ISSN (Print) : 2320 – 3765
ISSN (Online): 2278 – 8875

International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering

(An ISO 3297: 2007 Certified Organization)

Vol. 4, Issue 6, June 2015

Privacy Info Protection for a Video Using Frame Comparison Method in MATLAB Platform

Anupama R S [1], Dhanashree P Kutre [2]

PG Student [DECS], Dept. of ECE, Maratha Mandal Engineering college, Belgaum, Karnataka ,India1

Assistant Professor, Dept. of ECE, Maratha Mandal Engineering college, Belgaum ,Karnataka ,India 2

ABSTRACT: In today's day to day life, a new method is required that can provide maximum security and authenticity to a video information. When information is transmitted over the networks, the chances of external attacks and noise interferences are more. So many techniques were introduced in the field of information protection. This paper gives more attention towards the video signals. We know that in every field of entertainment, videos are essential factor and sometimes it may contain highly confidential informations that shouldn't get leaked .Not only in the entertainment fields, but also in the medical and military fields this method is applicable. This method involves the compression of videostream unlike other methods. The compression scheme used here is H.264/AVC compression, since it is the most advanced and is characterized by various features. Video compression techniques can reduce the volume of the file transmitted and stored .The proposed method involves mainly three steps; they are H.264/AVC encoding, data embedding and video extraction. The H.264/AVC coder is capable of performing the selective encryption of the videostream. Instead of encrypting the whole video information, some picture parameters are encrypted. This method can reduce the time required for encryption in comparison with other methods and still maintains the original picture quality.

KEYWORDS: Selective encryption, data embedding, frames, Arnold transformation, data extraction

1. INTRODUCTION

Videos are the most advanced media in the entertainment industry. A video is also known as motion picture or a sequence of frames. When information is transmitted from one end to the other, it should reach the correct destination without any loss and should not be accessible by any external interference. Transmitting a videostream over the network should be highly confident and secure. Video compression is a lossy compression technique. The proposed method is applicable in the real time applications like military, medical surveillance videos etc. The leakage of video content can be avoided by performing data hiding directly in the encrypted video streams. In cloud computing, a cloud server can manage video and ensure its veracity and safety by hiding a secret information into the encrypted frames. In this paper, the prediction modes and motion parameters in reference to the adjacent frames are encrypted. Data hiding is performed by using the features of watermarking [3][5] and Arnold scrambling techniques[4].

II.LITERATURE SURVEY

The review of literature about data hiding and extractions provides the justification of the proposed model. This paper emphasizes the various possibilities of information hiding and gives a brief idea of H.264/AVC encoding[1][2][6].Nowadays videos can be downloaded and transmitted without much difficulties due to the enhanced growth of internet facilities and increased network coverages. But the videos are more prone to unauthorized access, illegal tracking etc.This paper gives a solution to avoid these demerits by adopting a technique known as information hiding.

ISSN (Print) : 2320 – 3765
ISSN (Online): 2278 – 8875

International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering

(An ISO 3297: 2007 Certified Organization)

Vol. 4, Issue 6, June 2015

In case of videos, the encryption schemes always require to be time efficient and format complaint. Encryption and watermarking [2][3] are the two important terms that are described in these papers. There exists lot of encryption techniques such as traditional ciphers,DES, RSA,AES etc. The cost and time required for these techniques is very much high and is not practical to apply in real time applications. Selective encryption[3] encrypts some selected parameters of picture like prediction modes, motion vector differences etc. Arnold scrambling algorithm [4] is an image scrambling algorithm. It is used to convert a digital image into a meaningless form that cannot be recognized by strangers. In the proposed method, the advanced version of this algorithm is used to convert the image watermarks in the case of data embedding. In the case of Arnold scrambling, the image is divided into several number of non square regions. By doing this, the boundary of the image is cannot recognized by outsiders. As the number of scrambling is increased, the security of encryption also increased.

