

A Knowledge Multidisciplinary Fusion Map Construction Method for Network Security Congestion Data Prediction

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Abstract: With the progress and development of various technologies, computer technology has been widely used in all walks of life, which also leads to the increasingly serious problem of computer network congestion. If serious network congestion occurs in the process of computer network operation, it will lead to the phenomenon of low quality of network service, low efficiency of resource allocation and data packet loss. Effective measures should be taken. It is very necessary to control the network congestion. This paper mainly makes a brief analysis of the related congestion control theory, and puts forward the efficient control method of network congestion. It has a positive effect on improving the efficiency of computer network operation.

1. Introduction

With the advent of the information age, computer networks began to spread in society, ushering in an era of rapid development. The widely used computer network has greatly enriched people's lives, and is becoming an indispensable part of people's daily life, and has been applied to military, cultural and many other fields. Especially in recent years, the number of netizens in our country has increased in series, and the increasing number has directly led to the sharp collision of the scale of computer networks. However, the resource capacity of computer network does not increase with the increase of the number of netizens, or its speed is far less than that of netizens, which leads to the problem of computer network congestion. Once congestion occurs, the performance of the computer network will decline dramatically, and even lead to network crash. The problems of data delay, performance degradation and network data packet loss caused by it have become the key problems in the development of computer networks, and seriously affect the quality of computer network services. So how to effectively control the congestion of computer network has become a hot issue.

Whether data can be transmitted accurately and resource allocation is reasonable affect the quality of service of computer networks. Traditional TCP congestion control mechanism is a one-way best effort concept, which often results in data loss, inaccurate data transmission, unreasonable resource allocation and other problems when access surges. In order to solve this problem, this paper proposes an improved congestion control method for computer network. This is a new congestion control method based on TCP layer network congestion mechanism and IP layer resource queue management mode. While solving the congestion of computer network, it can also guarantee the quality of service of computer network. It is an efficient congestion control method of computer network. This paper gives a brief analysis of this.

2. Network Security Congestion Control

The main reason for the congestion in the operation of computer network is that the number of packets transmitted by computer network is too large. Once the number of packets is similar to the data processing ability of the network, it will directly lead to the difficulty of the computer network to meet the user's communication service requests, resulting in the decline of the data processing ability of the computer network. It is very important to take effective measures to control the

congestion of computer network. Necessary, but in the actual network operation process, the number of users and the number of resources used are difficult to control directly. Once the user's load request to the computer network is greater than the network's resource capacity and processing capacity, it will lead to the occurrence of computer network congestion.

There are several common causes of network congestion:

1) A large number of network data packets suddenly flow to one or several network links, resulting in local overload and congestion, and when serious, the congestion will spread to the whole network.

2) The processing speed of routing nodes in the network is insufficient, which leads to the accumulation of a large number of data packets in the network and overload, thus entering the congestion state.

3) The low bandwidth of the network will also cause data packets to accumulate in the network links, leading to network overload and congestion.

One of the important reasons is the uneven distribution of computer network resources. In the whole computer network, there are many network transmission nodes. The distribution of network resources and network capacity among different nodes is very different. Some nodes in the network have very large data transmission rate, while others have relatively small data transmission rate. If the transmission rate is too small, it will easily lead to the problem of network congestion. On the other hand, when multiple nodes in the network transmit data to a certain node at the same time, because of the limitation of the storage capacity of the intermediate node, if a large amount of data is transmitted to the node at the same time, it will lead to serious network congestion. Therefore, in practical application, in order to control the congestion of computer network, it is necessary to coordinate the relationship among network load, response time and throughput, so that the computer network is always in the best running state in the process of operation, which can effectively avoid the congestion of computer network and has a positive effect.

Once network congestion occurs, it is likely to deteriorate and spread further, because the routing node discards the data packet due to the saturation of the queue, and then the sender retransmits the data packet due to the timeout, even multiple retransmissions, which further increases the amount of data in the network and aggravates the network congestion. Therefore, one of the main purposes of congestion control is to avoid the network entering the congestion state, rather than "dredging" when the network enters the congestion state.

