ABSTRACT

Cloud multimedia services provide an efficient, flexible, and scalable data processing method and offer a solution for the user demands of high quality and diversified multimedia. As intelligent mobile phones and wireless networks become more and more popular, network services for users are no longer limit to the home. Multimedia information can be obtained easily using mobile, allowing users to enjoy ubiquitous network services devices. Considering the limited bandwidth available for mobile streaming and different device requirements, this study presented a network and device-aware Quality of Service (QoS) approach that provides multimedia data suitable for a terminal unit environment via interactive mobile streaming services, further considering the overall network environment and adjusting the interactive transmission frequency and the dynamic multimedia transcoding, to avoid the waste of bandwidth and terminal power. Finally, this study realized a prototype of this architecture to validate the feasibility of the proposed method. According to the experiment, this method could provide efficient self-adaptive multimedia streaming services for varying bandwidth environments.

LIST OF FIGURES

LIST OF ABBREVIATIONS

S.no	Acronyms	Abbreviation
1	**QoS**	Quality of service
2	**UPM**	User Profile Module
3	**NDAMM**	Network and Device Aware Multilayer Management
4	**DNEM**	Dynamic Network Estimation Module
5	**NDBPM**	Network and Device Aware Bayesian Prediction Module
6	**ACMCS**	Adaptive Communication Multilayer Content Selection

CHAPTER-1

INTRODUCTION

CLOUD computing has become the development trend of the Internet . Massive amounts of data are calculated simultaneously and user demands are met rapidly, based on the architecture of cloud resource virtualization. The basic technique of cloud computing is derived from distributed computing and grid computing. In recent years, as mobile devices have developed rapidly, users have been able to access network services anywhere and at any time. Especially with the development of 3G and 4G networks, multimedia services have become universal application services. The media cloud is an extended technology developed to meet the fast-changing information industry and user's demand for higher multimedia quality and various terminal units. It realizes multimedia computing, storage space configuration, and sharing services based on the powerful arithmetic capability of cloud computing . As intelligent mobile devices and multimedia technology have begun to popularize, the public has started to use mobile devices such as intelligent mobile phones or tablets to view multimedia videos by means of streaming . Generally speaking, accessing multimedia video services through networks is no longer a problem. The major video platforms, such as Youtube and Amazon, have good management styles and provide users to share multimedia videos easily with diversified services.

CHAPTER 2
LITERATURE SURVEY

2.1) Media Cloud: When Media Revolution Meets Rise of Cloud Computing

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Media cloud provides a cost-effective and powerful solution for the coming tide of the media consumption. Based on previous summary of the recent work on media cloud research, in this section, we first make some suggestions on how to build the media cloud, and then propose some potentially promising topics for future research.

2.2) Multimedia cloud computing

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Date of publication: 19 April 2011

This article introduces the principal concepts of multimedia cloud computing and presents a novel framework. We address multimedia cloud computing from multimedia-aware cloud (media cloud) and cloud-aware multimedia (cloud media) perspectives. First, we present a multimedia-aware cloud, which addresses how a cloud can perform distributed multimedia processing and storage and provide quality of service (QoS) provisioning for multimedia services. To achieve a high QoS for multimedia services, we propose a media-edge cloud (MEC) architecture, in which storage, central processing unit (CPU), and graphics processing unit (GPU) clusters are presented at the edge to provide distributed parallel processing and QoS adaptation for various types of devices.

2.3) Seamless Support of Multimedia Distributed Applications Through a Cloud

Stefano Ferretti, Vittorio Ghini, Fabio Panzieri, Elisa Turrini
Department of Computer Science, University of Bologna

We are planning to carry out a validation and a thorough experimental assessment of the performance of our cross-layer architecture as soon as its development will be completed. In addition, we would like to extend our study on this class of architectures to investigate the impact of dependability issues, such as fault tolerance and security, on their design.

2.4) Distributed Scheduling Scheme for Video Streaming over Multi-Channel Multi-Radio Multi-Hop Wireless Networks

Liang Zhou, Xinbing Wang, Wei Tu, Gabriel-MiroMuntean, and Benoit Geller

In this paper, we have developed fully distributed scheduling schemes that jointly solve the channel-assignment, rate allocation, routing and fairness problems for video streaming over multi-channel multi-radio networks. Unlike conventional scheduling schemes focus on optimal system throughput or scheduling efficiency, our work aims at achieving minimal video distortion and certain fairness by jointly considering media-aware distribution and network resource allocation. Extensive simulation results are provided which demonstrate the effectiveness of our proposed schemes.

