Chapter 22
A Deep Learning Solution for Multimedia Conference System Assisted by Cloud Computing

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ABSTRACT

With the development of information technology, more and more people use multimedia conference system to communicate or work across regions. In this article, an ultra-reliable and low-latency solution based on Deep Learning and assisted by Cloud Computing for multimedia conference system, called UCCMCS, is designed and implemented. In UCCMCS, there are two-tiers in its data distribution structure which combines the advantages of cloud computing. And according to the requirements of ultra-reliability and low-latency, a bandwidth optimization model is proposed to improve the transmission efficiency of multimedia data so as to reduce the delay of the system. In order to improve the reliability of data distribution, the help of cloud computing node is used to carry out the retransmission of lost data. the experimental results show UCCMCS could improve the reliability and reduce the latency of the multimedia data distribution in multimedia conference system.

1. INTRODUCTION

Multimedia Conference System (MCS in short) is an application used increasingly widely, which can provide real-time transmission of video, audio, and other data to facilitate people's communication in life and work. The demand of ultra-reliability and low-latency for multimedia conference systems has also become increasingly high. In the traditional multimedia conference system, the data distribution scheme can be used in unicast or multicast technology. With the growth of conference participants, MCS adopting unicast will receive network bandwidth limitation (Lao et al., 2005). Compared with unicast, the multicast scheme, which is a distributed concurrent transmission mode, is realized by using the intermediate nodes for distributed processing, thus becoming an efficient data transmission mechanism. IP multicast is the first proposed Internet multicast solution, but it has not been widely deployed due to many reasons such as technology and market. In order to avoid the problem of IP multicast deployment, the relevant research proposed the application layer multicast. In order to improve the stability and scalability of the multicast transmission, the researchers further put forward the seeding of the application layer based on the proxy. In overlay multicast, the proxy servers, which are deployed strategically in the Internet, become the infrastructure for building an overlay network, and the user hosts receive the multicast service by accessing the proxy server (Yang and Shang, 2013). At present, the system structure of proxy application layer multicast has gradually become one of the hot spots in the research of multicast architecture. It is also considered to be a long-term solution to the future Internet multicast (Zhang et al., 2016).

Meanwhile, with the wide application of cloud computing, there are many low cost and reliable cloud nodes on the current Internet which can be used for data distribution. In this paper, an ultra-reliable and low-latency solution assisted by Cloud Computing for multi-source multimedia conference system, called UCCMCS, is designed and implemented. In UCCMCS, there are two-tiers in its data distribution structure which combines the advantages of cloud computing. And according to the requirements of ultra-reliability and low-latency, a bandwidth optimization model is proposed to improve the transmission efficiency of multimedia data so as to reduce the delay of the system. In order to improve the reliability of data distribution, we use the help of cloud computing node to carry out the retransmission of lost data. And then performance evaluation experiments are designed to validate the performance of our UCCMCS. Compared with the solution using traditional multicast technology, the experimental results show UCCMCS could improve the reliability and reduce the latency of the multimedia data distribution in multimedia conference system. Our work sheds light for distributed application design in multimedia conference and Cloud computing.

The structure of this paper is outlined below: the related works is given in section 2. The Bandwidth problem description is presented in Section 3. In Section 4, we present a deep learning solution and optimization algorithm for Bandwidth Problem. In Section 5, we present the numerical simulations for performance evaluation. We conclude the paper in Section 6.

2. RELATED WORKS

In recent years, some researchers have attempted to combine the cloud computing and P2P (relationship between P2P and tree-type application-layer multicast has been described above) on the purpose of improving the data-distribution performance. S. Islam proposed a border cloud infrastructure (Islam and

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