Research on Intelligent Scheduling Optimization Selection Algorithm for Medical Information

Ming Li[a], Ruo Hu [b, *], Hong Xu [c], Huimin Zhao [d], Xueri Li [e]

School of Computer Science Guangdong Polytechnic Normal University Guangzhou, China

[a]1030249831@qq.com, [b, *] 512412657@qq.com, [c]513731052@qq.com, [d]245671615@qq.com, [e]270955268@qq.com

Abstract. Aiming at the problems of asymmetric information and long delay time and excessive use of network traffic and inaccurate recommendation in the traditional medical information recommendation algorithm, the improved adaptive scheduling algorithm and intelligent optimization recommendation algorithm are combined, it can completely solve the problems of time, traffic occupancy, stability and accuracy of medical information push. In this paper, an improved adaptive scheduling algorithm is proposed to solve the problems of time occupancy, traffic flow and connection stability of medical information recommendation. The proposed intelligent optimization recommendation algorithm solves the accuracy problem of medical information recommendation. Experimental results show that the proposed algorithm has the advantages of short delay time, low flow occupation, stable connection and high accuracy of push.

Keywords: Medical Information, Adaptive Scheduling, Intelligent Optimization, Accuracy.

1. Introduction

In recent years, with the rapid development of Internet application technology and mobile intelligent devices, Medical Information [1-4] Intelligent Optimization and Selection Service System [5-7] has also been developed rapidly, this system refers to the service that the server sends medical information 1-4to the target user in real time according to the characteristics of the message and customer demand. The traditional medical information optimization and selection service system adopts the retrieval mode, it will send medical information to users indiscriminately, with the rapid growth of medical information, too much information does not guarantee that medical information is available to the right user in a timely manner, resulting in asymmetric information.

The traditional optimization and selection service of medical information adopts the original adaptive scheduling algorithm. In case of a busy network, the optimization of long network connection cannot only select medical information timely, but also will cause frequent long network connection failure due to the unreliable network. In such cases, the client will constantly ask for reconnection, and the server will not be able to handle a large number of long network connections, resulting in serious resource consumption and paralysis.

Combining with the above problems, we want to create a Mobile Medical Messages [5-7] Intelligent Scheduling Optimization Selection System, first, we need to create an intelligent optimization and selection mechanism for medical information belonging to the system, we improved the algorithm used.

2. Algorithm

2.1 Overview of Adaptive Scheduling Algorithm

The original adaptive scheduling algorithm, the original adaptive scheduling algorithm is that the client requests an optimization selection message from the server, and after the server obtains the running and analyzing data sent by the client, the server optimizes the selection of messages for the client based on the analysis results. When the client requests the optimization selection message again to the server, the optimized adaptive scheduling algorithm will acquire the running parameters of the client again, and the server redistributes the optimization selection message for the client for the new parameter. The optimized algorithm determines whether the network environment is busy or idle according to various parameters of the client. If it is a weak network, it switches back to the polling mode, and the polling mode can ensure the real-time effective optimization of the message.

(1) Unimproved Adaptive Scheduling Algorithm

The operating system set of the network long connection optimization algorithm is $l-n$, and the operating system set of the network long connection optimization algorithm is used to record the set of operating system types supporting the network long connection optimization algorithm service on the client, namely $N=\{l-n_1,l-n_2,\cdots,l-n_n\}$,among then $\{l-n_i \mid l-n_i=0 \; or \; l-n_i=1\}$, $l-n_i=1$ indicates that the client supports the network long connection optimization algorithm,$l-n_i=0$ indicates that the client does not support the network long connection optimization algorithm. Nu indicates the number of long network connections that the server has established, the T indicates the polling request period, and Pt indicates the optimal selection scheduling threshold. When the server's existing network long connection number exceeds Pt, the connection request is assigned to polling mode.

The ASA algorithm (Adaptive Scheduling Algorithm) should ensure the immediacy of message optimization selection, the ASA algorithm also needs to consider the loss of client resources and the reliability of the network, the ASA algorithm should consider whether the client supports the network long connection optimization algorithm8-11. The real-time performance of the ASA algorithm optimization selection message must be better than the polling mode.

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By comparing the operation steps of the above two, it can be found that: the connection mode is in the state of the network long connection optimization algorithm, and if the network disconnection occurs, the network long connection optimization algorithm does not immediately disconnect the connection state, and still maintains for dynamic monitoring. If the dynamic monitoring period is set long, the network long connection optimization algorithm will remain in the "suspended" state on the server, and it will remain in this state for the unfinished period. In the case of a busy network, using the network long connection optimization algorithm, the message will not be optimized in time, instead, the connection will be disconnected frequently, causing the server to establish a large number of new network connections, the old message will not be processed, this can lead to excessive consumption of server resources, increase the load on the server, and in severe cases, the server will be paralyzed[12-13].