2.5) Toward Optimal Deployment of Communication-Intensive Cloud Applications

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In this paper, we propose a clustering-based cloud node selection approach for communication-intensive cloud applications. By taking advantage of the cluster analysis, our approach not only considers the QoS values of cloud nodes, but also considers the relationship (*i.e.,* response time) between cloud nodes. Our approach systematically combines cluster analysis and ranking methods. The experimental results show that our approach outperforms the existing ranking approaches.

2.6) Playback-Rate Based Streaming Services for Maximum Network Capacity in IP Multimedia Subsystem

Chin-Feng Lai, Member, IEEE, and Min Chen, Senior Member, IEEE

This paper proposed cross-layer playback-rate based streaming services, which can maintain network transmission quality and receive data before playback reliably in IMS networks with many users. The experimental results show that the services could reduce the overall network load without the occurrence of dropped packets.

CHAPTER 3

SYSTEM REQUIREMENTS

3.1 REQUIREMENT SPECIFICATION

3.1.1 SOFTWARE REQUIREMENTS

1. Language - Java (JDK 1.7)
2. OS - Windows 7 32bit
3. MySql Server
4. Android ADK

3.1.2 HARDWARE REQUIREMENTS

1. 1 GB RAM
2. 80 GB Hard Disk
3. Above 2GHz Processor
4. Android Mobile With GPRS

CHAPTER 4

SYSTEM ANALYSIS

4.1 EXISTING SYSTEM

In the previous service, the mobile device side exchanges information with the cloud environment, so as to determine an optimum multimedia video. Scholars have done numerous researches toward conventional platform (CDN) to store different movie formats in a multimedia server, to choose the right video stream according to the current network situation or the hardware calculation capabilities. To solve this problem, many researchers have attempted dynamic encoding to transfer media content, but still cannot offer the best video quality.

DISADVANTAGES

- Video communication over mobile broadband networks today is challenging due to limitations in bandwidth and difficulties in maintaining high reliability, quality, and latency demands imposed by rich multimedia applications.

- Increasing in network traffic by the use of multimedia content and applications.

4.2 PROPOSED SYSTEM

The proposed system provided an efficient interactive streaming service for diversified mobile devices and dynamic network environments. When a mobile device requests a multimedia streaming service, it transmits its hardware and network environment parameters to the profile agent in the cloud environment, which records the mobile device codes and determines the required parameters. Then transmits them to the Network and Device-Aware Multi-layer Management (NDAMM). The NDAMM determines the most suitable SVC code for the device according to the parameters, and then the SVC Transcoding Controller (STC) hands over the transcoding work via map-reduce to the cloud, in order to increase the transcoding rate. The multimedia video file is transmitted to the mobile device through the service.

ADVANTAGES

- The network bandwidth can be changed dynamically.
- This method could provide efficient self-adaptive multimedia streaming services.

CHAPTER 5

SYSTEM IMPLEMENTATION

THE PROJECT ENTITLED AS "**NETWORK AND DEVICE AWARE QOS APPROACH FOR CLOUD BASED MOBILE STREAMING**" DEVELOPED USING JAVA.

