A DYNAMIC FRAMEWORK OF ADVANCED MOBILE VIDEO STREAMING AND SOCIAL VIDEO SHARING IN CLOUDS

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ABSTRACT

The media data has grown over years in all streams of technology. Video and images plays a vital role in communication around the glob. The usage of mobile device along with media has boomed year age of technology. The usage of traditional networking and service providers lacks to provide the quality centered and reliable service to the mobile users concerning with the media data. The vital problems that leads to the poor services from the service providers would be low bandwidth which affects the efficient transfer of video to the user, the disruption of video streaming also occurs due to the low bandwidth. The buffer time of the video over mobile devices which moves from place to place affects the smooth streaming and also sharing of video from one user to another user over social media. Our survey shows the functioning of various methods and architecture which used cloud to provide effective solution for providing better service to the users. AMES is cloud architecture built specially to provide video service to the user. The study has come up with an optimal solution, proposing with video cloud, which collects the video from video service providers and providing the reliable service to the user. While demands on video traffic over mobile networks have been souring, the wireless link capacity cannot keep up with the traffic demand. The gap between the traffic demand and the link capacity, along with time-varying link conditions, results in poor service quality of video streaming over mobile networks such as long buffering time and intermittent disruptions. Leveraging the cloud computing technology, we propose a new mobile video streaming framework, dubbed AMES-Cloud, which has two main parts: AMoV (adaptive mobile video streaming) and ESoV (efficient social video sharing). AMoV and ESoV construct a private agent to provide video streaming services efficiently for each mobile user. For a given user, AMoV lets her private agent adaptively adjust her streaming flow with a scalable video coding technique based on the feedback of link quality. Likewise, ESoV monitors the social network interactions among mobile users, and their private agents try to prefetch video content in advance. We implement a prototype of the AMES-Cloud framework to demonstrate its performance. It is shown that the private agents in the clouds can effectively provide the adaptive streaming, and perform video sharing (i.e., prefetching) based on the social network analysis.

Key Words: Scalable Video Coding, Adaptive Video Streaming, Mobile Networks, Social Video Sharing, Cloud Computing.

Literature Survey

Over the past decade, increasingly more traffic is accounted by video streaming and downloading. In particular, video streaming services over mobile networks have become prevalent over the past few years [1]. While the video streaming is not so challenging in wired networks, mobile networks have been suffering from video traffic transmissions over scarce bandwidth of wireless links. Despite network operators' desperate efforts to enhance the wireless link bandwidth (e.g., 3G and LTE), soaring video traffic demands from mobile users are rapidly overwhelming the wireless link capacity. While receiving video streaming traffic via 3G/4G mobile networks, mobile users often suffer from long buffering time and intermittent disruptions due to the limited bandwidth and link condition fluctuation caused by multi-path fading and user mobility. Thus, it is crucial to improve the service quality of mobile video streaming while using the networking and computing resources efficiently. Recently there have been many studies on how to improve the service quality of mobile video streaming on two aspects: Scalability: Mobile video streaming services should support a wide spectrum of mobile devices; they have different video resolutions, different computing powers, different wireless links (like 3G and LTE) and so on. Also, the available link capacity of a mobile 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 defines a base layer (BL) with multiple enhance layers (ELs). These sub streams can be encoded by exploiting three scalability features: (i) partial 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 the SVC, 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 [2]. 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. Scalable video coding and adaptive streaming techniques can be jointly combined to accomplish effectively the best possible quality of video streaming services. That is, we can dynamically adjust the number of SVC layers depending on the current link status [9] [12].However most of the proposals seeking to jointly utilize the video scalability and adaptability rely on the active control on the server side. That is, every mobile user needs to individually report the transmission status (e.g.,packet loss, delay and signal quality) periodically to the server, which predicts the available bandwidth for each user. Thus the problem is that the server should take over the substantial processing overhead, as the number of users increases.

Cloud computing techniques are poised to flexibly provide scalable resources to content/service providers, and process offloading to mobile users. Thus, cloud data centers can easily provision for large-scale real-time video services as investigated. Several studies on mobile cloud computing technologies have proposed to generate personalized intelligent agents for servicing mobile users, e.g., Cloudlet and Stratus. This is because, in the cloud, multiple agent instances (or threads) can be maintained dynamically and efficiently depending on the time-varying user demands. Recently social network services (SNSs) have been increasingly popular. There have been proposals to improve the quality of content delivery using SNSs. In SNSs, users may share, comment or re-post videos among friends and members in the same group, which implies a user may watch a video that her friends have recommended. Users in SNSs can also follow famous and popular users based on their interests (e.g., an official facebook or twitter

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account that shares the newest pop music videos), which is likely to be watched by its followers.

