IMPROVING QUALITY OF VIDEOS IN VIDEO STREAMING USING FRAMEWORK IN THE CLOUD

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ABSTRACT

Video streaming has become increasingly popular with commercial video streaming applications such as YouTube accounting for a large quantity of Internet traffic. Using the cloud, user can stream any video from any video provider service to social network services. User, while streaming some type of video in wireless network over the internet, traffic will occur in that streaming. Because of this traffic, we get a poor service quality of video streaming such as long buffering time and intermittent disruptions. In this paper, we propose a new mobile video streaming framework, AMES- cloud has two main parts: adaptive mobile video streaming (AMoV) and efficient social video sharing (ESoV). AMoV and ESoV are to construct a private agent for improve the efficiency of video streaming. In AMoV let her private agent adaptively adjust her streaming flow with salable coding techniques. Likewise ESoV observe the social networks interactions among the different users, and their private prefetch the video content. We implement the AMES-framework in this paper, efficiently to provide adaptive video streaming and video sharing based on social network.

Keywords: AMES, Adaptive video streaming, Cloud Computing, Scalable video coding, social video sharing, video cloud(VC), video base(VB).

I.INTRODUCTION

Cloud Computing is a technology that uses the internet and to maintain data and applications in central remote servers. It allows consumers and businesses to use applications without installation and access their personal files at anytime and anywhere with internet access.

For example of cloud computing is Yahoo email, Gmail, or Hotmail etc. All you need is just an internet connection and you can start sending emails. The server and email management software is all on the cloud (internet) and is totally managed by the cloud service provider Yahoo, Google etc. Cloud computing is broken down into three segments: application, storage and connectivity. Each segment serves a different purpose and offers different products for businesses and individuals around the world.

Today, video streaming is one of the most popular services on the Internet[1]. The increasing demand for video streaming has meant video constitutes a large portion of the total data traffic on the Internet. Video streaming means divide the whole videos into number of segment and then transmitted the segment into client [1]. While transmitting the videos in server, client side can automatically create the buffer for storing the divide segment. If one buffer is full, video can start to play and automatically create another buffer for storing remaining segment.

Video data are usually encoded as frames to be displayed at fixed frequencies, for example, 1 Mbps displayed at 30 frames per second. As video data arrives at the client, data is placed into a buffer to be decoded and displayed on the screen at the right time.

A client buffer can be used to alleviate degradations caused by unwanted changes in data rate [4]. Packets are temporarily stored at the client buffer in order to smooth out bandwidth variation. The role of the client buffer in video streaming. The fill rate is the rate data enters the client buffer and the drain rate is the rate the playout drains from the client buffer.

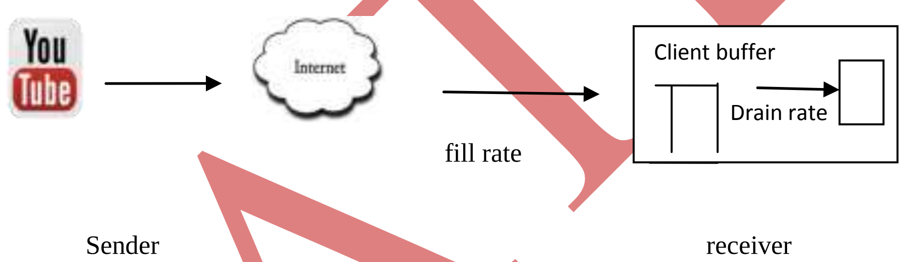

Fig.1. video streaming system, showing video sender and video receiver, with client buffer

As video data arrives at client side from the server, data put into the client buffer at the fill rate then pulled out at the drain rate and is decoded and displayed. With buffered data, the receiver is able to smooth over temporary drops in the received rate.

Choosing an appropriate size of buffer is important. If the buffer is too small, when TCP congestion control reduces the fill rate below the drain rate, it causes the buffer to empty and results in unwanted pauses in the video playout. On the other hand, if the buffer is too large then users have to wait extra time when filling the buffer before watching the video.

The social network services (SNS) on the mobile networks is becoming increasingly popular. In SNS's mobile users might post, comment and share videos which can be viewed and by his/her friends.

So, we are interested to extend the relationship between the mobile users and their SNS activities in order to prefetch the first part of the video during streaming for the users who have not seen the video yet. It will be done by the background job supported by the agents of cloud so when the user clicks the video, it will start playing instantly.

In this paper, to designed and implemented an adaptive video streaming and effective sharing of videos framework for users. Here it constructs a private agent for each mobile users in cloud computing environments. For adaptive video streaming, we adjust the bit rate for each users using scalable video coding. The private agents will keep track of the feedback information on the link status. They are dynamically initiated and optimized in the cloud computing platform. For the efficient video sharing part the users are provided with the instant playing of shared video by prefetching the video clips in advance from the private agent to the local storage of the mobiles..