5.1 SYSTEM ARCHITECTURE

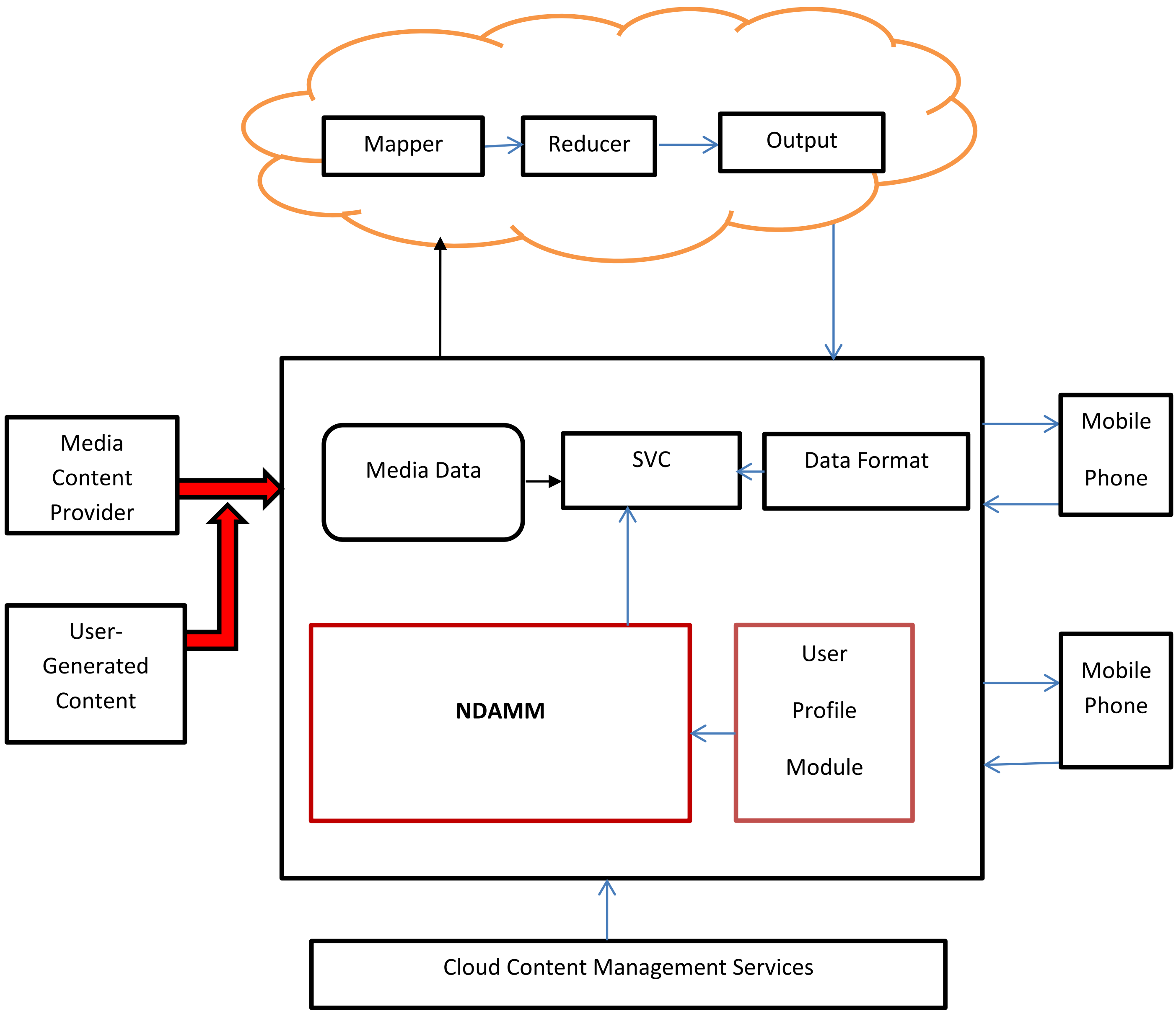

FIG 5.1 SYSTEM ARCHITECTURE

5.2 MODULES

1. User Profile Module
2. Network and Device Aware Multi-Layer Management (NDAMM)
3. Dynamitic Network Estimation Module (DNEM)
4. Network and Device-Aware Bayesian Prediction Module (NDBPM)
5. Proposed Adaptive Communication and Multi-Layer Content Selection (ACMCS)

5.3 MODULE DESCRIPTION

5.3.1 User Profile Module

The profile agent is used to receive the mobile hardware environment parameters and create a user profile. The mobile device transmits its hardware specifications in XML-schema format to the profile agent in the cloud server. The XML-schema is metadata, which is mainly semantic and assists in describing the data format of the file. The meta data enables non-owner users to see information about the files, and its structure is extensible. However, any mobile device that is using this cloud service for the first time will be unable to provide such a profile, so there shall be an additional profile examination to provide the test performance of the mobile device and sample relevant information. Through this function, the mobile device can generate an XML-schema profile and transmit it to the profile agent. The profile agent determines the required parameters for the XML-schema and creates a user profile, andthen transmits the profile to the DAMM for identification.

