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Scalability of Multimedia Streaming Service: A Cross-Layer Perspective

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Abstract: ***Video streaming is in advance popularity among mobile users. The latest mobile devices, such as smart phones and tablets, are well equipped with multiple wireless network devices. In order to continue video streaming quality while reducing the wireless service cost, in this paper, the most favorable video streaming process with multiple links is formulated as a Markov Decision Process (MDP). This function is designed to improve the quality of service (QoS) requirements for video traffic, such as the startup Latency, playback fluency, average playback quality, playback smoothness and wireless service cost. To solve the MDP in real time, we propose an adaptive, best-action search algorithm to obtain a sub-optimal solution. To estimate the performance of the proposed adaptation algorithm, we implemented a test bed using the android mobile phone and the Scalable Video Coding (SVC) codec. Test results demonstrate the probability and effectiveness of the proposed adaptation algorithm for mobile video streaming applications in android application, which outperforms the existing state-of-the-art adaptation algorithms.***

Keywords: QoS, NDAMM

1. Introduction

Cloud computing is that the use of computing resources that ar delivered as a service over a network, generally the Internet [1]. The name comes from the utilization of a cloud-shaped image as an abstraction for the advanced infrastructure it contains in system diagrams. Cloud computing entrusts remote services with a user's knowledge, computer code and computation. The essential technique of cloud computing springs from distributed computing and grid computing[3]. to supply wealthy media services, multimedia system computing has emerged as an interesting technology to come up with, edit, process, and search media contents, cherish pictures, video, audio, graphics, and so on. For multimedia system applications[5] and services over the web and mobile wireless networks, there are sturdy demands for cloud computing thanks to the many quantity of computation needed for serving several web or mobile users at identical time. In recent years, as mobile devices have developed chop-chop, users are ready to access network services anyplace and at anytime. Particularly with the event of 3G and 4G networks, multimedia system services became universal application services. Cloud multimedia system services offer an economical, flexible, and climbable processing technique and supply an answer for the user demands of top quality and varied multimedia system. multimedia system applications and services over wireless networks is difficult because of constraints and heterogeneities cherish restricted battery power, restricted information measure, random time-varying weakening impact, totally different protocols and standards, demanding QoS necessities[2].

Sharing is an integral a part of cloud service. The request of straightforward sharing is that the main reason the multimedia system contents occupy an oversized portion of cloud cupboard space. Conventionally, multimedia system sharing[4]. happens only if the one who shares the contents and therefore the one who is shared with area unit each on-line and have a high-data-rate association. Media is sometimes streamed from recorded files however may be distributed as a part of a live broadcast feed. In an exceedingly live broadcast, the video signal is reborn into a compressed digital signal and transmitted from an online server as multicast, causation one file to multiple users at constant time. Streaming media is transmitted [13] by a server application and received and displayed in period by a shopper application known as a media player. Streaming technologies have improved considerably since the Nineties, once delivery was generally uneven. However, the standard of streamed content remains dependent upon the user's association speed. Streaming media is video or audio content sent in compressed type over the net and vie straight off, instead of being saved to the drive. With streaming media, a user doesnt ought to wait to transfer a file to play it. As a result of the media is distributed in an exceedingly continuous stream of knowledge it will play because it arrives. Users will pause, rewind or fast-forward, even as they might with a downloaded file, unless the content is being streamed live.

Here square measure some benefits of streaming media:

- Makes it potential for users to require advantage of interactive applications like video search and customized playlists.
- Permits content deliverers to watch what guest's square measure look and the way long they're look it.
- Provides associate economical use of information measure as a result of solely the file that is being transferred is that the part that's being watched.
- Provides the content creator with a lot of management over his belongings as a result of the video file isn't keeping on the viewer's laptop. Once the video knowledge is contend, it's discarded by the media player.