In this regard, we are further motivated to exploit the relationship among mobile users from their SNS activities in order to prefetch in advance the beginning part of the video or even the whole video to the members of a group who have not seen the video yet. It can be done by a background job supported by the agent (of a member) in the cloud; once the user clicks to watch the video, it can instantly start playing. 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). The contributions of this paper can be summarized as follows: AMoV offers the best possible streaming experiences by adaptively controlling the streaming bit rate depending on the fluctuation of the link quality. AMoV adjusts the bit rate for each user leveraging the scalable video coding. The private agent of a user keeps track of the feedback information on the link status. Private agents of users are dynamically initiated and optimized in the cloud computing platform. Also the real-time SVC coding is done on the cloud computing side efficiently.
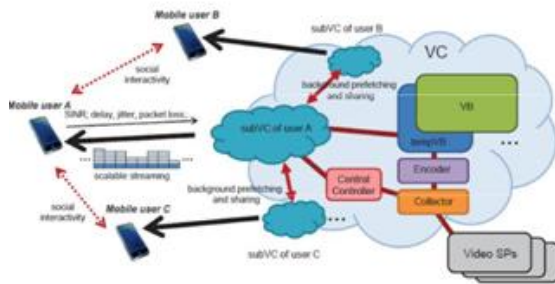
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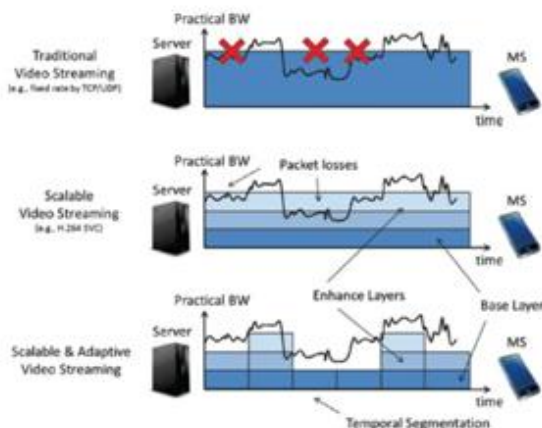
AMES-Cloud supports distributing video streams efficiently by facilitating a 2-tier structure: the first tier is a content delivery network, and the second tier is a data center. With this structure, video sharing can be optimized within the cloud.

Unnecessary redundant downloads of popular videos can be prevented. Based on the analysis of the SNS activities of mobile users, ESoV seeks to provide a user with instant playing of video clips by prefetching the video clips in advance from her private agent to the local storage of her device. The strength of the social links between users and the history of various social activities can probabilistically determine how much and which video will be prefetched.

The era of cloud computing reigns with advancements in technology, the technology provides various services to the human's need and also it urges the more necessity for the emerging technology. Could computing provides a platform for other advanced technologies like big data, mobile computing to inculcate its service and provide the QoS to the customers. The cloud has grown to a vast extend over the period of years. All the services that are provided to the customer are done using could as their backbone, it give vast amount of resources and infrastructure to consumer who acts as vendors to small scale business and cloud could provide services to fully fledged organization with less cost. Organizing the service and extending the service depending upon the growing needs of the customer could be achieved by cloud service and infrastructure[1,5]. The major issue is the resources, while any service needs to be extended, the resources with the service vendor plays a vital role. Investing huge sum of dollars on hardware is just one part of extension, maintaining the hardware along the services provided would carry tons of dollars. Where cloud provides space for extending the services as a service provider and also it can provide infrastructure service to small scale service vendors. In recent years the usage of data has grown to very large extend. The studies shows us that, amount of data generate over the last decade is three times lesser than the amount of data generated in last one year. The era of hardware limitation has vanished, new age has begun the hardware limitation are not considered but the situation turns out that, if the hardware resources are not utilized effectively, maintain the resources becomes very serious problem. The data that is being used among the computing world has faced drastic change. These data occupies large amount of

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data, need very heavy processing powers. All the needed resources such as storage space and processing power are provided by the cloud and can be extended depending upon the service. The problem doesn't rise until these data are transferred on the internet. The data created on the host, should be sent to the cloud for storage

System Architecture:

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. 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 is a live adaptive streaming service which can switch among different bit rate segments encoded with configurable bit rates and video resolutions at servers, while clients dynamically request videos based on local monitoring of link quality. Adobe and Apple also developed client-side HTTP adaptive live streaming solutions operating in the similar manner. There are also some similar adaptive streaming services where servers controls the adaptive transmission of video segments, for example, the Quavlive Adaptive Streaming. However, most of these solutions maintain multiple copies of the video content with different bit rates, which brings huge burden of storage on the server. Regarding rate adaptation controlling techniques, TCP-friendly rate control methods for streaming services over mobile networks are proposed, where TCP throughput of a flow is predicted as a function of packet loss rate, round trip time, and packet size. Considering the estimated throughput, the bit rate of the streaming traffic can be adjusted. A rate adaptation algorithm for conversational 3G video streaming is introduced. Then, a few cross-layer adaptation techniques are discussed, which can

acquire more accurate information of link quality so that the rate adaptation can be more accurately made. However, the servers have to always control and thus suffer from large workload.

Future Enhancement:

Implementing more Dynamic Framework of Advanced Mobile Video Streaming and sharing using cloud environments provides effective and secured data and video sharing among different users.

Conclusion

The cloud computing has been well positioned to provide video streaming services, especially in the wired Internet because of its scalability and capability. For example, the quality-assured bandwidth auto-scaling for VoD streaming based on the cloud computing is proposed, and the CALMS framework is a cloud-assisted live media streaming service for globally distributed users. However, extending the cloud computing-based services to mobile environments requires more factors to consider: wireless link dynamics, user mobility, the limited capability of mobile devices. More recently, new designs for users on top of mobile cloud computing environments are proposed, which virtualize private agents hat are in charge of satisfying the requirements (e.g.QoS) of individual users such as Cloudlets and Stratus. Thus, we are motivated to design the AMES-Cloud framework by using virtual a gents in the cloud to provide adaptive video streaming services.

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