When the computer network is congested due to the excessive transmission of messages in the process of operation, TCP congestion control mechanism will be applied in the traditional processing mode. Its main processing principle is to imitate the principle of traffic command. In the actual processing, the main method is to select the transmission path of data packets. In the case of network congestion, the transmission of data packets will be carried out. In order to ensure the transmission rate, some data packets will be discarded in order to ensure the reliability of data transmission. In the process of operation, the packet loss rate is calculated according to the following formula:

$$F = \frac{\left(\sum P_i \right)^2}{n \sum P_i}$$

In the above formula, n denotes the total number of data transmission packets; P_i denotes the probability that the first packet will be discarded in the process of computer network congestion control; F denotes the probability that the data packet will be discarded by calculating the index of data packet loss rate. If this transmission method is used, the probability of data packet discarded is very large, and the distribution of network resources. The calculation of efficiency is as follows:

$$Power = \frac{Throughput^a}{Respond - Time}$$

The meaning of "a" in the above formula is: adjustment coefficient; the meaning of "Respond Time" is: response time; the meaning of "Throughput" is: network throughput; the meaning of "Power" is: the allocation efficiency of network resources. From the analysis above, it can be seen that using traditional methods to control network congestion can easily lead to the loss of some data packets, and will also cause network congestion. Throughput has a serious impact, and will affect the efficiency of network resource allocation. This low quality of network service will be difficult to meet the network transmission needs of users. This requires an efficient network congestion control method based on the existing ones.

3. Relevant evaluation methods of network congestion control mechanism

In order to apply it to actual network congestion control, we need to evaluate the effectiveness of its control mechanism. In the process of evaluation, the main quality evaluation indicators are: time delay, data packet loss rate, throughput rate, etc. In the actual operation of computer network, if there is network congestion phenomenon, the main quality evaluation indicators are: time delay, data packet loss rate, throughput rate, etc. In order to evaluate the effectiveness of its control methods, the network performance can be evaluated by using the efficiency of network resource allocation and data loss rate as evaluation indicators. The efficiency of network resource allocation reflects the optimization of the network after using the efficient congestion control mechanism. Capacity and data loss rate reflect the ability to ensure the complete transmission of network data information after the application of computer network congestion control mechanism. It mainly stands on the level of data information and evaluates the operation performance of computer network. In practical application, the evaluation effects of these two aspects can be calculated through relevant calculation formulas, and the whole evaluation work can be done. In practice, the data loss rate of the congestion control method is very low, and compared with the traditional control mechanism, the network has a smaller correlation adjustment coefficient than 1. If the main concern is the throughput of the network, the correlation adjustment coefficient is larger than 1. In practice, the data loss rate of the congestion control method is very low. The allocation efficiency and response time of resources have been effectively optimized. In practical application, the control method has a very good application effect and is worth popularizing in practical application.

4. Network Congestion Solution

In order to effectively control the congestion of computer network, a new congestion control method based on TCP layer network congestion control and IP layer network resource queue management is proposed, which can effectively solve the problem of computer network congestion. In the process of solving congestion problem, TCP computer network congestion control mechanism mainly applies traffic command rules. To a certain extent, it can effectively solve network congestion problem. However, with the increase of the scale of computer network and the complexity of computer network structure, it is difficult to meet the actual network demand if this control method is used alone, on this basis. On the basis of TCP control, the network resource queue management strategy of IP layer can be fully applied to optimize the congestion control mechanism effectively, which has a positive effect on solving the network congestion problem, and can effectively improve the response time and service quality of computer network, and the first-in-first-out control principle. It mainly refers to: in the actual network operation process, the basic principle of data packet processing and transmission is that the first arrival of the data packet first serves, then achieves the data packet and then serves. In practical applications, all data packets transmitted in the computer network are sent through the sender. After being transmitted to the router, they are effectively processed by the first-in-first-out principle. However, due to the limitation of the size of memory space used by the router cache, once the data packets it receives

occupy its storage space in the buffer storage area, after that, they are processed by the first-in-first-out principle. The transmitted packets will not be accepted, and the packets will be discarded.

5. Summary

In a word, network congestion always changes with the development of network and computer. In fact, the purpose of studying network congestion is not to solve the problem thoroughly, but to make the performance indicators such as packet loss rate and delay, network link application rate balanced and harmonious. Therefore, when controlling network congestion, it is necessary to balance the congestion status with the resource status, so as to achieve the optimal network resources and the optimal balance of network performance parameters.

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