This paper [8] discusses mainly the H.264/AVC compression scheme and also data hiding and the intra prediction modes. In this paper the authors made experiments using some 8 video sequences with same number of frames and constant frame rate .This method emphasizes the advantage of using intra prediction modes for data hiding compared with other data hiding methods .And there are a total of nine prediction modes are there ,of which 4x4 intra prediction modes are used. This paper noticed that the technique of embedding data in the 4x4 prediction modes in the I frame increases the video quality.The above literature discussed the scope of using intra prediction modes for data hiding. There are nine prediction modes are available and all these modes are not required for real time applications. So in this paper[9] an analysis is made in terms of the nine prediction modes-mode 0,mde 1,mode 2,mode 3,mode 4,mode 5,mode 6,mode 7,mode 8-and compared their performances in terms of the performance parameters like compression ratio, picture quality(PSNR) and bitrate. The literature found out the performance parameters for each modes and compared the extracted frames for each modes in which the data hiding is performed. From the analysis this paper suggested that mode 2 is the best prediction modes with good performance parameters.

III. PROPOSED METHODOLOGY

In this paper, a new method is introduced which can provides security and confidentiality for a video stream very effectively. The proposed method involves mainly three steps. They are video encryption, information hiding, and video extraction. This technique is applicable to many real time applications and in the fields of medical surveillance, military and cloud computing. The three methods are discussed briefly.

A.VIDEO ENCRYPTION

The video stream that is required to transmit is converted into unrecognizable format by using an H.264/AVC encoder. The video is fragmented into frames since it is a sequence of frames. Here the entire frames are not encrypted; instead a selected number of frames are encrypted. The frames are encrypted by using Bit XOR operation. The H.264 is an advanced video coding standard. All the existing methods like traditional ciphers and the other techniques like AES ,DES etc are not practicable to real time applications and it requires more time and expenses. The chaos encryption is applied to the Intra frames(I-frames) without any reference to other frames and it is the first frame. The other frames are encrypted in comparison with the I frame and the motion parameters are encrypted.

B.INFORMATION HIDING

The transmitting video is encrypted in the first section. After that the encrypted video is again undergoes an another technique called information hiding. It is a process in which a secret data that can be a text message or an image is inserted into the encrypted video. The text message and image, both are encrypted before embedding or hiding. The text message is encrypted using chaos encryption and a key also inserted which is required during extraction process. The image used is a watermark image.

Fig 1:Watermarks

ISSN (Print) : 2320 – 3765
ISSN (Online): 2278 – 8875

International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering

(An ISO 3297: 2007 Certified Organization)

Vol. 4, Issue 6, June 2015

This watermark also encrypted using Arnold transformation. The image is two dimensional matrix. By using Arnold image scrambling algorithm the position of rows and columns are shuffled and as many times the shuffling can be performed. The security is increased as the number of shuffling is increased.

C.VIDEO EXTRACTION

The next step is the video extraction process. For this operation the inverse operation is performed. The frames and the embedded secret data and watermark image also retrieved. The is achieved by adopting the inverse encryption and inverse Arnold scrambling.