The rest of the paper includes in section II. Section III, & IV includes related work and cloud frameworks(Adaptive mobile video streaming and social video sharing and prefetching). Section V & VI includes conclusion and references at the last.

II.RELATED WORK

There have been many studies on how to improve the service quality of mobile video streaming on two aspects:

Scalability: Video streaming services should support a wide spectrum of mobile devices [2]; they have different video resolutions, different computing powers, different wireless links and so on. Also, the available link capacity of a device may vary over time and space depending on its signal strength, other users traffic in the same cell, and link condition variation. Storing multiple versions (with different bit rates) of the same video content may incur high overhead in terms of storage and communication.

To address this issue, the Scalable Video Coding (SVC) technique (Annex G extension) of the H.264 AVC video compression standard [8], a video can be decoded/played at the lowest quality if only the BL is delivered. However, the more ELs can be delivered, the better quality of the video stream is achieved.

Adaptability: Traditional video streaming techniques designed by considering relatively stable traffic links between servers and users perform poorly in mobile environments. Thus the fluctuating wireless link status should be properly dealt with to provide 'tolerable" video streaming services.

To address this issue, we have to adjust the video bit rate adapting to the currently time-varying available link bandwidth of each mobile user. Such adaptive streaming techniques can effectively reduce packet losses and bandwidth waste.

In this paper, we design a adaptive video streaming and prefetching framework for mobile users with the above objectives in mind, dubbed AMES-Cloud. AMES-Cloud constructs a private agent for each mobile user in cloud computing environments, which is used by its two main parts: (i) AMoV (adaptive mobile video streaming), and ESoV (efficient social video sharing).

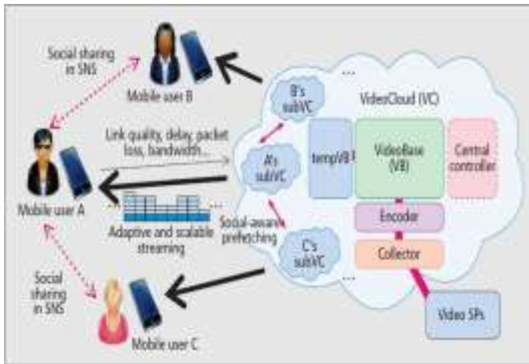

Fig.2. An illustration of the AMES-Cloud framework

III. ADAPTIVE MOBILE VIDEO STREAMING

1.1 Adaptive Video Streaming Techniques

In the adaptive streaming, the video traffic rate is adjusted on the fly so that a user can experience the maximum possible video quality based on his or her link's time-varying bandwidth capacity [6].

There are mainly two types of adaptive streaming techniques, depending on whether the adaptivity is controlled by the client or the server. The Microsoft's Smooth Streaming [5] is a live adaptive streaming service. Video content segmented into small chunks & usually multiple bit rate are encoded, so the client can choose best video bit rate.

Adobe and Apple, suppose produce an app that delivers video longer than ten min or 5MB greater [5], so we developed client-side HTTP adaptive live streaming it will create multiple file for destination to the player change stream to optimize playback.

1.2. Adaptive and Efficient Video Streaming and Sharing in Cloud

The architecture was constructed based on the video service provided in cloud called as "AMES"[3]. The architecture contains

1.2.1. Video service provider (VSP): The originated place of actual video data. It can handle multiple requests at the same time, while coming to the QoS with the mobile users, the VSP does not provide service up to the mark.

1.2.2. Video cloud (VC): The whole video storing and streaming system in the cloud.

1.2.3. Video base (VB): In the VC, there is a large-scale video base (VB), which stores the most of the popular video clips for the video service providers (VSPs).

1.2.4. Temp video base (TVB): It contains the most recently accessed video data and it also contains most frequently accessed video data.

1.2.5.Vagent: It is an agent created for every mobile user who requests for the video service to the video cloud.

1.2.6. Mobile users: The users who are mobile and providing the availability of the service to their location is difficult. The video cloud provides services under two main methodologies adaptive mobile video streaming and efficient mobile video sharing.

