Techniques used for Processing H.264/AVC Video Stream

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***Abstract*—Now advanced videos should put away and handled in an encoded configuration to keep up security and protection. With the end goal of substance documentation, it is important to perform information hiding away in these scrambled recordings. In expansion, it is more productive without decoding taken after by information covering up and re-encryption. In this paper, a novel plan of information covering up specifically in the encoded form of H.264/AVC video stream is proposed, which incorporates the accompanying three parts, i.e., H.264/AVC video encryption, information inserting, and information extraction. In this paper, specific end goal is to adjust the various application situations; information extraction should be possible either in the encoded area or in the unscrambled space. Besides, video document measure is entirely protected even after encryption and information installing.**

Keywords — H.264/AVC, Encryption, Data hiding.

I. INTRODUCTION

Distributed computing has turned into an imperative innovation trend, which can give profoundly effective calculation and substantial scale storage answer for video information. Given that cloud administrations may draw in more assaults and are helpless against deceitful framework directors, it is fancied that the video content is open in scrambled shape. The ability of performing information hiding away specifically in encoded H.264/AVC video streams may leads to get a solution for video leakage problem.

With the increasing demands of providing video data security and privacy protection, data hiding in encrypted H.264/AVC videos will undoubtedly become popular in the near future. Obviously, due to the constraint of the underlying encryption, it is very difficult and sometimes impossible to transplant the existing data hiding algorithms to the encrypted domain. To the best of our knowledge, there has been no report on the implementation of data hiding in encrypted H.264/AVC video streams. Only few joint data-hiding and encryption approaches that focus on video have been proposed [1].

Multimedia content encryption has attracted more and more researchers and engineers owing to the challenging nature of the problem and its interdisciplinary nature in light of challenges faced with the requirements of multimedia communications, multimedia retrieval, multimedia compression and hardware resource usage [2]. Besides, encryption and watermark embedding would lead to increasing the bit-rate of H.264/AVC bit stream.

II. COMMON APPROACHES FOR ENCRYPTION

A. Scrambling

Scrambling is one of the simplest form of encryption that can be applied to multimedia data. It usually refers to encryption methods which perform random permutations to video data using some scheme. The histogram of image generally remains the same except for the fact that the individual positions are shuffled. Early work on Advances in Multimedia Encryption signal scrambling was based on using an analog device to permute the signal in the time domain or distort the signal in the frequency domain by applying filter banks or frequency converters [2]. However, these schemes are extremely easy to crack using modern computers. With the popularization of DSP (Digital Signal Processing), in the digital signal domain focus was placed on scrambling in the domain of orthogonal transforms (DFT, DCT, wavelet transform, Hadamard transform, etc.) [2]. The security provided by scrambling alone is low. It also decreases the compression effi- ciency of video bitstream leading to compression losses and increased size of video file.

B. *Selective Encryption*

The idea of selective encryption overlaps with post-compression approaches in some cases but it can also be applied during the compression process. A lot of research on integrating encryption with multimedia compression standards to reduce the overall computation cost is focused on using some form of selective encryption.

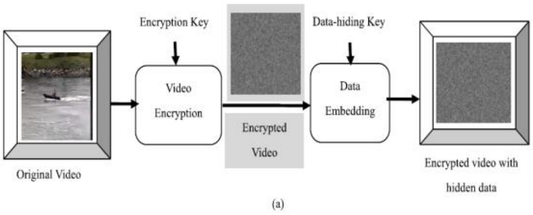

Fig 1. Encrypted data and embedded data at the sender side

C. Intra-Prediction Mode (IPM) Encryption

According to H.264/AVC standard, the following four types of intra coding are supported, which are denoted as Intra_4×4, Intra_16×16, Intra_chroma, and I_PCM [3]. Here, IPMs in the Intra_4×4 and Intra_16×16 blocks are chosen to encrypt. Four intra prediction modes (IPMs) are available in the Intra_16×16. The IPM for Intra_16 ×16 block is specified in the mb_type (macroblock type) field which also specifies other parameters about this block such as coded block pattern (CBP).

D. Motion Vector Difference (MVD) Encryption

In order to protect both texture information and motion information, not only the IPMs but also the motion vectors should be encrypted. In H.264/AVC, motion vector prediction is further performed on the motion vectors, which yields MVD. In H.264/AVC baseline profile, Exp-Golomb entropy coding [19] is used to encode MVD. The codeword of Exp-Golomb is constructed as[*M zeros*] [4] [*I NFO*], where *I NFO* is an *M*-bit field carrying information.

E. Residual Data Encryption

In order to keep high security, another type of sensitive data, i.e., the residual data in both I-frames and P-frames should be encrypted.

III. DATA EMBEDDING & EXTRACTION

An embedded file refers to any type of multimedia file that you might insert, or embed into the Web page. This includes files like graphics and sound files.

A. Text Substitution

To hide text data file, we used .avi video file as a cover video and apply higher LSB algorithm. After data hiding, cover video will be called as stego video. To make data extraction more difficult we can use pixel swapping encryption technique to get encrypted stego video.

B. Code Word Substitution

Data hider may embed additional data in the encrypted domain by using codeword substitution technique, without knowing the original video content. In order to adapt to different application scenarios, data extraction can be done either in the encrypted domain or in the decrypted domain. Furthermore, video file size is strictly preserved even after encryption and data embedding.

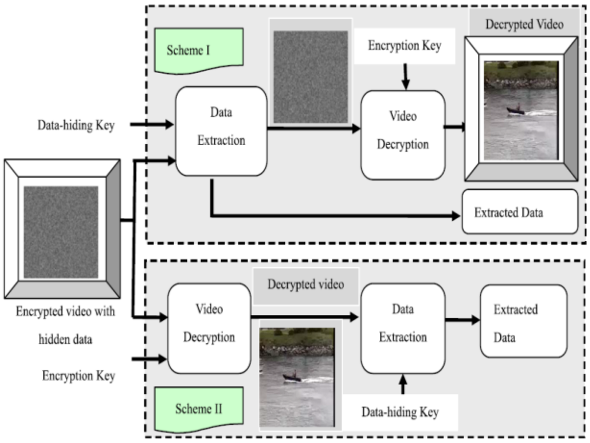

Fig 2. Data extraction and video display at the receiver end

The hidden data can be extracted either in encrypted or decrypted domain, as shown in Fig. 2.

The data extraction can be done in two ways.

A. Encrypted Domain Extraction:

To protect privacy, a database manager (e.g., cloud server) may only get access to the data hiding key and have to manipulate data in encrypted domain.

B. Decrypted Domain Extraction:

In encoded space extraction, both implanting and extraction of the information are performed in scrambled area. In any case, at times, clients need to unscramble the video first and concentrate the concealed information from the decoded video. For instance, an approved client, which possessed the encryption key, got the encoded video with shrouded information. The got video can be unscrambled utilizing the encryption key. That is, the decoded video still incorporates the concealed information, which can be utilized to follow the wellspring of the information.

IV. CONCLUSION

Information covering up in scrambled media is another subject that has begun to draw consideration due to the security safeguarding prerequisites from cloud information administration. In this paper, a calculations accessible to insert extra information in scrambled H.264/AVC bit stream is exhibited, which comprises of video encryption, information installing and information extraction stages. The calculation can save the bit-rate precisely even after encryption and information implanting, and is easy to execute as it is specifically performed in the packed and encoded space, i.e., it doesn't require decoding or fractional decompression of the video stream therefore making it perfect for constant video applications.

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