Video communication over mobile broadband networks nowadays is difficult thanks to limitations in information measure, totally different device needs and difficulties in maintaining high dependableness, quality, and latency demands obligatory by made multimedia system applications. Because the variety of network users is speedily increasing, information measure insufficiency can occur then network multimedia system services are affected considerably. Differing from general services that have a high acceptance rate for packet loss, multimedia system packets emphasize the correctness, sequence order and period nature of packets. Once a multimedia system video service is applied, the service quality declines greatly whereas making an attempt to satisfy the stress of video transmission. Because the net becomes the final word archive for all of the non-public stuffs like photos, emails, etc and it's mixed with the complete streaming of content, information measure becomes the new drive. This may be the massive and arduous media hurdle. Here have problems with information measure asphyxiation and therefore the ability to possess unlimited knowledge is turning into a subject of heated discourse. Unlimited knowledge through high speed and mobile access is foregone conclusion and it is also attending to be a tremendous media expertise for the patron. Obtaining the content producers, hardware makers and access suppliers to play nicely is wherever the challenge lies. This type of streaming is inevitable, and once customers expertise it and realize it.

2. Literature Survey

A literature review is an evaluative report of information found in the literature related to selected area of study. The review should describe, summarise, evaluate and clarify this literature. It should give a theoretical base for the research and help the author to determine the nature of research.

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

Mingfeng Tan Computer Engineering Department San Jose State Universit A literature review is an evaluative report of information found in the literature related to selected area of study. The review should describe, summaries, evaluate and clarify this literature. It should give a theoretical base for the research and help the author to determine the nature of research.

y San Jose, CA, U.S. mingfeng.tan@gmail.com 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[16], and then propose some potentially promising topics for future research.

b) Multimedia cloud computing Digital Object Identifier 10.1109/MSP.2011.940269 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[9]. 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.

c) 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.

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

Liang Zhou, Xinbing Wang, Wei Tu, Gabriel-Miro Muntean, and Benoit Geller,In this paper, we have developed fully distributed scheduling schemes that jointly solve the channel-assignment, rate allocation, and 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.

e) Toward Optimal Deployment of Communication-Intensive Cloud Applications

Pei Fan, Ji Wang National Laboratory for Parallel & Distributed ProcessingNational University of Defense Technology Changsha, 410073, P.R.Chinapeifan@nudt.edu.cn,jiwang@ios.ac.cnIn 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[18]. 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.

f) 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.

3. Existing System

All the videos will be stored on server with different format. The network configuration will be considered when the user requests a video to transmit.

Limitations:

- Considers only network configuration.
- Have to maintain many copies of videos.
- Occupies large space.

4. Proposed System

In proposed system, we consider mobile configuration also to transmit a video to user. No duplicate copies will be stored in server. Only one best quality video will be stored and only one copy will be stored. Before transmitting the video, it will be converted to compatible copy for both mobile and network. The conversion will be done on server.

Advantages:

- Calculates dynamic changing network.
- Considers both network and mobile configurations.
- Adapts with the environment.
- Occupies less space.
- Videos will be converted on server side on user request.

