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Recent Advances in Audio Video Multimedia Communication Technology

Narangale S. M.[#1], G. N. Shinde[*2]

[#] *School of Media Studies,SRTM University,Nanded-431606, INDIA*
[*] *Indira Gandhi College (Sr.), CIDCO,*Nanded-431603, INDIA

***Abstract*— Multimedia Communication starts with its generation, editing, sharing, storage, broadcast, send/receive, management, and so on. Multimedia trade has experienced a tremendous growth over last decade. This paper demonstrates the recent advances in the field of Multimedia Communication particularly video and audio formats. It covers synchronization methods, security issues, multimedia trends, streaming, etc. Review has been conducted on data encryption before sending and receiving messages as secured file transmission over the network. The features of temporal and content based retrieval approach are existing in this paper. The image quality enrichment, features of streaming, video and audio dealing out is discussed in this paper.**
Extreme changes in Multimedia enhancement have been adopted by Multimedia Technology.

***Keywords*— Multimedia, Communication, HD High Definition, FLAC, mp3, compression, Synchronization**

I. INTRODUCTION

Multimedia is the synchronous presentation of different media like text, graphics, audio, animation and video. Multimedia communication is possible through various applications such as television, movie-on-demand, mobile TV, on-line chatting, digital library, videoconference, tele-messaging applications nowadays has become very popular through software tools over Smartphone applications like YouTube, WeChat, Whatsapp, hike, etc. Multimedia has been used nowadays for academic effectiveness. Multimedia in ICT enabled teaching learning has become important.

Providing Security protection is an important issue for multimedia, which aims to protect the multimedia content, service interaction and user privacy, etc. For example, the content related to business secret needs to be protected against unauthorized users, the payment interactions between the user and the seller are perceptive to the third party, and the user profiles are private and should not be published. Until now, various techniques and tools have been proposed for multimedia information system security. Most of them focus on multimedia content security, secure interaction, and on privacy protection [1].

Multimedia communication starts with its generation, editing, sharing, storage, broadcast, send/receive, management, and so on. Internet statistics of the traffic will show that, the global IP traffic will reach 1.1 zetta bytes per year. In 2013, the content delivery networks traffic was 36% of all internet traffic, which will be 55% in 2018 globally. For the multimedia, the IP video traffic will be 79% of all IP traffic, which 66% in 2013. Internet video to TV was 11% in 2013, and, will reach to 14% in 2018. With the exception of short-form video and video calling, most forms of Internet video do not have a large upstream component. The upstream and downstream traffic is not symmetric. Subscribers consume lot more video than they produce. To maintain the symmetry, the P2P live video streaming, PC-to-PC video calling and high-end video calling has to become popular[2].

II. GENERATION/ PRODUCTION OF MULTIMEDIA SYSTEM

Multimedia content production has faced very high growth in terms of techniques of video such as from monochrome display to 3D projection display; in terms of sound gramophone to mp3 to Flac format; in terms of animation from 2D frame projection to smooth 3D animation. The presentation quality has shifted from Standard Definition (SD) to High-Definition (HD) content and High-Definition (HD) content to Ultra HD (UHD) picture quality. Limitations of size, bandwidth, processor capacity has tremendously has reduced. Viewer's requirement has shifted from lossy compression method to lossless compression method. The quantitative information explained above represents the growth trends in the internet traffic.

Starting with the invention of Cathode-Ray-Tube (CRT) by Braun (in 1897) to the quality of flat panel displays available today; it has indeed been a momentous journey. During this period technology has been building on technology; sometimes augmenting an old technology and sometimes displacing it. This has resulted in existence of several viable technologies such as CRT, Liquid Crystal Display (LCD), Plasma Display Panels (PDP), Organic Light Emitting Diodes (OLED), Field Emitter Displays (FED) and many others. Similar advances have taken place in drive electronics also[13].

Fig. 1. Monochrome – gray scale image

Fig. 2. Color – 3D render image

The figure 1 is a monochrome gray scale image displayed over a CRT – monochrome display. Advances to the display technology such as increase in computing capacity, retrieval mechanism, display drivers, etc. has improved the quality, resolution, pixel depth as in figure 2 HD color – 3D render image.

The image quality can be improved by adjusting image contrast; putting the image under edge detection technique on images of various contrasts. The technique of histogram stretching is used for adjusting the image contrast [3].

