Research on Node Video based on Multimedia

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Abstract: According to the limitation of multimedia, this paper puts forward the research of node video based on multimedia. By comparing the speed and algorithm of video node, compared with traditional media, it is concluded that the research has great practical value

Keywords: Multimedia; Traditional single network; System

1. Introduction

Real-time multimedia transmission system is widely used in real-time monitoring system, video conferencing and the others [1]. However, with the development of the mobile devices' ability and wireless communication technology, the traditional single network environment gradually becomes heterogeneous equipment and pervasive computing environment made up of network. Multimedia transmission has obvious differences with traditional file transmission, the transmission of traditional file for transmission delay, jitter is not too many requirements, but there are strict error control and retransmission mechanism. In the transmission of real-time multimedia transmission, demanding synchronicity, and requires small transmission delay. Multimedia transmission can endure packet loss caused by the error and abnormal, can endure due to no retransmission or error correction mechanism of packet loss or latency, but it will not tolerate caused by error control mechanism based on retransmission display discontinuity or confusion. In the pervasive environment, the difference of different links' transmission capacity is huge, and in particular, wireless link bandwidth is smaller and unstable; the difference of each node's processing capacity is huge, and in particular, the mobile node's processing power is often weak [2-4]. These features cannot ensure the reliability of real-time multimedia transmission system.

Multimedia network transmission technology, however, because of the multimedia compression, compression and transmission problem not solve, have not been able to achieve the ideal effect. In recent years, multimedia communication technology

SOA uses the available service to build loose coupling application. As the key technology of SOA, service composition can combine independently distributed and available basic service to meet user's complex business requirements, which makes it adapt to the pervasive computing environment [5]. These characteristics help SOA use the existing distributed service resources to dynamically build loose coupling multimedia transmission system in pervasive environment.

In the service-oriented real-time multimedia transmission system, a number of multimedia services deploy in different nodes in the network beforehand. These services can be divided into functional and non-functional services. Features services meet the functional requirements of users through subtitle's embedment, tags' addition and codes' conversion and the other necessary processing for the source information. Non-functional services can reduce the amount of data transmission and reduce the time delay of data transmission through media compression and sampling, etc. In particular, for mobile users using wireless access, these non-functional services can effectively improve the achieved services' reliability of users, but it has the function itself to deal with time delay and reduce the multimedia video's quality. The function of the system is as follows. When receiving the users' request, the system starts from the data source and builds a multimedia information processing chain after a number of functional and nonfunctional service processing nodes so as to transfer multimedia information with relatively low latency and high reliability to end users. In this paper, it is assumed that the user's service requests arrive one by one and they don't affect each other.

2. Define the Parameters

In a pervasive multimedia transmission environment, the multimedia service nodes and the parameters of the network link directly affect the routing effect of algorithm. This section mainly shows that the parameters of the model and defines the problems.

Combined with the research question, the definitions of related parameters are given: bandwidth, unit processing time, IORatio and reliability. For the sake of simplicity, the difference between transmission and spread is ignored. In the below description, the transmission is used to represent the process that the data transmits from a node and it is accepted by the next node.

Bandwidth: bandwidth refers to the current links' transmission capacity the link between the two service nodes in multimedia transmission environment, which is shown by B. Unit processing time: the unit processing time refers to the time which is taken to process unit data in a certain service node, which is shown by O according to the characteristics of the multimedia information. Multimedia system is data intensive application and the size of the amount of data has a great influence on processing time. In addition, due to the heterogeneity of service node, there are great differences among different service node's computing capacity. Therefore, the time which is taken to process unit data is used to measure the node's processing capacity.

IORatio: the IORatio is defined as the ratios of unprocessed data and processed data after a certain service processing, which is shown by r. It is also closely related to the characteristics of multimedia system. The services with different functions tend to have different effects on the amount of data. For example, the embedment of subtitles could hardly affect the quantity of the data, but the media data compression tends to make the amount of data become smaller. In general, the IORatio of services with different functions is different, but the IORatio of different copies of the same service is the same.

Reliability: the reliability expresses the degree of the reliability when a service processes nodes, which is shown by e according to historical data. This paper uses the definition in literature [4] that inspects K times system's calls for a certain service node in the past period of time and if the number of successful calls is C, e will be equal with C/k. Because the reliability is product parameter, the reliability of a service path refers to the product of all service nodes in this path (it is believed that all the links are reliable).

Delay: The delay includes transmission delay and data processing delay, which is represented by d. Because the delay is cumulative parameters, a service path delay refers to the sum of all nodes' processing delay and links' transmission delay in this service path.

3. Functional Image and Service Image

Because for the same type of user's service, generally speaking, there are a variety of functions service combination can meet the demand. Therefore, the FG is used to represent the system the combination of all the possible functions of the service relationship. There are five basic assumptions system multimedia processing services, as shown in Figure 1, then set off from f_0 to f_4 there are four possible ways of service combination, respectively $(f_0\ f_1\ f_4, f_0\ f_1\ f_3\ f_4, f_0\ f_1\ f_2\ f_4, f_0\ f_1\ f_2\ f_3\ f_4)$.