FIG 5.3.1 USER PROFILE MODULE

5.3.2 Network and Device Aware Multi-Layer Management (NDAMM)

The NDAMM aims to determine the interactive communication frequency and the SVC multimedia file coding parameters according to the parameters of the mobile device. It hands these over to the STC for transcoding control, so as to reduce the communication bandwidth requirements and meet the mobile device user's demand for multimedia streaming. It consists of a listen module, a parameter profile module, a network estimation module, a device-aware Bayesian prediction module, and adaptive multi-layer selection. The interactive multimedia streaming service must receive the user profile of the mobile device instantly through the listen module. The parameter profile module records the user profile and determines the parameter .This is provided to both the network estimation module and the device-aware Bayesian prediction module to predict the required numerical values Rw and Rh represent the width and height of the supportable resolution for the device, CP avg and CP represent the present and average CPU operating speed. Db and Db rate represent the existing energy of the mobile device and energy consumption rate, and BW, BW avg, and BW std represent the existing, average and standard deviation values of the bandwidth. When this parameter form is maintained, the parameters can be transmitted to the network estimation module and the device-aware Bayesian prediction module for relevant prediction.

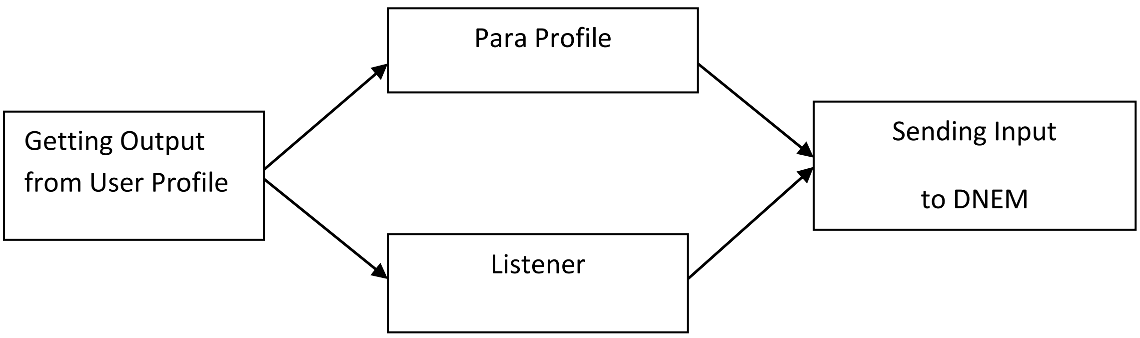

FIG 5.3.2 NDAMM MODULE

5.3.3 Dynamitic Network Estimation Module (DNEM)

The DNEM is mainly based on the measurement-based prediction concept; however, it further develops the Exponentially Weighted Moving Average (EWMA). The EWMA uses the weights of the historical data and the current observed value to calculate gentle and flexible network bandwidth data for the dynamic adjustment of weights. In order to determine the precise network bandwidth value, the EWMA filter estimates the network bandwidth value in which is the estimated bandwidth of the No. t time interval, is the bandwidth of the No. time interval, and is the estimation difference. For different mobile network estimations, this study considered the error correction of estimation and the overall standard difference and estimated the different bandwidths by adjusting the weights among which, is the moving average weight and is the standard deviation weight. When the prediction error is greater than, the system shall reduce the weight modification of the predicted difference; relatively, when the prediction error is less than, the system shall strengthen the weight modification of the predicted difference. When the changed bandwidth of the system is greater than the standard difference, the predicted . If the present mobile network is in a stable state, its hall conform to the following equation among which, is the coefficient of the evaluated standard deviation. The value is almost 1.128. If the network bandwidth value of this time cycle is within plus-minus three standard deviations of the standard value, the present mobile network will be in a stable state; otherwise it will be in a fluctuating state.

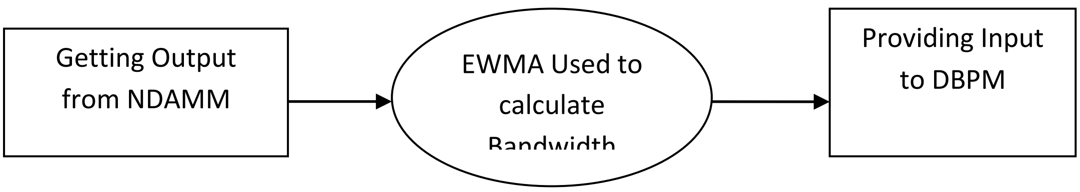

FIG 5.3.2 DNEM MODULE

5.3.4 Network and Device-Aware Bayesian Prediction Module (NDBPM)

The SVC hierarchical structure provides scalability of the temporal, spatial and quality dimensions. It adjusts along with the FPS, resolution and video variations of a streaming bitrate: however, the question remains of how to choose an appropriate video format according to the available resources of various devices. Hereby, in order to conform to the real-time requirements of mobile multimedia, this study adopted Bayesian theory to infer whether the video features conformed to the decoding action. The inference module was based on the following two conditions:

• The LCD brightness does not always change This hypothesis aims at a hardware energy evaluation. The literature states that TFT LCD energy consumption accounts for about 20%–45% of the total power consumption for different terminal hardware environments. Although the overall power can be reduced effectively by adjusting the LCD, with multimedia services, users are sensitive to brightness; they dislike video brightness that repeatedly changes. As changing the LCD brightness will influence the energy consumption evaluation value, the LCD brightness of the mobile device is assumed to not able to change at will during multimedia service.

The energy of the mobile device shall be sufficient forplaying a full multimedia video Full multimedia servicemust be able to last until the user is satisfied. This assumedcondition is also the next main decision rule.As for the three video parameters of FPS, resolution and bitrate, the bit rate depends on the frame rate and resolution, sothe Bayesian network adopts the frame rate andresolution as the video input features and uses the bit rate as parameter considered.

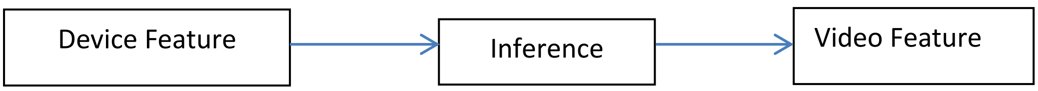

FIG 5.3.4 NDBPM MODULE

5.3.5 Proposed Adaptive Communication and Multi-Layer Content Selection (ACMCS)

When the predicted bandwidth state and the Bayesian predictive network are determined, the cloud system will further determine the communication and the required multimedia video files according to the information.

1) Communication Decision:

A good dynamic communication mechanism can reduce the bandwidth needs and the power consumption of the device resulting from excessive packet transmission, and the transmission frequency can be determined according to the bandwidth and its fluctuation ratio based on such dynamic decision-making. The transmit mode is engaged until the device finds a variation of the transmitted variables that exceeds a threshold. Although the threshold can reduce the communication frequency effectively and precisely, in this mode the mobile device must start up additional threads for continuous monitoring; thus, the load on the device side is increased. When the network bandwidth difference exceeds a triple standard deviation, this indicates the present network is unstable. The overall communication frequency shall incline to frequency to avoid errors; however, when the network bandwidth difference is less than a triple standard deviation, the current network is still in a stable state, and the influence on bandwidth difference can be corrected gradually.

2)SVC Multi-Layer Content Decision:

SVC is an improvement over traditional H.264/MPEG-4 AVC coding, as it has higher coding flexibility. It is characterized by temporal scalability, spatial scalability and SNR scalability, allowing video transmissions to be more adaptable to heterogeneous network bandwidth. The appropriate bandwidth interval was determined, in which the average bandwidth was used as the standard value and each standard deviation was the bandwidth interval segment. A quadruple standard difference is assumed to be the boundary value. As the communication and prediction mechanisms are constructed, the system will correct the overall threshold according to the bandwidth variation gradually, in order to avoid the bandwidth boundary exceeding the practical situation. When the bandwidth interval is completed, it becomes the criterion of the video streaming bit rate. The appropriate resolution and frame rate can then be determined as the streaming data. When the mobile device transmits the current network and hardware features to the cloud environment, the NDAMM will predict the bandwidth at the next time point according to the bandwidth and standard deviation and will identify whether the bandwidth state is stable or not. The DBPM infers whether the multimedia video, at different resolutions and frame rates, can complete smooth decoding and whether the hardware can provide complete video playback services, according to the profile examination and subsequent hardware features. When the Bayesian inference table is completed, the next communication time can be determined, and the SVC multimedia coding applicable for the mobile device can be provided according to the predicted and inferred network and hardware features.

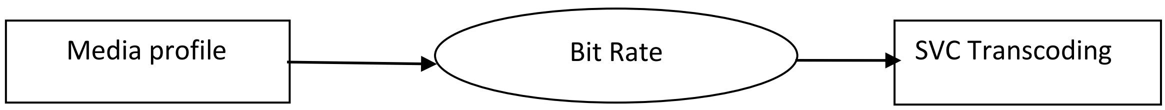

FIG 5.3.5 ACMCS MODULE