Adaptive HTTP streaming is frequently used to deliver video to mobile devices in which the aim is to deliver video by splitting the original stream into independent segments of a specified length[4]. Streaming media is experiencing emerging growth on Smartphone and Tablets. For example, YouTube [5] reports that their traffic from mobile devices tripled in 2011 and that more than 20% of the global YouTube views took place on mobile devices.

HTTP is the popular protocol for adaptive streaming in the cost-effective solutions that reuses existing infrastructure of video content, and adaptive HTTP streaming is now widely deployed by major systems provided by, for example, Microsoft [6], Adobe [7], and Apple [8]. Hierarchical modulation favored those H.264/AVC partitions containing more important data for the reconstruction of the video frame[9].

For the video processing focus is on time-based audio and video synchronization, content-based synchronization, and content-based retrieval. Most of the Synchronization algorithms depend upon temporal relationship between audio and video streams. In the timestamp exchange method, all the clocks in the residential Ethernet must be synchronized by one clock called Grand Master[10] . Another method proposes that the each incoming stream timestamps each object with generating time at the sink, resulting in managing the presentations of multimedia streams[11]. These synchronization mechanisms do not provide the appropriate synchronization under different delay and jittered conditions.

In the content based synchronization, the audio data is embedded inside the corresponding video frame using high bit rate information hiding techniques. At the player side the audio is extracted and played. This process guarantees the synchronization, but increases processing at sender as well as receiver side to embed and extract audio.

One more content-based multimedia synchronization scheme was proposed. Here, the media stream objects based on their content are logically structured hierarchically composed of smaller objects. These logically structured objects derive temporal relation among them and synchronization is achieved[12]. This method consumes significant time for synchronization, so, not suitable for interactive applications.

Development of audio technology started from the gramophone to dat to mp3 to flac format. Gramophone is a talking machine wherein a sound record is first traced into a fatty film covering a metal surface and can be played back. The gramophone was invented in 1887 by Emile Berliner[14] [15].

For the audio computing and processing in general the computed features are typically calculated based on some Time-Frequency Decomposition Technique. Some examples are the Short Time Fourier Transform (STFT), the Discrete Wavelet Transform (DWT), and Linear Prediction Coefficients (LPC). All these audio signal processing techniques calculate how the energy of the audio signal is distributed in time and frequency[16].

The audio recording and playback methodology based on computing and processing features can be categorized in the popular audio file formats such as 3gp, amr, mkv, dat, cd, wma, mp3, wav, mp4, flac, etc. Different audio file formats are correlated with different file sizes, quality, retrieval speed, etc. Especially MP3 files take up most of music file in world music markets which are regardless of its legal or illegal. According to the recent report, about 90% of the music contents is traded by an MP3 file type in music market whether it is online or off line[17][18]. MP3 include information associated with music contents such as a table of Hoffman code, scale factors, stereo types. As the computing storage and bandwidth capacity was limited, the audio file formats were developed using high compression algorithms resulting in loss of quality.

Nowadays, as the storage capacity, processing capacity and bandwidth capacity has grown up, so, people started looking for high quality lossless audio files. So, a new technology is developed, which creates lossless files and provides good quality sound feature i.e. FLAC. FLAC (Free Lossless Audio Codec) is a lossless compressed codec (compressor-decompressor or coder-decoder) of digital audio which allows being such that file size is reduced without any information being lost. Digital audio compressed by FLAC's algorithm can typically be reduced to 50– 60% of its original size[19].

III. CONCLUSION

Tremendous escalation can be found in Multimedia users, they are using multimedia through diverse communication channels. Multimedia communication is possible through various applications such as television, movie-on-demand, mobile TV, on-line chatting, digital library, videoconference, tele-messaging applications. It also has become very popular through software tools over Smartphone applications like YouTube, WeChat, Whatsapp, hike, etc. This paper demonstrates the recent advances in the field of Multimedia Communication especially video and audio formats. The conclusion of this paper focuses on rapid growth of multimedia technology which improves the quality and productivity of multimedia. In the early stages, the people were demanding data compression for multimedia. They were ready to compromise the quality as the size constraint, bandwidth restrictions and processor capacity restrictions existed. Nowadays, it seems that, people are looking for good quality multimedia rather than data compression as the boundaries of size, bandwidth and processor capacity has been enhanced. The multimedia today needs to be of superior quality.

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