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A study on stereoscopic video file transmission over internet through ISDN Lines

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Abstract: Integrated Services Digital Network (ISDN) is a set of communications standards for simultaneous digital transmission of voice, video, data, and other network services over the . public switched telephone network.. The key feature of ISDN is it integrates voice and data on the same lines. In a videoconference, ISDN provides simultaneous voice, video, and text transmission between individual desktop videoconferencing systems and group video conferencing systems. A stereoscopic visual communication system can be conceived by arranging two identical video cameras with an appropriate inter-ocular separation, encoding the video signals and transporting the resultant data over a network to one or more receivers where it is decoded and properly displayed. In this paper I analysis various techniques to perform stereo video file transmission over internet.

Keywords: ISDN, video files, compression, protocols, internet, MPEG 2 H.264.

I. INTRODUCTION

The integrated services digital networks are one of the faster technologies to transmit data with the help of phone lines among the different technologies of transmission. Basically its working depends upon the telephone line that consists of the copper wire With the help of such infrastructure ISDN have ability to transfer different forms of the data such as voice data, video data and data packets. Integrated services digital networks have power to convert the ordinary copper telephone lines single circuit into the multiple circuits for the sake of transmission. Due to this reliable and faster networking, basically it is a type of network used for the communication and data transferring. Typically it is defined as the type of the communication network that is based on the digital telephony services for the sake of different purposes such as the data transmission, voice or video communication and also sending different forms of multimedia messages with the help of digital phone lines is called as the integrated services digital networks or ISDN. They are very much faster as compared to the analog telephone lines. These kind of networks are used in all over the world fro the sake of many useful processes. ISDN are very much recommended for video conferences. Generally the main work of the integrated services digital networks is to change the infrastructure of the analogue lines into the digital lines because ISDN only work on digital networks.

II. STEREOSCOPIC VIDEO FUNDAMENTALS

The basis for stereoscopic perception is the binocular disparity of the human visual system that causes two slightly different images to be projected on the retinas of the eyes. The two different perspective images are fused in the visual cortex of the brain to compose a single three-dimensional view. This process can be simulated by having two cameras arranged with the same inter-ocular distance as the human eyes [2]. On average the separation of the human eyes is about 65 mm, so placing the two cameras this distance apart with coplanar image sensors will model the human visual system in respect to the difference in perspective between the two viewpoints. When each camera's image is presented only to the corresponding eye of the viewer the two images will be used to one, providing the cameras are identical. A number of display techniques have been developed to filter out and present the appropriate images to each eye.

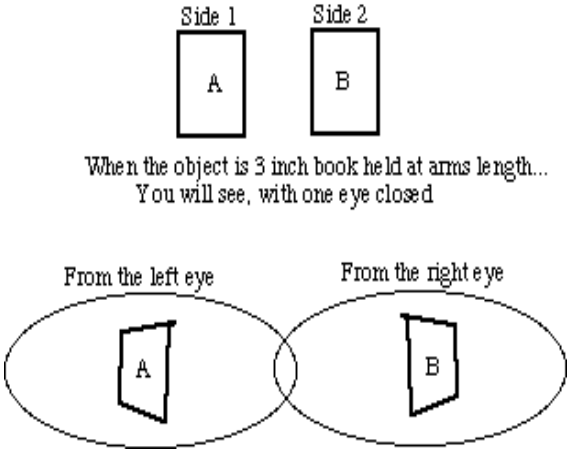

Figure 1. Stereocopic view of an object

This effect adds to the depth perception information the brain needs to derive an image with three dimensions[1]. Combining these images makes a three-dimensional image. Stereo video, or stereoscopic video, is the practice of producing the illusion of a 3D image in moving form. There are a variety of methods used to achieve this effect, usually classified by whether the viewer needs to wear glasses, and, in turn, whether these glasses play an active role in the effect. The basic concept of stereo video is the same as 3D imaging. The viewer is shown a picture that combines two images, one viewed by each eye. These images show the same scene, but from slightly differing perspectives. The brain's attempt to reconcile this difference creates an illusion of depth. The

concept of stereo video is to simply recreate this effect for every frame of the movie.

Figure 2. Stereo view by classes

There are three main types of stereo video, the first two of which involve the viewer wearing glasses. The most well known was passive glasses, which mean the glasses are entirely static. One example of this is polarized glasses, which use one red lens and one green lens. The two images are shown on the screen simultaneously, with the lens for each eye filtering out the "wrong" image. There are several kinds of access interfaces to ISDN defined as Basic Rate Interface (BRI), Primary Rate Interface (PRI) and Broadband ISDN (B-ISDN). ISDN provides access to packet switched networks, designed to allow digital transmission of voice and data over ordinary telephone copper wires. A major application for ISDN is Internet access. ISDN provides a maximum of 128 Kbit/s in both upstream and downstream directions and achieve a greater data rate. ISDN is designed to provide access to voice and data services simultaneously.

