50592 Maria M Sheikh

Transmission of Video with Caching with Retransmission of I-Frame

Abstract

Streaming media (video and audio) and its applications such as video conferencing and Internet audio and video broadcast are popular over the Internet. Real-time digital video transmission over Internet is a challenging problem because it is sensitive to loss and delay. However, video streaming over the internet is difficult because the internet only offers best effort service and cannot guarantee the Quality of Service (QoS) for video. Most video streaming applications transmit UDP packets without congestion control, which disrupts other TCP connections and jams the network.

Mechanisms that support caching of streaming video include PLFU (Partial Least Frequently Used), which suffers from caching storage and transmission losses issues. The PLFU caching server is compelled to cache the entire video stream even though some segments may never be viewed and therefore inevitably runs out of storage space. The PLFU mechanism excessively reserves space for all kinds of frame losses and monitors and recovers from all types of losses. This research enhances the caching ability of PLFU mechanism by selectively storing parts of the video stream on the caching server instead of the entire stream and enabling the server to recover from the more critical I-frame losses that can take care of the rest of frame losses without excessive monitoring and reservation of storage space.

The presented mechanism caches the initial part of video viewed by end-user instead of caching the whole file at the cache proxy server. This increases the number of on-demand files in proxy server's cache and reduces the number of trips between the cache proxy server and the origin server. My video hit rate scheme also checks which file is requested and then sets the hit rate of the requested file. When the hit rate threshold arrives, the caching server request for the remaining video file by sending the last sequence number and then makes it available to the user if he wants to see more video than what is available.

The mechanism's loss recovery scheme is based on the streamed frames instead of video files and consideration of I-Frames losses. Whenever an I-frame is lost, the identity of the I-frame is detected from the sequence number field. I-frame is a still picture and is considered as data, so the mechanism sends a TCP/IP repair request to origin server for retransmission of I-frame. The playing quality is much better due to this retransmission of I-frame.

Our replacement algorithm is designed to fit our frame based caching proxy. Algorithm performs when the cache is running out of space, chooses the file, which is not in use and removes those

frames from the file that are not in use.

The results shows that in proposed mechanism the number of on-demand files are increased that will reduce the number of trips between cache proxy server to origin server. Moreover, there is no repeat request for the same video. On the other hand, in PLFU mechanism the video files are requested that were previously available which increases the number of trips between cache proxy server to origin server. Furthermore, the result shows that in proposed mechanism the recovery of I-frames is approximately twenty times less then the recovery of frames in PLFU mechanism.

This research enhances the caching ability of PLFU mechanism, which would reduce the flow of traffic between cache proxy server and origin server, and also increase the number of on-demand files in Cache Proxy Server. In addition, this research presents a mechanism that is based on the streamed frames instead of video files and the consideration of I-frames loss recovery. The playing quality will be better due to this retransmission of I-frame. The future goal of the research is to develop strategies for streaming to avoid network congestion and to develop the strategies to eliminate the delay in transmission.