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REAL TIME VIDEO STREAMING PLATFORM DEVICE FOR MOBILE NETWORKS

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Abstract: Cloud multimedia services provide a capable, flexible, and scalable data processing method and offer a elucidation for the user demands of high quality and diversify multimedia. Generally speaking, accessing multimedia video services through networks is no longer a problem. Multimedia information can be obtained easily using mobile devices and allowing users to enjoy network services everywhere. 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 multimedia applications. The video quality version can only be manually selected by users and such decision can be error-prone. Considering the limited bandwidth available for different devices for mobile streaming this method could provide efficient self-adaptive multimedia streaming services for varying bandwidth environments.

***Index Terms* – Self adaptive streaming , Cloud Computing , Automatic mobile parameter retrieval .**

I. INTRODUCTION

Cloud computing is the delivery of different services through the Internet. These resources include tools and applications like data storage, servers, databases, networking, and software. Rather than keeping files on a proprietary hard drive or local storage device, cloud-based storage makes it possible to save them to a remote database. As long as an electronic device has access to the web, it has access to the data and the software programs to run it.

Scalable Video Coding Technique:

Scalable Video Coding (SVC) is an international standard technique for video compression. It is an extension of H.264 Advanced Video Coding (AVC). SVC standardizes the encoding of a high-quality video bitstream that also contains one or more subset bitstreams. A subset video bitstream is derived by dropping packets from the larger video to reduce the bandwidth required for the subset bitstream.

The objective of the SVC standardization has been to enable the encoding of a high-quality video bitstream that contains one or more subset bitstreams that can themselves be decoded with a complexity and reconstruction quality similar to that achieved using the existing H.264/MPEG-4 AVC design with the same quantity of data as in the subset bitstream.

The following modalities are possible:

- Temporial Scalability
- Spatial Scalability
- SNR/Quality/Fidelity Scalability

a. Temporial Scalability :

In temporal scalability the motion compensation dependencies are structured so that complete pictures can be dropped from the bitstream. It is already enabled by H.264/MPEG-4 AVC. SVC has only provided supplemental enhancement information to improve its usage.

b. Spatial Scalability:

In spatial scalability video is coded at multiple spatial resolutions. The data and decoded samples of lower resolutions can be used to predict data or samples of higher resolutions in order to reduce the bit rate to code the higher resolutions.

c. SNR/Quality/Fidelity Scalability:

In this scalability video is coded at a single spatial resolution but at different qualities. The data and decoded samples of lower qualities can be used to predict data or samples of higher qualities in order to reduce the bit rate to code the higher qualities.

II. LITERATURE REVIEW

Chin-Feng Lai, Honggang Wang, Han-Chieh Chao, and Guofang Nan [1], in their research used DNEM and DBPM for the prediction of network and hardware features, and the communication frequency and SVC multimedia streaming files most suitable for the device environment were determined according to these two modules. This model also proposed for a device aware QoS approach for interactive mobile streaming.

Jian Wang [2], proposed a cellular video live streaming machine with Wi-Fi/4G cell smart phone to seize video and disseminate. The results suggests that this system implements the function of video capturing in terminal, deciphering and encoding uncooked records, media playing, real-time streaming media transmission and so on.

Cong Wang, Michael Zink [3], in their research investigated to what extent the realtime video encoding clouds can be powered by renewable energy sources.They showed that video encoding tasks are suitable for execution on clouds that are powered by a combination of renewable and grid energy sources. With the use of their power management policies, grid energy usage can be reduced by 73–83%, which leads to electricity cost reductions of 14–28% compared to unlimited non-renewable power.

Andreas Gerstlauer [4], their reasearch objective is to deal with this mission inside the context of video shipping over an Autonomous Aerial Vehicle network.This community suffers from limited bandwidth and delay constraints of real-time video streaming under time-various wireless channel situations. Hence, they designed a low complexity real-time video transmission protocols which might be suitable for such structures.

Jiangchuan Liu [5], proposed a scheduling set of rules that makes adaptive offloading decisions in quality granularity in dynamic Wi-Fi community conditions and verify its effectiveness through trace-driven simulations. This paper similarly present case research with superior cell systems and sensible packages to demonstrate the superiority of their solution and the vast advantage of the approach over baseline techniques.

III. PROPOSED WORK

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 transmit to the Qos Management (QosM). The QosM determines the most suitable SVC code for the deviceaccording to the parameters and then the SVC Transcoding Controller (STC) hands over the Trans coding work via map-reduce to the cloud, in order to increase the Trans coding 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.

IV. IMPLEMENTATION

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 profile agent determines the required parameters for the XML-schema and creates a user profile, and then transmits the profile to the DAMM for identification.

3.2 Web Service Connection

When web methods are invoked from inside Android application, the application gets back the data from the server in the form of XML. The response which has been received can be parsed and rendered in the application as needed. SOAP is a protocol specification for exchanging structured information in the implementation of Web Services in computer networks.