5. Architectural Diagram

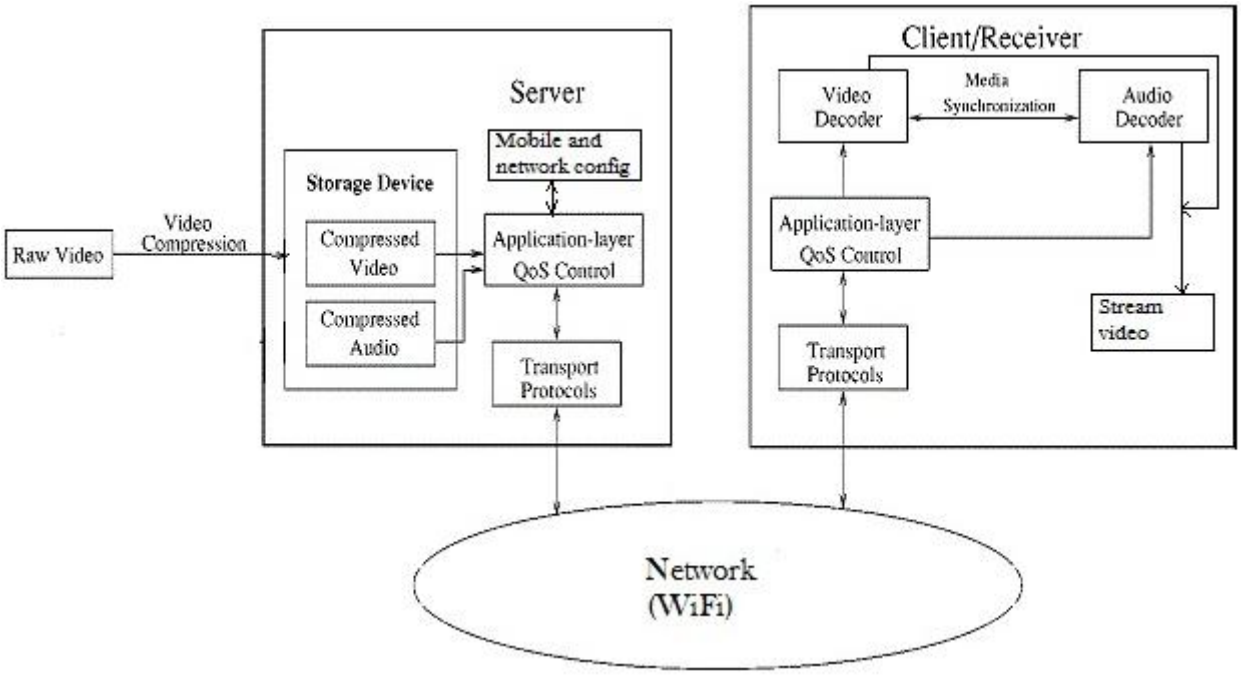


Figure 1: Architecture

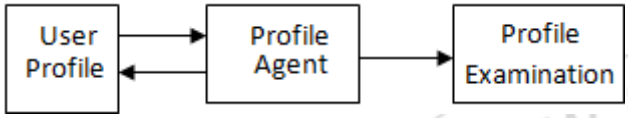
The planned system provided associate economical interactive streaming service for various mobile devices and dynamic network environments. Once a mobile device requests a multimedia streaming service, it transmits its hardware and network atmosphere parameters to the profile agent inside the cloud atmosphere that 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 foremost applicable SVC code for the device in step with the parameters, so the SVC transcoding Controller (STC) hands over the transcoding work via map-reduce to the cloud, therefore on extend the transcoding rate. The multimedia video file is transmitted to the mobile device through the service.

6. Modules

a) User Profile Module
b) Network and Device Aware Multi-Layer Management (NDAMM)
c) Dynamitic Network Estimation Module (DNEM)
d) Network and Device-Aware Bayesian Prediction Module (NDBPM)

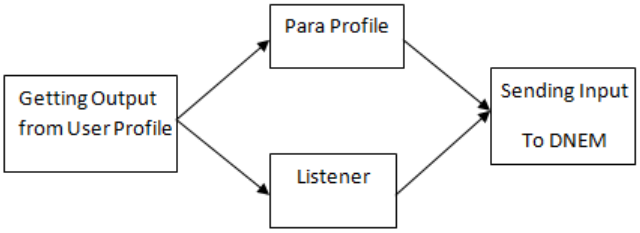
a) User Profile Module:
Only the sure users are allowable to request and access the multimedia system file via Network QoS system. There are 2 choices in it, watch the videos that are hold on within the server and user will transfer the video on to the server. The new user will sign up to the system and enter their details like user name, secret and email id. Solely it's entered that user got the permission to access the file.

The admin will read the user log details like name of the media file viewed, name of the user United Nations agency viewed the file with date and time additionally by coming into the username and secret. Solely the admin will read these details. The profile agent is employed to receive the mobile hardware surroundings parameters and build a user profile. The mobile device transmits its hardware specifications in schema format to the profile agent within the cloud server. The schema is data, that is especially linguistics and in describing the information format of the file. a further profile examination is required to supply the take a look at performance of the mobile device and sample relevant data. Through this operate, the mobile device will generate a schema profile and transmit it to the profile agent. The profile agent determines the desired parameters for the schema and creates a user profile, so transmits the profile to the DAMM for identification.