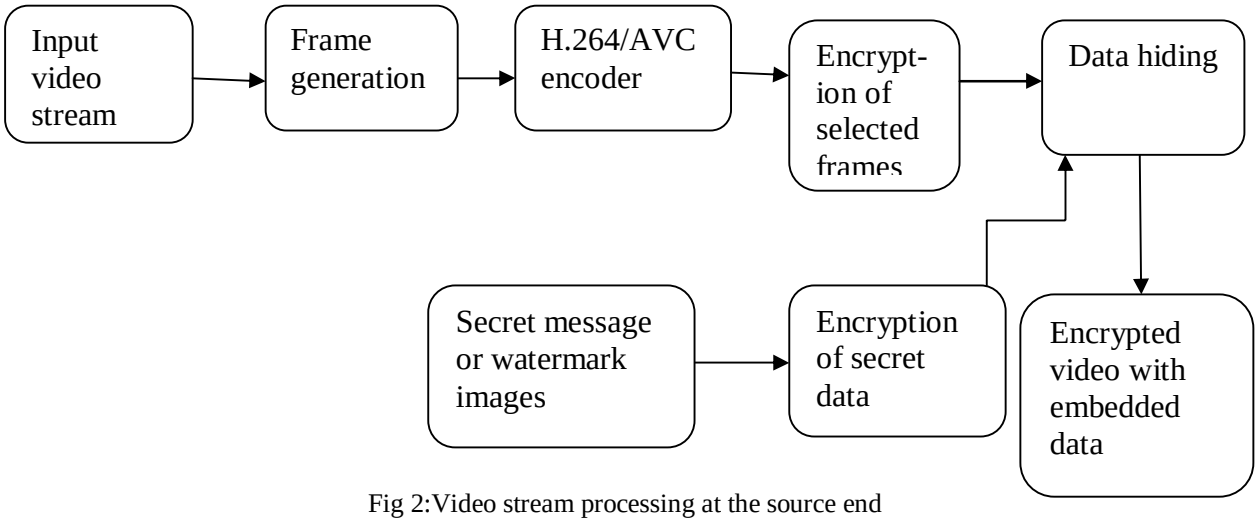

Fig 2:Video stream processing at the source end

\

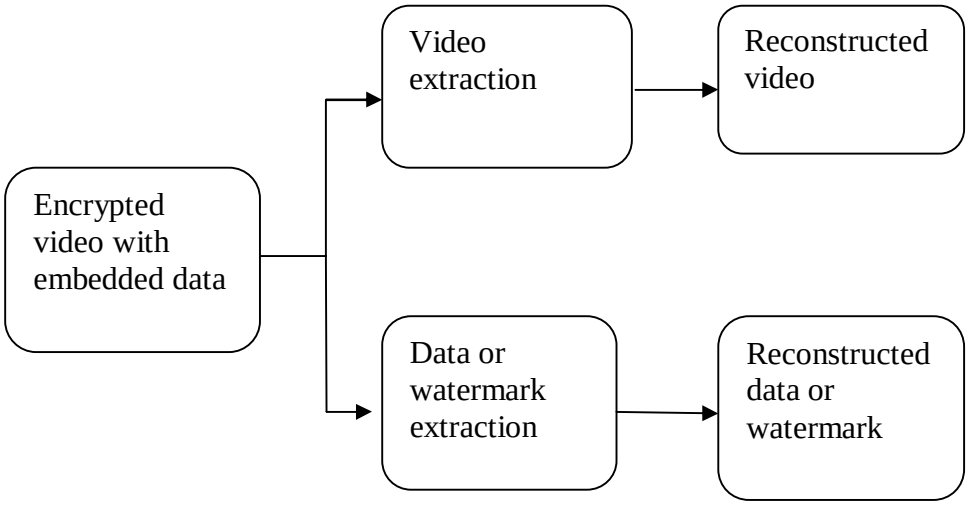

Fig 3:Video extraction at the destination

IV RESULTS

Here in this method it is possible to run more number of videos. There is a comparison is made in response to the various performance parameters .The graphs can be plotted by taking the values of the different videos. The simulation results are displayed below.

ISSN (Print) : 2320 – 3765
ISSN (Online): 2278 – 8875

International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering

(An ISO 3297: 2007 Certified Organization)

Vol. 4, Issue 6, June 2015

The figure below shows the videos that are used for experiment. The test video window is appeared when the program asked to input a video while simulating. We can simulate more than two number of videos at the same time.