III. PROTOCOLS

Video communication standards over IP networks have emerged from two sources one is the International Telecom Union (ITU-T) and the Internet Engineering Taskforce (IETF). Internet applications use the Transmission Control Protocol (TCP), that implements reliable, connection-oriented data delivery over the connectionless datagram service provided by IP. The ITU-T Recommendation H.323 defines protocols and procedures for multimedia communication over packet networks[5]. Most Internet applications use the Transmission Control Protocol (TCP), that implements reliable, connection-oriented data delivery over the connectionless datagram service provided by IP. The TCP transport protocol achieves reliability by retransmission of lost packets using an acknowledgment scheme. The Real-time Transport Protocol (RTP) is an IETF proposed standard providing end-to-end delivery over packet networks for data with real-time characteristics RTP defines a packet header containing information that is of common interest for many real-time applications,

A. Media Encodings:

Digital media signals, in particular video, need to be compressed when transported over a network, to make efficient use of the bandwidth. Compression algorithms can be characterized as loosy and lossless. A lossless compression algorithm allows perfect reconstruction of the original digital signal, whereas a lossy algorithm introduces controlled loss of information so that a accurate approximation of the original signal can be reconstructed. Lossless compression algorithms are used for data compression where perfect reconstruction is critical. For video compression, lossless algorithms typically result in moderate compression efficiency. Most video compression algorithms are lossy, exploiting the properties of the human visual system to discard information that is of insignificant perceptual importance.

Figure. 3. Multimedia scene

As with lossless algorithms, redundancy in the original signal is also exploited to represent the information more efficiently. Video compression algorithms are based on the following methods.

a. color space conversion and sub sampling,
b. Inter-frame coding,
c. Transform coding,
d. Quantization,
e. Entropy coding.

B. Color Space Conversion and Sub Sampling:

The first step of video compression algorithms is to convert the images from the RGB color space into a luminance/chrominance representation (YCrCb). The human visual system is less sensitive to variations in chrominance, the chrominance components are sub sampled to reduce the data rate[12]. The chrominance components are represented with one sample for every four luminance samples.

C. Inter-frame coding:

Inter-frame coding means temporal correlations in a video signal to reduce redundancy. Coding a frame differentially from a previous frame as an error signal improves subsequent run-length and entropy coding techniques. This predictive coding (P-coding) is usually performed on smaller subblocks of the image, typically 16-by-16 pixels large. To improve the efficiency of predictive coding a technique called motion compensation is often utilized. In a motion compensation scheme a block is coded predicatively from a spatially translated block in a previous image. The differentially coded block together with a displacement vector, called a motion vector, are used by the decoder to recreate the block. Optionally a scheme called conditional replenishment can be utilized together with block-based predictive coding. The idea is that only blocks whose error signal, when coded

differentially from a previous frame, is larger than some threshold value will be transmitted[7]. This implies that only the spatial regions of a video scene that changes temporally will be transmitted, resulting in efficient bandwidth utilization for video sequences with fairly static content. Temporal prediction can be performed either from previous frames or from subsequent frames, providing that the temporally posterior frames have been sampled in advance. Video communication over the Internet directional prediction (B-coding). B-coding improves compression efficiency, but is of limited applicability for interactive applications with hard delay requirements. Predictive coding introduces interframe dependencies that make the video coding sensitive to packet loss. This is of great concern for Internet video applications, since they are typically based on unreliable transport protocols. To reduce the adverse implications of packet loss for video decoding, intra-coded frames are interleaved at regular intervals, providing re-synchronization points for the decoder.

D. Transform Coding:

In transform coding an image is transformed from the spatial domain to the frequency domain and represented as a linear combination of some set of basis functions. The reason for transforming an image to the frequency domain is to obtain a more compact representation of the data. Since the human visual system is more sensitive to low-frequency content in an image, high-frequency information can be excluded or represented with less precision. The discrete cosine transform (DCT) is the most widely used transform for image and video compression. For instance the JPEG, MPEG and H.261 compression algorithms are based on the DCT. Since the cosine function has infinite support and since the spatial correlation of image pixels is localized, the transform is applied to small blocks of the image (8X8). The wavelet transform is based on basis functions obtained by translation and dilation of a single wavelet mother function.

The wavelet basis functions are localized in space and can consequently be applied to the whole image, This is beneficial at high compression ratios where block-based algorithms typically result in quantization defects known as blocking artifacts. The DWT provides a native multiresolution representation that can be progressively decoded. This is highly beneficial when designing scalable encodings. Transform coding is primarily used for intra-coding of video images. However, three-dimensional transform coding algorithms for video have been proposed that extend the two-dimensional spatial transform to the temporal dimension. Indeed, video compression algorithms based on the 3D DWT have been shown to obtain very high compression ratios, but the computational complexity is prohibitively high.