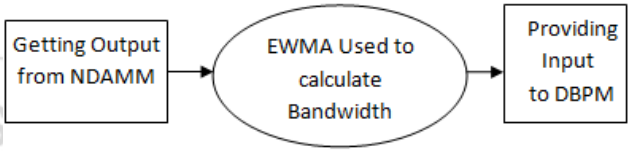
b) Network and Device Aware Multi-Layer Management (NDAMM):

The NDAMM aims to see the interactive communication frequency and also the SVC transmission file committal to writing parameters per the parameters of the mobile device. It hands these over to the STC for transcoding management, therefore on scale back the communication information measure needs and meets the mobile device user's demand for transmission streaming. It consists of a listen module, a parameter profile module, a network estimation module, a device-aware theorem prediction module, and adaptive multi-layer choice. The multimedia service should receive the user profile of the mobile device instantly through the listen module. The profile module records user profile and determines the parameter this can be provided to each the network estimation module and also the device-aware theorem prediction module to predict the desired numerical values. Rw and Rh represent the dimension and height of the endurable resolution for the device, CP avg and CP represent this and average hardware operative speed. Decibel and decibel rate represent the prevailing energy of the mobile device and energy consumption rate, and BW, BW avg, and BWstd represent the prevailing, average and variance values of the information measure. Once this parameter type is maintained, the parameters may be transmitted to the network estimation module and also the device-aware theorem prediction module for relevant prediction.



c) Dynamitic Network Estimation Module (DNEM)

The DNEM is principally supported the measurement-based prediction thought, but it more develops the Exponentially Weighted Moving Average or EWMA. The EWMA uses the weights of the historical knowledge and also the current ascertained worth to calculate light and versatile network information measure knowledge for the dynamic adjustment of weights. So as to see the precise network information measure worth, the EWMA filter estimates the network information measure worth within which is that the calculable information measure of the t amount is that the total of information measure of the t-1 amount, and also the estimation distinction. Once the prediction error is larger than the error boundary, the system shall remove modification of the anticipated distinction. Once the prediction error is a smaller amount, the system shall strengthen the burden modification of the anticipated distinction. Once the modified information measure of the system is larger than the quality distinction, the anticipated weight can increase because the corrected worth of the quality deviation is reduced.



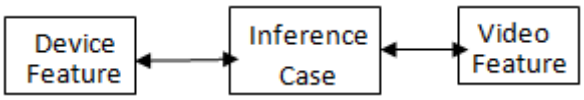
d) Network and Device-Aware Bayesian Prediction Module (NDBPM)

The SVC hierarchical data structure provides quantifiability of the temporal, spatial and quality dimensions. This module determines the way to select Associate in nursing applicable video format in line with the accessible resources of assorted devices. For that purpose, the study adopted Bayesian theory to infer whether or not the video options conformed to the secret writing action. The abstract thought module was supported the subsequent 2 conditions:

- The alphanumeric display brightness doesn't continuously modification. User's square measure sensitive to brightness, they dislike video brightness that repeatedly changes.
- The energy of the mobile device shall be sufficient for enjoying a full transmission video full transmission service must be ready to last till the user is glad. The bit rate depends on the frame rate and determination.

7. Conclusion

After conducting various tests we conclude that, In this paper investigated the challenges in transmission streaming. For mobile transmission streaming services, a way to give applicable transmission files in step with the network and hardware devices is a noteworthy subject. during this study, a collection of adaptive networks and a tool aware QoS approach for interactive mobile streaming was projected, which give economical self-adaptive transmission streaming services for varied information measure environments. Supported the device parameters and information measure the acceptable file format is chosen. Thus the facility and information measure are with efficiency utilized. This adjusts the interactive transmission frequency and also the dynamic transmission transcoding, to avoid the waste of information measure and terminal power.



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