Volume 2, Issue 1, January 2012 ISSN: 2277 128X
International Journal of Advanced Research in Computer Science and Software Engineering
Research Paper
Available online at: www.ijarcsse.com

Simulation Based Watermarking for Confidential Data Security for Video Signal

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***Abstract*-There are several protocols and embedding techniques which are used to hide data digitally for an object in highly sophisticated environment. These protocols and technique must fulfil a number of requirements correctly applied for steganography.**

The purpose of this experimental study is to measure the quality of embed watermarks in video signals and to hide confidential data over it without any change and loss of data.

The main focus of this paper is that we use two video clips which are bbc.avi and apple.avi. Here we set some parameter value for both clips as mention above. We are varying the quality of referenced image from 100-20% with unit difference 20% and extract the watermarks image with the value of control parameter NC.

***Keywords*— Discrete Cosine Transform, Watermarking, Steganography, Matlab.**

I. INTRODUCTION

The stego object must be correct, clear and well defined whenever the hidden information will be integrated over the original image. The hidden massage must not change in any case (e.g. add addition information in stego object, loss of info) [8].If the hidden information is changed during steganography process, the whole process would be failed [1].

There are two most techniques used to ensure data confidentially as steganography and Encryption. The main difference between both of them that steganography hides the existence of secrete massage while in encryption any body can see it [8].

In present world the secrete data which would be in picture or in video format can be used for watermarking for communicate or transfer secrete data between two medium [4].

In this paper we use DCT as a technique to implement digital watermarking in a video by embedding secure image into an original video [1]. There are many techniques for transformation of image in digitalized form which is FFT, DFT, and DCT and so on. But DCT is one of the best techniques for transformation of data.

In this paper we describe in Section I Introduction Section II Discrete Cosine Transform Section III Simulation Tool Section IV Imitation Parameters Section V Parameters Value Setup Section VI Results and Analysis and section VII Conclusion.

II. DISCRETE COSINE TRANSFORM (DCT)

The DCT algorithm is one of the main component of the JPEG compression technique and to ensure data hiding .The DCT allows an image to be broken up into different frequency bands, and making it which easier to embed watermarking information into the middle frequency bands of an image [10].

Transform coding is specifically used to constitute the integral component of image/video processing. Transform coding works on the condition that pixels in an image inherit with their neighbouring pixels in an image inherit with their neighbouring pixels at a certain level of correlation. A video transmission system similarly uses high correlation between adjacent pixels in consecutive frames [10]. These correlations can be splitted to enhance the value of pixel from its respective neighbours [8].

The two dimensional DCT is process of JPEG to convert between the special domain and the frequency domain. The JPEG compression algorithm is used to divide an image into 8x8 blocks of pixels and DCT is applied separately to each block [7].

The DCT is a type of singular transform which can be used to transform data into a sum of cosine transform.

$$DCT_{uv} = \frac{1}{\sqrt{2N}} C_u C_v \sum_{x=0}^{N-1}\sum_{y=0}^{N-1} DCT_{i,j} \cos\left[\frac{(2x+1)u\pi}{2N}\right] \cos\left[\frac{(2y+1)u\pi}{2N}\right]$$

$$\text{where } C_u, C_v = \begin{cases} 1/\sqrt{2} & \text{for } u, v = 0 \\ 1 & \text{otherwise} \end{cases}$$

III. SIMULATION TOOL

Matlab is used for technical computing as a high performance language. It has capability for integrates computation, programming eenvironment and visualization.It has also sophesticated data structures modern programming language environment debugging tools and supporting object-oriented programming [9].These all tools make Matlab as an excellent tool for mathematical computations.t has powerful built-in programs that ensure to user for wide varity of computations.The Matlab provides easy to use graphics commands that helps to visuallize results immediately. Matlab provides tool boxes for signal processing, control theory, symbolic computation, simulations and many more.Matlab is excellent for graphics facilities where the pictures can be inserted into LATEX and word document [11].

