former (Brennan et al., 2013).

3. METHODOLOGY

3.1 Exponentially weighted moving average algorithm

Exponential weighted moving average algorithm is an output algorithm based on output value in historical process to estimate the current process. This algorithm has been widely used in daily life. We can analyze the parameters of the path. Then we carry out a comprehensive estimation to obtain the current evaluation value according to the parameter history evaluation value and the current time value. Exponentially weighted moving average algorithm is an evaluation algorithm with simplicity and efficient storage. It can be combined with the historical data and the weighted index; meanwhile, it has the characteristics of rapid response to major changes. It is often used as a sensitive detector in many statistical process control applications. In dynamic system, the state characteristics of the system need to react by monitoring data of the neighboring sensor nodes. Therefore, it is very important and necessary to give more attention to the monitoring data of the neighboring sensor nodes.

The exponential weighted moving average value of T moments is set. The average value of the previous data is sometimes used as an initial value. The weighting factor is between 0 and 1, which indicates the weight coefficient of the historical survey value. The more the value is close to 1, the weight of the past measured value is lower. When it is equal to 1, the slip value at the moment of t is equal to the sample value at the moment of t. We do not consider the impact of the past; instead, we regard the current information as the weight. It can be seen that the exponential weighted moving average value at the moment of t, in fact, is the weighted average value. Weighting coefficient is a geometric progression. The more recent the data is, the greater the weight coefficient will be. The more distant the data is, the smaller the weight coefficient will be, and the sum of weights equals 1. Because the weighting coefficient is consistent with the exponential law; in addition, it has the function of moving average data, it is called exponential weighted moving average.

Exponentially weighted moving average algorithm is a commonly used method of sequence data processing. In the field of communication, it is mainly used for estimation and smoothing of the network state parameters. From the angle of signal processing, it can be seen as a low pass filter. By controlling the weighting coefficient, the smooth form of the signal is provided by eliminating the short-term fluctuations and retaining the long-term trend of development.

3.2 Comprehensive average evaluation algorithm

In the initial stage of the network, a series of route discoveries and route establishments are carried out. During the initial period of the process, the parameters of the path changed greatly, which led to the large deviation of assessment by using the exponential weighted moving average algorithm. It cannot follow the change of the actual value. In order to improve the convergence rate of the evaluation and to maintain the long-term stability of the process, an integrated average evaluation algorithm is proposed in this paper. In the exponential weighted moving average algorithm, once the weighting factor is determined, it will not change with the number of evaluation in the whole evaluation process. In view of this situation, the coefficient is set and initial assessment value is selected after the comprehensive average evaluation algorithm actually starts. Here the average value of the previous data is used as an initial value. Then we calculate the weighted coefficient of the first evaluation. If at this moment there is a current value input, and the first assessment value calculated will be stored in is in an array. After that, we calculate the weighted coefficient of the next evaluation and start the next assessment test until there is no current value entered and no further evaluation is required.

4. RESULT ANALYSIS AND DISCUSSION

Because it is at the initial stage of evaluation, the convergence rate of integrated average evaluation algorithm is faster than the exponential weighted moving average algorithm. In order to compare the performance of the two algorithms, we only intercept the time delay of the initial stage to analyze, and we carry out the simulation as shown in Figure 1.

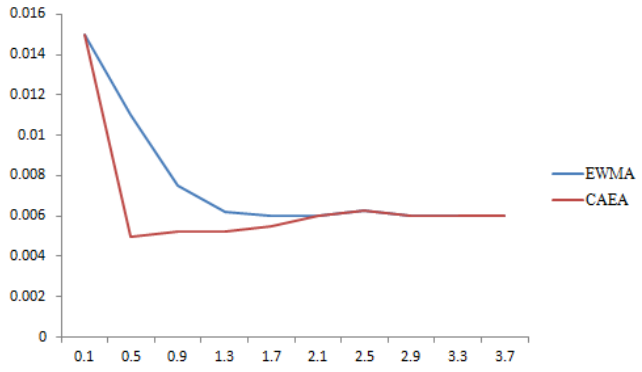

Figure 1: Initial phase comparison

Two algorithms are used to evaluate and deal with the time delay of the same group. The results of the test are shown in Figure 2.

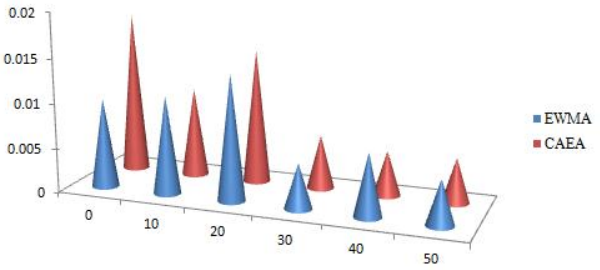

Figure 2: Overall comparison

As is shown in the graph, in the initial stage, the convergence rate of the composite average evaluation algorithm is significantly improved

compared with that of the exponential weighted moving average algorithm. At the initial stage we mainly focus on the current values. Therefore, it is able to converge quickly, and the final simulation curves of both of them coincide with each other. The comprehensive average evaluation algorithm does not affect the stability of the system, and it only changes the speed of response.

5. Conclusion

On the basis of relevant domestic and foreign theories and researches, in view of the existing problems, a computer network routing configuration method based on intelligent algorithm was proposed in this paper; meanwhile, the feasibility of the method was verified by simulation experiment. The results indicated that the comprehensive average evaluation algorithm proposed based on exponentially weighted moving average algorithm does not affect the stability of the system, and it only changes the speed of response. In the research of the paper, the consideration of the situation is relatively simple. Other factors that may affect the outcome of the system have not been considered. Therefore, there might be a certain deviation of the actual situation. It is necessary for us to make up for these deficiencies in the following research.

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