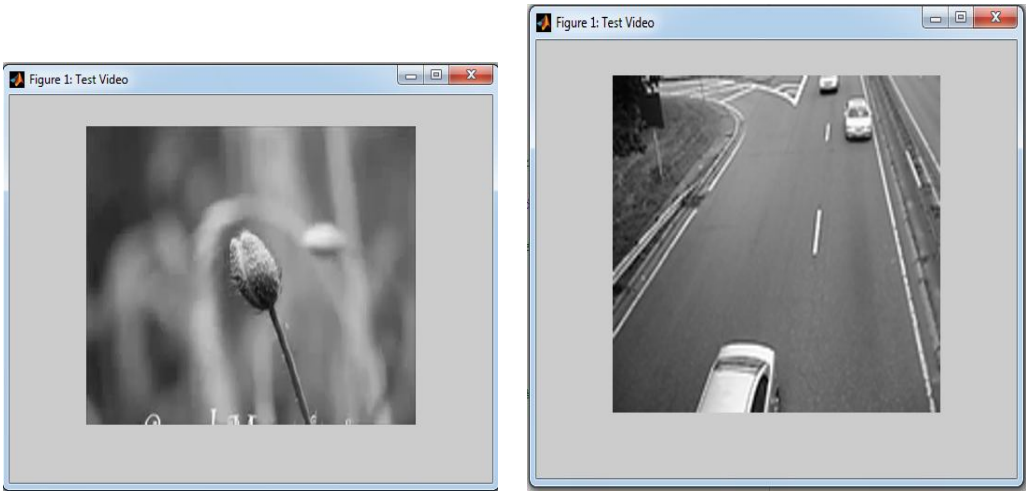

Fig 4:a)test video 1 b)test video 2

Here the selected number of bits in the I frame are encoded and after that using I frame as a reference the subsequent P frames are encoded. The figures below shows the encoding operation using the wait bar command in Matlab.

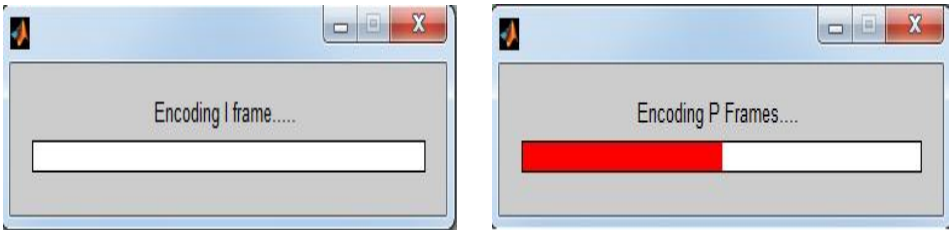

Fig 5:a)I frame encoding b)P frame encoding

figures below shows the encrypted images of the two videos selected.

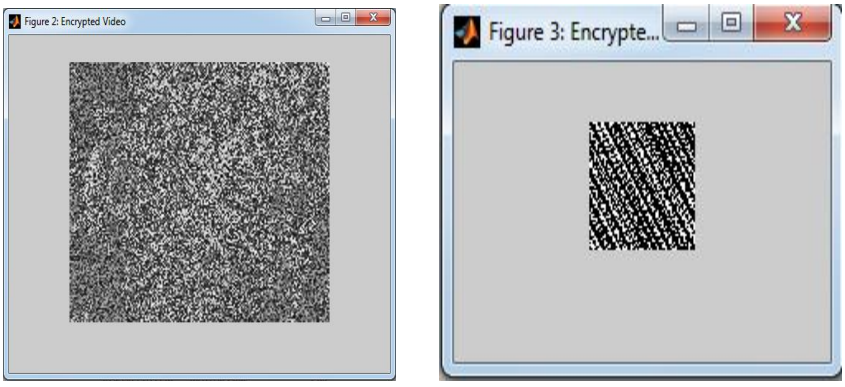

Fig 6:a)Encrypted version of video 1 b)Encrypted version of video 2

ISSN (Print) : 2320 – 3765
ISSN (Online): 2278 – 8875

International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering

(An ISO 3297: 2007 Certified Organization)