(2) Improved Optimized Adaptive Scheduling Algorithm-IOASA

Based on the problems of the network long connection optimization algorithm, we propose an improved adaptive scheduling algorithm. In this algorithm, the total duration of the standard stable link is recorded as T_o,when the network optimization long connection is disconnected, the actual total time of the link (T_s), when the network optimization long connection is disconnected, when the total length of the actual link (T_s) is less than the total duration of the standard stable link (T_o),that is,($T_S < T_O$),the actual number of disconnection reconnections caused by$T_S < T_O$ occurs continuously (D_n) plus one:($D_n = D_n + 1$).

The total length of the real working link of the traditional network long connection optimization algorithm is recorded as Ts. the total length of the actual link is updated each time the network long connection optimization algorithm refreshes:$T_s = T_s + T_n$,the connection duration of a single network long connection optimization algorithm is represented by T_n.

The length of time before and after refreshing twice. The total length of time when the network long connection optimization algorithm is reconnected is zero (Ts=0). The connection length of the single network long connection optimization algorithm is T_n,That is the length of time used for two refreshes before and after. If the standard continuously occurs$T_s < T_o$, the network type is scheduled to be polled. The improved ASA algorithm flow chart, as shown in figure 1.

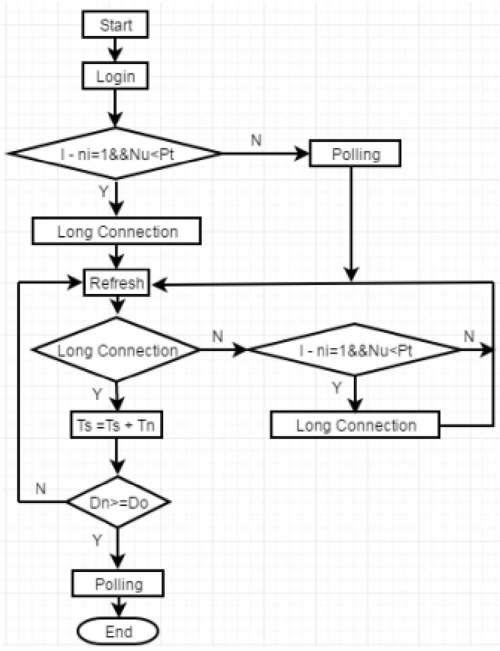


Figure 1. improved SAS algorithm

(3) Performance evaluation index

①Medical message optimization selection real-time r: $r = \frac{1}{t}$,the message optimization selection real-time is measured by the average delay time t of the optimized selection message, t is the denominator, and the smaller the t value, the better the real-time performance of the optimized selection message.

②Network resource consumption F: $F = \frac{f_n}{t_n}$,the network resource consumption is measured by measuring the average amount of resources consumed in one second, and f_n is the amount of resources consumed in the nth time t_n .

③Network stability: $W = \frac{j_n}{t_n}$,judging by the number of times the network connection is reconnected within 1 second, j_n is the number of times the nth sample is rejoined in time.

2.2 Optimized Adaptive Scheduling Algorithm Experiment

Table 1. Test results of information recommendation time

Serial numberr	Push	Simulate the number of receivers	Total number of messages sent	Total number of messages received	Mean delay time
1	polling	16000	16000	16000	2067ms
2	A long connection	16000	16000	16000	785ms

Table 2. test results of occupancy rate

Serial number	Push	48 hours of traffic
1	Polling	55.32KB
2	A long connection	50.63KB

Testing in a weak network environment compares the cost of server connections before and after ASA mode optimization. First, in the Wi-Fi environment of the weak network, the network is disconnected once every 1 second. Then check the connection count of the server as shown in figure 2.

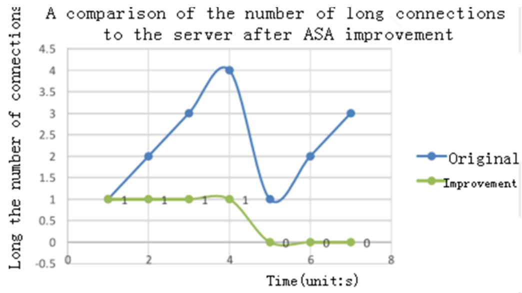


Figure 2. The number of long connections to the server in a weak network environment

The results of the test comparison in a weak network environment show that the original ASA algorithm server has a long-term fluctuation in the number of connections. The original ASA is a network long connection mode, which requires high server performance and consumes a lot of resources of the server. You can see the optimized ASA algorithm; the server connection number curve is relatively flat.