E. Quantization:

Quantization is a lossy procedure wherein the precision of data samples is limited to a set of discrete values. The quantization function maps several of its input values to a single output value in an irreversible process. The quantization can be either uniform or non-uniform [6]. Uniform quantization limits the precision of samples uniformly over the input range. This can easily be implemented by dividing each input sample value by a quantization factor and then rounding off the result [11]. In non-uniform quantization the input samples are represented with different precision. Non-uniform quantization is typically implemented with a look-up table known as a quantization table. By reducing the precision of sample values, quantization limits the number of different symbols that need to be encoded in the entropy coding step following the quantization.

F. Entropy coding:

Entropy coding is the process of assigning the shortest code words to the most frequent symbols based on the probability distribution of the input data [8]. Examples of entropy coding schemes are Huffman coding and arithmetic coding. Entropy coding is most often preceded by a run-length coding that encodes a consecutive series of the same symbol value as a run-length count and a symbol codeword.

IV. STEREO VIDEO COMPRESSION STANDARDS

Standardization of video compression algorithms has been performed primarily by the Moving Pictures Expert Group (MPEG) of the International Standardization Organization (ISO) and by the Telecommunication standardization sector of the International Telecommunication Union (ITU-T)[4]. MPEG has developed a number of video compression standards at different multimedia applications,[9] ITU-T has developed standards for teleconferencing applications. MPEG-1 defines a video compression algorithm based on the DCT and motion compensation, for multimedia applications with data rates up to about 1.5 Mbit[8]. MPEG-2 extends MPEG-1 with support for greater input format flexibility, higher data rates and better error flexibility. The basic principles of MPEG-2 are the same as MPEG-1 and MPEG-2 is backwards compatible with MPEG-1[10]. MPEG-2 is also part of the ITU classification as ITU-T Recommendation H.262[12]. MPEG-4 takes an object-oriented approach to video encoding. Visual scenes can be represented as a collection of objects, each with a specific encoding and compression format.

Figure 4.Compressed by MPEG 2

Figure 5.Compressed by H.264

Visual objects can be either synthetic or natural. Natural video objects are compressed using the DCT and motion compensation [11]. ITU-T recommendations H.261 and H.263 are video compression standard targeted at teleconferencing applications at data rates up to 2 Mbit/s. Both are based on the DCT and motion compensation.. The success of the Internet is dependent on its ability to support a large number of simultaneous users.

V. CONCLUSION

Therefore, when designing a video communication system based on Internet technology, a fundamental concern must be the effects of scaling the system to many simultaneous users and large network topologies. H.264 is getting so much attention because it can encode video with approximately 3 times fewer bits than comparable MPEG-2 encoders. H.264 is up to twice as efficient as MPEG-2. The International Telecommunications Union (ITU) initiated the H26L the overriding goal was to achieve a factor-of-2 reduction in bit rate compared to any competing standard. This focus if further stressed by the fact that video communication is a very demanding application in terms of bandwidth and processing requirements. The best-effort model of the current Internet, where all state information pertaining to an end-to-end communication session is kept at the endpoints, imposes a requirement on the applications, or the transport protocols used by the applications, to be adaptive to changing conditions.

VI. REFERENCE

[1] Jones, G.R.; Lee, D., Holliman, N.S., Ezra, D. (2001). "Controlling perceived depth in stereoscopic images" (PDF). Stereoscopic Displays and Applications Proc. SPIE 4297A.

[2] A Tutorial on MPEG/Audio Compression", Davis Pan, IEEE Multimedia, pp. 60-74, 1995.

[3] G.K. Wallace, The JPEG Still Picture Compression Standard CCITT, Recommendation H.261

[4] D. Le Gall, MPEG: A Video Compression Standard for Multimedia Applications

[5] K. Patel, et. al., Performance of a Software MPEG Video Decoder

[6] P. Cosman, et. al., Using Vector Quantization for Image Processing

[7] "Coding of Moving Pictures and Associated Audio for Digital Storage Media at up to about 1.5 Mbit/s," ISO/IEC 11172-2: Video (November 1991).

[8] "Generic Coding of Moving Pictures and Associated Audio Information: Video," ISO/IEC 13818-2 : Draft International Standard (November 1994).

[9] Barry G. Haskell, Atul Puri, Arun N. Netravali, Digital Video: An Introduction to MPEG-2, Chapman and Hall, 1997.

[10] K.R. Rao, P. Yip, Discrete Cosine Transform Algorithms, Advantages, Applications, Academic Press, Inc., 1990.

[11] Majid Rabbani, Paul W. Jones, Digital Image Compression Techniques, SPIE Optical Engineering Press, 1991.

[12] Joan L. Mitchell, William B. Pennebaker, Chad E. Fogg, Didier J. LeGall, MPEG Video Compression Standard, Chapman and Hall, 1997.