IV. IMITATION PARAMETER

In this case the extracted watermark is a visually recognizable pattern. We compare the respective result with the referenced image. The subjective measurement is reliant on expertise factor of the viwers, simulation result, programmed condition etc. A mathematical measurement is used to objective judgment of the extracting results. We defined the parallel measurement among the referenced watermarked image WM and extracted watermark image WM' as:

$$\text{Normalized correlation (NC)} = \frac{\sum i \sum j \, WM(i,j)WM'(i,j)}{\sum i \sum j \, [WM(i,j)]^2}$$

Which is the cross-correlation normalized by the reference watermark energy to give unity as the peak correlation.

V. PARAMETERS VALUE SETUP

Parent Video Clip used for watermark insertion:-

TABLE I

PARAMETER VALUES FOR REFERENCED SIGNAL

S.No.	Parameter Name	Parameter Value
1	File name with extension	bbc.avi
2	File Size	9215336
3	No. of Frames	300
4	Frames per second	30
5	Width	160
6	Height	154
7	Image type	"Indexed"
8	Video compression	none
9	Quality	Non-zero
10	No. of color map entries	256

Inserted Video Clip as Watermark:-

TABLE II

PARAMETER VALUES FOR HIDDEN IMAGE

S.No.	Parameter Name	Parameter Value
1	File name with extension	apple.avi
2	File Size	2354202
3	No. of Frames	300
4	Frames per second	1
5	Width	64
6	Height	64
7	Image type	"Indexed"
8	Video compression	none
9	Quality	Non-zero
10	No. of color map entries	256

VI. RESULT AND ANALYSIS

In this experimental study we use two video clips which are bbc.avi and apple.avi. Here we set some parameter value for both clips as mention above. We are varying the quality of referenced image from 100-20% with unit difference 20% and extract the watermarks image with the value of control parameter NC.

(A) When JPEG image Quality = 100%

Fig. 1 referenced video


Fig. 1.1 Extracted

Finding parameter NC Value = 86.129

(B) When JPEG image Quality = 80%

Fig. 2 Referenced Image


Fig. 2.1 Extracted Image

Finding parameter NC Value = 83.216

(C) When JPEG image Quality = 60%

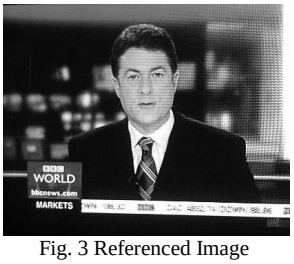

Fig. 3 Referenced Image

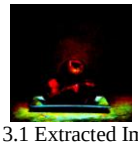

Fig. 3.1 Extracted Image

Finding parameter NC Value = 74.876

(D) When JPEG image Quality = 40%

Fig. 4 Referenced Image

Fig. 4.1 Extracted Image

Finding parameter NC Value = 56.601

(E) When JPEG image Quality = 20%

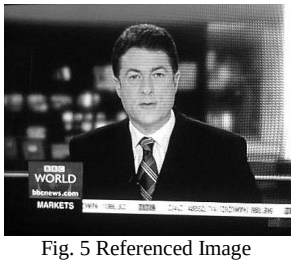

Fig. 5 Referenced Image

Fig. 5.1 Extracted Image

Finding parameter NC Value = 29.722

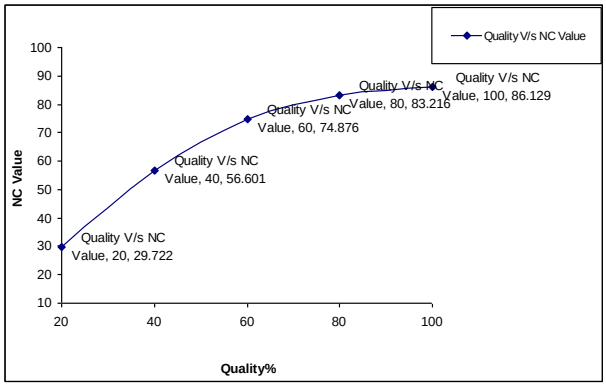

Fig. 6 Quality V/S Control parameter NC

Using the DCT Techniques with setup of parameters values, we are varying the quality of referenced image from 100-20% and find out the value of control parameter NC. We are getting NC values based on formula and examine that value of NC is linearly decreased when quality of referenced image is decreased. We can derive a formula according to simulation results as:

Normalized Correlation α Quality of Referenced Image

Where Quality of Referenced image is varying from 100 to 20 with the interval of 20, it can be easy to determine by the histogram as shown below:

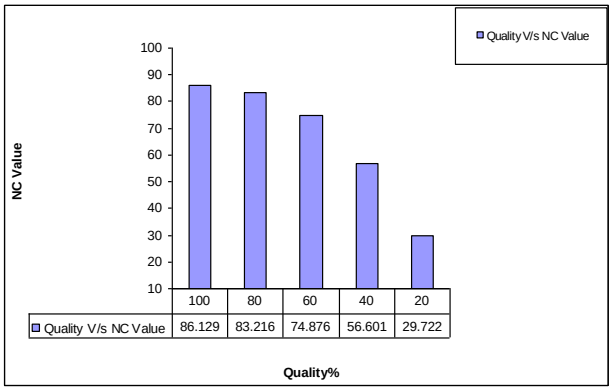

Fig. 7 Histogram of Quality V/S NC Values

VII. CONCLUSION

The results of our simulations are analysed and discussed in this section. Our study provides an optimal result which is fully based on simulation and analysis. The results are analysed and discussed in case of varying quality of referenced image and respectively we determine value of control parameter Normalized Correlation of extracted image. The purpose of this experimental study is to measure the quality of embed watermarks in video signals and to hide confidential data over it without any change and loss of data.

ACKNOWLEDGMENT

The authors are thankful to the JaganNath Gupta Institute of Engineering and Technology, Rajasthan, India for providing research facilities and their faculty for being the constant source of inspiration. The authors would like to thank Department of Electronics and Communication, Bhagwant University, Ajmer, and BIT, Bhagwantpuram, Muzaffarnagar, UP, India for his valuable support during the preparation of this paper.

REFERENCES

[1] A Video Watermarking Algorithm Based on the Human Visual System Properties Ji-Young Moon and Yo-Sung Ho Samsung Electronics Co., Paldal-gu, Suwon-si, Gyenggi-do,Korea Kwangju Instituteof Scienceand Technology(K-ST) Kwangju,500-712,Korea.

[2] An Efficient Digital Image-in-Image Watermarking Algorithm Using the Integer Discrete Cosine Transform (IntDCT) . J. Zhang, Anthony T. S. Ho ICICS-PCM 2003 15-18 December 2003 Singapore IEEE 2003

[3] C. Cachin, An Information-Theoretic Model for Steganography, Proceedings of 2nd Workshop on information Hiding, MIT Laboratory for Computer Science, May 1998

[4] M. D. Swanson, B. Zhu and A. H. Tewfik, Robust Data Hiding for Image, IEEE Digital Signal Processing Workshop, pp. 37-40, Department of Electrical Engineering, University of Minnesota, http://www.assuredigit.com/tech_doc/more/Swanson_dsp96_robust_datahiding.pdf, September 1999
[5] Voloshynovskiy Sviatolsav, Joachim J. and Su Jonathan K., Attacks on Digital Watermarks: Classification, Estimation-Based Attacks, and Benchmarks, Proceedings of IEEE Communications Magazine, vol. 39, pages 118--126, August 2001.
[6] C. I. Podilchuk and W. Zeng, Image-adaptive watermarking using visual models, IEEE J. Select. Areas Common. vol. 16, pp. 525539, May 1998.
[7] An efficient watermark embedding technique Ahmed A. Ab delwahab, E.M. Saad , Nessrin I. Yassin NRSC (2005) March 15-17, 2005 cairo Egypt
[8] Steganography and digital watermarking Jonathan Cummins ,Patrick Diskin, Samuel Lau and Robert Parlett, School of computer science, The University of Birmingham. DCT based Digital video Watermarking using HVS properties.
[9] David Houcque,"Introduction to MATLAB for Engineering Students",northwestern university, version 1.2, August 2005
[10] Anibal J.S. Ferreira. An odd-DFT based approach to time-scale expansion of audio signals. IEEE Trans. Speech and audio Proc., 7(4):441-453, 1999.
[11] K. R. Coombes, B. R. Hunt, R. L. Lipsman, J. E. Osborn, and G. J. Stuck. Differential Equations with MATLAB, John Wiley and Sons, 2000

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