2.3 Intelligent Optimization Recommendation Algorithm-IORA

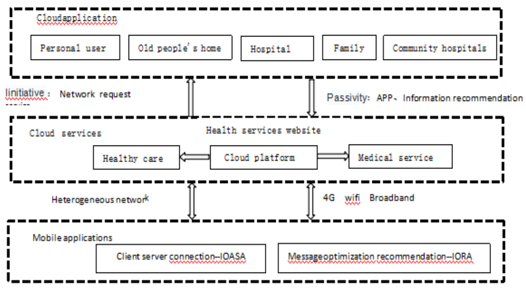


Figure 3. Distributed mobile service system based on cloud platform

The message intelligent optimization recommendation service will record the history of the user browsing messages, analyze the frequency of the user's browsing of the message, and obtain the target customer interested in the message, and optimize the selection message through the intelligent priority recommendation algorithm system. The specific steps are as follows:

(1) By describing the characteristics of the message by the message to be selected and the label of the task, the optimal selection of the message and the task can be realized.

(2) Record the history of the customer's download message and get the download history of each type of message for each customer.

(3) The intelligent priority recommendation algorithm analyzes and calculates the customer's demand matrix for messages from a large number of messages.

(4) When there is a new message that needs to be optimized, the demand matrix and the intelligent algorithm of the message are used to obtain a customer group that is highly likely to read the message, and recommend messages to these customer groups.

The optimization selection system has to cope with the optimization selection requirements of a large number of users, in order to ensure the stability of the system in the case of high concurrent message task requests. The intelligent module is inserted the message queue so that the system is layered into three parts: the foreground, the task message queue, and the background as shown in figure 4, figure 5 is a comparison diagram of the traditional and intelligent optimization users.

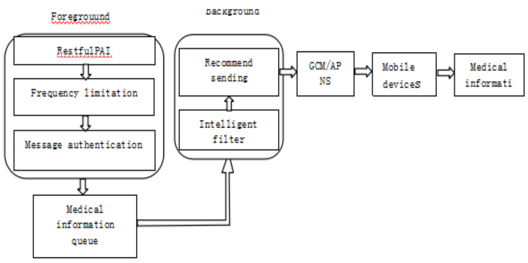
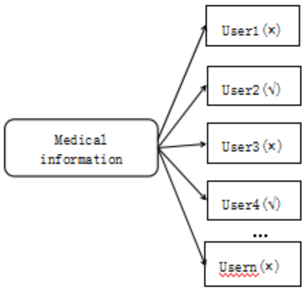


Figure 4. Intelligent system architecture diagram



(a)Traditional user selection

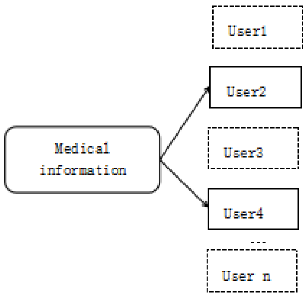


Figure 5. (b)Intelligent optimization of user's selection

3. Result

Based on the above analysis, the improved adaptive push method recommends the average delay time and the traffic occupancy performance evaluation index, and the long connection mode is superior to the polling mode. The information optimization recommendation algorithm recommends the accuracy rate, and the IOPA push mode accuracy rate is higher than the long connection and the polling mode. In any case, the message optimization option can be guaranteed to achieve a specified degree of stability.

Table 3. accuracy test results of message optimization recommendation

Serial number	Push	Total number of messages sent	Satisfy client messages	accuracy
1	A long connection	12000	2468	20.56%
2	Polling	12000	2217	18.48%
3	IORA	12000	10623	88.52%

4. Conclusion

This paper combines adaptive scheduling algorithm and intelligent optimization recommendation algorithm to completely solve the problem of time, traffic occupation, stability and accuracy of medical information push. This paper proposes an improved adaptive scheduling algorithm to solve the problem of time occupation, usage flow and connection stability of medical information recommendation. The intelligent optimization recommendation algorithm proposed in this paper solves the problem of accuracy of medical information recommendation. The experimental results show that the proposed algorithm has the advantages of short delay time, less traffic usage, stable connection and high push accuracy.

Acknowledgments

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