Vol. 4, Issue 6, June 2015

At the destination, the receiver can extract the original videos using the inverse operation. The decoding of I frame and P frame are decoded and decoded the encoded watermark also. The decrypted watermark and the wait bar indicating the decoding of P frames are shown below

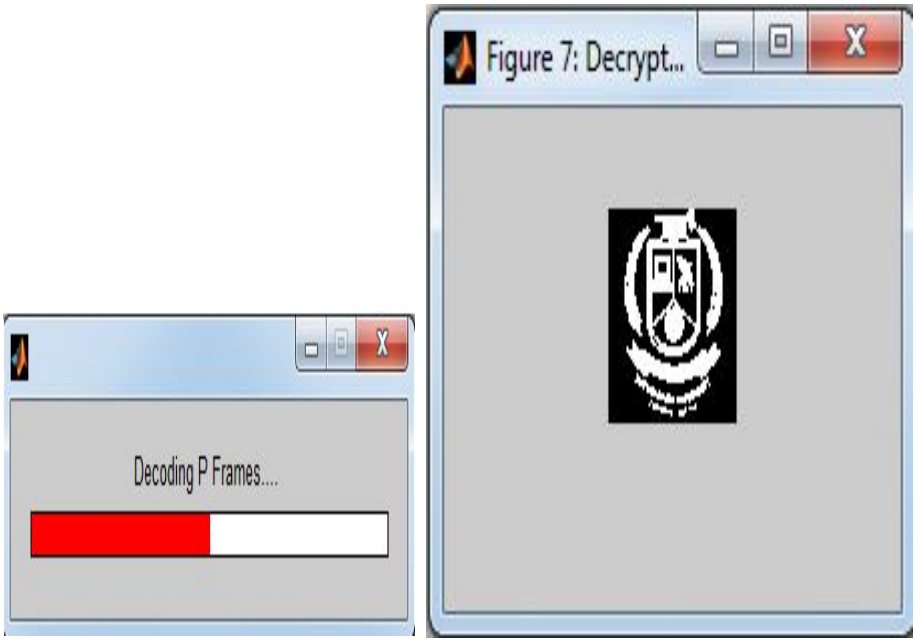

Fig 7: a)P frame decoding b) Decrypted watermark

The reconstructed videos are displayed below

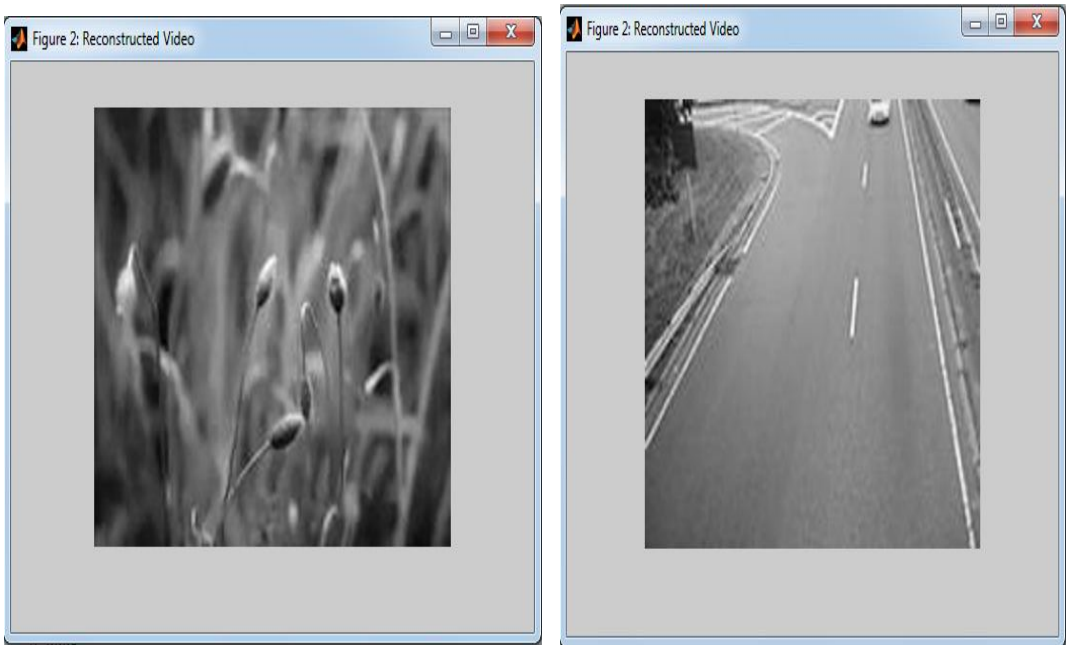

Fig 8:Reconstructed videos

ISSN (Print) : 2320 – 3765
ISSN (Online): 2278 – 8875

International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering

(An ISO 3297: 2007 Certified Organization)

Vol. 4, Issue 6, June 2015

The table below shows the performance parameters obtained after simulation.

	Video 1	Video 2
Raw Input File Size	76032	76032
Compressed File Size	5856	8481
Compression Ratio	12.9819	8.9650
Mean Square Error	2.6919	2.6324
Peak Signal to Noise Ratio	43.8302	43.9273
Correlation	0.9971	0.9978
Percentage Residual Difference	0.1017	0.1001
Structure Similarity Index	0.9749	0.9721

Table 1:Performance Parameters

V.CONCLUSION

Here in this paper, a new formula is proposed to formulate an enhanced method in the case of privacy info protection. The method combines various advanced methods. This method can provide more security authenticity and confidentiality compared to all other existing methods. The various performance parameters are estimated and observed that it can provide the better values compared to existing methods**.**

REFERENCES

[1] Dawen Xu, Rangding Wang, And Yun Q. Shi, "Data Hiding in Encrypted H.264/AVC Video Streams by Codeword Substitution" IEEE Transactions On Information Forensics And Security, Vol. 9, No. 4, April 2014.