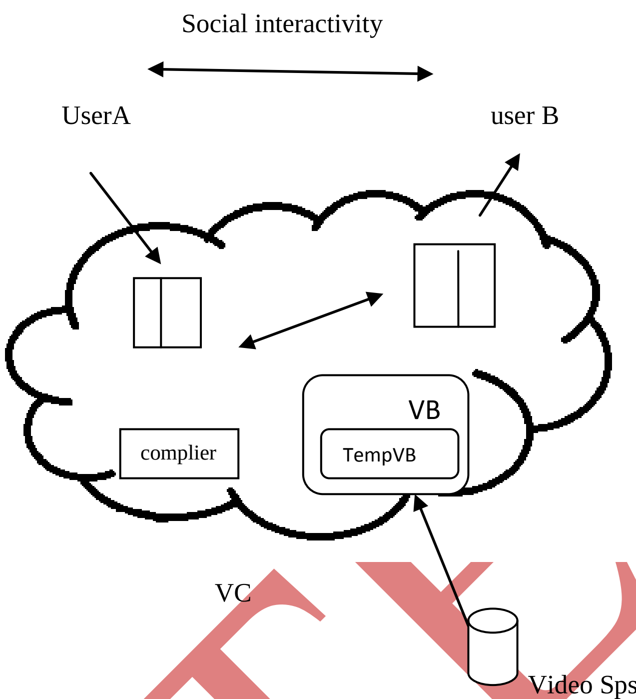

Fig.3. VC architecture

1.3. SVC

Scalable Video Coding (SVC) technique of the H.264 AVC video compression standard defines a base layer (BL) with multiple enhance layers (ELs). . By the SVC, a video can be decoded/played at the lowest quality if only the BL is delivered [8]. However, the more ELs can be delivered, the better quality of the video stream is achieved.

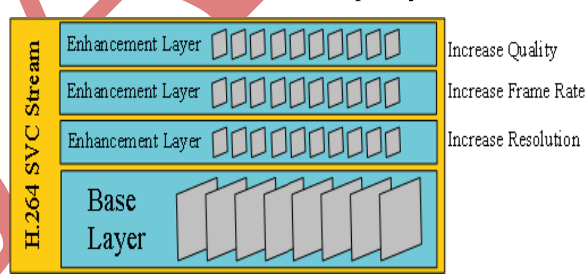

Fig.4. svc Layer System

These sub streams can be encoded by exploiting three scalability features: (i) spatial scalability by layering image resolution (screen pixels), (ii) temporal scalability by layering the frame rate, and (iii) quality scalability by layering the image compression

By using SVC encoding techniques, the server doesn't need to concern the client side or the link quality. Even some packets are lost, the client still can decode the video and display. But this is still not bandwidth-efficient due to the unnecessary packet loss.

So it is necessary to control the SVC-based video streaming at the server side with the rate adaptation method to efficiently utilize the bandwidth.

SVC is an extension to the H.264/AVC standard. It is classified as a layered video codec which can encode a video stream in several types and numbers of enhancement layers on top of the H.264/AVC-compatible base layer. These enhancement layers can be added or removed from the bit stream during streaming without reencoding of the media.

The transmission rate of scalable video streams in the mobile network can be controlled by using TCP- friendly rate control. The streams are encoded using the Scalable Video Coding (SVC) extension of the H.264/AVC standard.

Adding or removing the layers is decided based on the TFRC during varying channel conditions of the mobile network SVC provides a high-quality multimedia communication services in heterogeneous network environment, especially when the client processing power, system resources, and network state unknown. The SVC video stream have flexible scalability, and high quality coding efficiency.

IV. EFFICIENT SOCIAL VIDEO SHARING

In SNSs, users can access and authenticate their profile using internet[2]. So the user first create their account in social activities, once he create account, they can find their friends, request to friends and accept the others friends request. For spreading videos in SNSs, one can post a video in the public, and his/her subscribers can quickly see it; one can also directly recommend a video to specified friend(s); furthermore one can periodically get noticed by subscribed content publisher for new or popular videos.

This method involves three different steps

1. Uploading and Rating videos:
2. User details
3. Rate videos

Uploading and rating Video: Here we can upload the videos and also we can give rating to the videos depending upon the priorities or the usage.

User Details: In this we will maintain the details of the users and also determine the usage of each user.and keep track of the videos the user is requesting and account them.

Rate videos: This will avoiding unexpected videos from users. After accept/reject videos then only user can/cannot view their own videos.

Different strengths of the social activities indicate different levels of probability that a video will be soon watched by the recipient. It defines three prefetching levels regarding the social activities of mobile users:

"Parts": Because the videos that published by subscriptions may be watched by the subscribers with a not high probability, we propose to only push a part of BL and ELs segments, for example, the first 10% segments.

"All": The video shared by the direct recommendations will be watched with a high probability, so we propose to prefetch the BL and all ELs, in order to let the recipient(s) directly watch the video with a good quality, without any buffering.

"Little": The public sharing has a weak connectivity among users, so the probability that a user's friends (followers) watch the video that the user has watched or shared is low. We propose to only prefetch the BL segment of the first time window in the beginning to those who have seen his/her activity in the stream.

V. CONCLUSION

In this paper, we discussed our proposed method of adaptive mobile video streaming and sharing framework, called AMES-Cloud, which efficiently stores videos in the clouds (VC), and to construct private agent (subVC) for each mobile user to try to offer "non-buffering" video streaming adapting to the fluctuation of link quality based on the Scalable Video Coding technique. The focus of this paper is to improve the transmission adaptability and refetching for mobile users. We have a future work of shared videos in social network are securely open to particular friends of users. So, we create a private key for video , to avoid unwanted activities in public networks i.e., social activities.

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