3.3 Bandwidth Estimation

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 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 devices; CPavg 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, BWavg, and BWstd 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.

3.4 Scalable Video Conversion

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 weight will increase as the corrected value of the standard deviation is reduced. The predictor formula for the overall mobile network quality uses the standard normal state value range concept of plus-minus three standard deviations of statistics, referring to identify the stable or unstable state of the current mobile network. If the present mobile network is in a stable state, it shall 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.

3.5 Streaming

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 bit rate: 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 for playing a full multimedia video full multimedia service must be able to last until the user is satisfied. This assumed condition is also the next main decision rule.

As for the three video parameters of FPS, resolution and bit rate, the bit rate depends on the frame rate and resolution, so the Bayesian network adopts the frame rate and resolution as the video input features and uses the bit rate as parameter considered.

3.6 Output Prediction

There are several objective video quality metrics like the peak signal- to-noise ratio (PSNR) and VQM metrics that can be used to analysis the performance of various video coding techniques. The PSNR is widely used because of its simplicity to measure the performance of several video coding techniques.

Peak Signal-to-noise Ratio (PSNR)

The term peak signal-to-noise ratio (PSNR) is an expression for the ratio between the maximum possible value (power) of a signal and the power of distorting noise that affects the quality of its representation. Because many signals have a very wide dynamic range, (ratio between the largest and smallest possible values of a changeable quantity) the PSNR is usually expressed in terms of the logarithmic decibel scale.

The SVC technique provides better video coding quality than the MPEG-4 and MPEG-2 because SVC has a higher PSNR values when compared to MPEG-4 and MPEG-2. PSNR is most commonly used to estimate the efficiency of compressors, filters, etc. The larger the value of PSNR, the more efficient is a corresponding compression or filter method.

V. RESULTS AND DISCUSSION

If the user already has an account ,then user had to enter the username and password or the user has to register a new account through sign up page.

Fig.1 Registration Page

After signing in, the mobile device parameters are recorded. These parameters are transmitted to QoS Management which applies the SVC code according to the parameters. The SVC Transcoding Controller (STC) hands over the Trans coding work via map-reduce to the cloud, in order to increase the Trans coding rate.

For different users the network bandwidth can be changed ,so the quality of video will be varied according to their mobile device parameters and video will be transcoded or encoded and stored in a cloud environment.

Fig.2 Mobile Device Parameter

Choose a file that you want to upload in the cloud server. Once your file is added click upload. It Uploads the file according to the mobile device parameter such as bandwidth, phone type, network name, sim state etc the videos are stored in a cloud environment.

Fig.3 Original Video

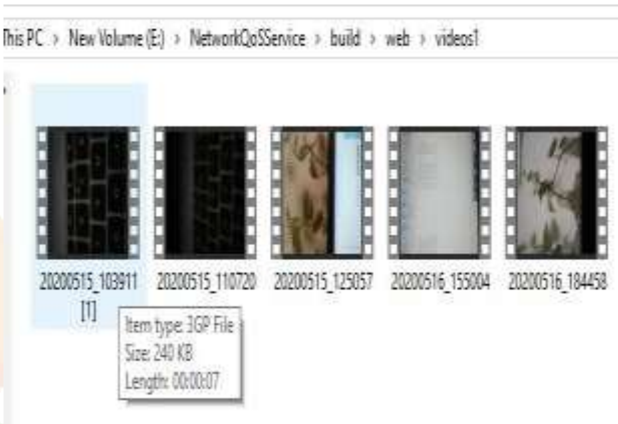

Fig.4 Transcoded Video

X- Axix Name of the algorithm
Y-Axix PSNR values

Fig.5 PSNR For The Transcoded Video With Various Video Compression Techniques

Table 1 Performance Analysis Of Various Video Coding Techniques With PSNR

CODEC / VIDEOS	PSNR		
	MPEG - 2	MPEG - 4	SVC
20200515_103911	24.965339	24.910642	24.98131
20200515_110720	29.745664	29.616621	29.780821
20200515_125057	24.208879	24.153385	24.226359
20200516_153806	30.694473	30.539502	30.7266
20200516_155004	28.662713	28.874075	28.730792
20200521_115504	19.749685	19.780548	19.784209
20200604_111604	31.117176	30.93418	31.176971

VI. CONCLUSION

In this study self adaptive multimedia streaming services of cloud based mobile streaming was proposed.The test results have shown that there is no packet loss experiencing by the client during the transmission of the streaming video. However some other parameters suggested a bit lower Qo S received by the smart phone compared to its original quality before the transmission. The developed application in the mobile phone has shown that it can provide the real-time schedule of events to the users, which will give the users more convenience access to the events that they are interested in.

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