Function diagram describes the system function abstraction. Further more, each service has a plurality of service we consider all copies, copies of each service in the function diagram is extended form as shown in Figure 2 service graph (service graph, referred to as SG). Service description is the dependence between the copies of all services, contains all the information of the system. In Figure 2, assume that the service f_0 has 1 copy, 2 copies of f_1, f_2 has 1 copy, 2 copies of f_3, f_4 has 2 copies, and add a St as the final transfer of multimedia data the destination node to arrive. As we can see, $f_4\ f_0\ f_1\ f_2$ corresponds to a path in FG, if you choose as a service instance of f_1, as a service instance of f_4, then in SG service path specific. At the same time definition, if there exists a directed edge from the $SOs_4^2, s_1^2 s2 s_4^2$, then s_j is called the precursor node s_j, s_j for subsequent s_i.

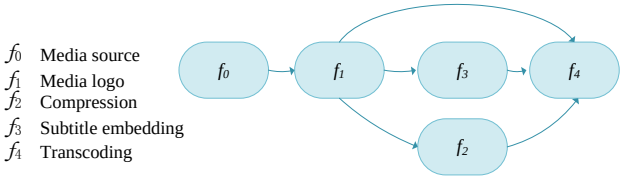

Figure 1. Domain

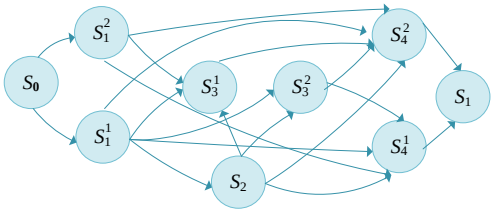

Figure 2. Service Area

LD/RPath algorithm is an approximation algorithm whose idea is to transform the original problem into a conventional shortest path problem through a series of approximate conversion and then use classical the shortest path algorithm (such as Dijistra algorithm) to solve. The LD/RPath algorithm can in polynomial time complexity yields better results, since the original problem is NP- complete problem, it is not guaranteed to get the optimal results, but the experimental results show that, the algorithm obtains results close to the optimal solution. Next, from beginning of the amount of data approximation, design step by step LD/RPath algorithm's designed idea is introduced step by step.

4. The Amount of Data Approximation

Some multimedia services will change the amount of data, so before the path was not determined, we cannot know a service node or link on the actual amount of data transmission. In Figure 2, a S0 data is m, so before the path is not determined, processing data may be from s_0 and $s_1^1 (or\ s_1^2)$ transmission reaches, there may be from $s_0\ \ s_1^1 (or\ s_1^2)$ reach and s_2 transmission. Therefore, the data may be $m.r_0.r_1$ m·r0·r1. This uncertainty makes the

problem become more complex, so it is needed to approximate amount of data processing.

As the algorithm shown in algorithm 1 data approximation, the main idea is that, for a service replica node s_i, assuming the L precursor node in the service map, and then we considered the amount of data received by the s_i data volume is equal to the all L precursor node output of the arithmetic average. Note that these precursor nodes associated with the amount of data is similar, so this is a recursive process.

Algorithm1. Approximation algorithm for data

a) $Initialization: index[i] \leftarrow 0$ {Initialize each service node number is 0}

b) $flag \leftarrow true$

c) $while\ flag = true\ do$ {As long as the node number changed, the serial number will continue to adjust}

d) $flag \leftarrow false$

e) $for\ each\ e(i, j) \in E\ do$

f) $f\ index(j) \le index(i)\ then$ {Ensure to number tail node side than the first node number}

g) $index(i) \leftarrow index(j) + 2$ {Node number adjustment}

h) $flag \leftarrow true$

i) *end if*

j) *end for*

k) *end while*

l) $for\ each\ index[i]\ do$

m) $t \leftarrow 0, sum \leftarrow 0$

n) $for\ each\ node\ v \in ty\ do$ {Find all the precursor nodes}

o) $f\ v\ has\ a\ service\ link\ to\ index[i]\ then$

p) $t \leftarrow t+1, sum \leftarrow sum + m[v]$ { The amount of data accumulated from all of its precursor, and count}

r) *end if*

s) *end for*

t) $m[index[i]] = sum / t$ {The amount of data the precursor node all outgoing arithmetic average }

u) *end for*

v) $return\ m[O, S_{n-1}]$

5. Conclusion

The two comprehensive efficiency and the selection effect of experimental results show that, LD/RPath algorithm in network topology is in small scale selection effect is close to Optimal algorithm, and running time almost equal to Random algorithm. When the network topology size become bigger, LD/RPath algorithm selection effect is better than the Random algorithm, Optimal algorithm cannot guarantee real-time gradually to be not applicable. In general, the LD/RPath algorithm with low time complexity to obtain good path selection effect, is suitable for real-time multimedia service oriented transmission.

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