[2] Yiqi Tew, and KokSheik Wong, *"An Overview of Information Hiding in H.264/AVC Compressed Video"* IEEE Transactions On Circuits And Systems For Video Technology, Vol. 24, No. 2, February 2014.
[3]. Shiguo Lian, Member, Zhongxuan Liu, Zhen Ren, and Haila ,*"Commutative Encryption and Watermarking in Video Compression"*,IEEE Transactions On Circuits And Systems For Video Technology, Vol. 17, No. 6, June 2007.
[4] Min Li,Ting Liang, Yu-jie He," *Arnold Transform Based Image Scrambling Method"*
[5] Bin Zhao , Weidong Kou , Hui Li , Lanjun Dang , Jun Zhang ,*" Effective watermarking scheme in the encrypted domain for buyer–seller watermarking protocol "journal homepage: www.elsevier.com/locate/ins.*
[6] ThomasWiegand, Gary J. Sullivan, Senior Member, IEEE, Gisle Bjøntegaard, and Ajay Luthra, Senior Member, IEEE, *"Overview of the H.264/AVC Video Coding Standard"*, IEEE Transactions On Circuits And Systems For Video Technology, Vol. 13, No. 7, July 2003.
[7] Shiguo Lian, IEEE, Zhongxuan Liu, Zhen Ren, and Haila Wang,*"Secure Advanced Video Coding Based on Selective Encryption Algorithms*",IEEE Transactions on Consumer Electronics, Vol. 52, No. 2, MAY 2006.
[8] Samira Bouchama, Latifa Hamami, and Hassina Aliane,"H.264/AVC Data Hiding Based on Intra Prediction Modes for Real-time Applications", Proceedings of the World Congress on Engineering and Computer Science 2012 Vol I, October 24-26, 2012.
[9]janaik.N, Manjunath.R,"Selection Of Intra Prediction Modes For Intra Frame Coding In Advanced Video Coding Standard" International Journal of Research in Engineering and Technology Volume: 02 Issue: 12 | Dec-2013.