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VIDEO STEGNOGRAPHY USING 32 *32 VECTOR QUANTIZATION OF DCT

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Abstract *:* Stegnography is a filed in which we merge content of one format to anther format.A lot of algorithms have been proposed into the same contrast . This paper focuses on video stegnography which has been achieved with 32*32 vector quantization of DCT . Previous research works have focused their work on 16*16 vector quantization in the combination of some other algorithms . Video stegnography is better than that of image stegnography as more amount of data can be merged into it as a matter of fact , Video is a combination of different image slices .The future of this proposed paper may involve combination of DCT with set of rules may be fuzzy or Neural.

Keywords*:* Stegenography , DCT , Vector Quantization

Introduction :

In the present electronic communication scenario, data security is one of the major challenges. After the World War II, the need for a secure and robust communication between the communicating entities has increased due to the fear of terrorism. The publishers of digital audio and video are worried of their works being corrupted by illegal copying or redistribution, hence it is of primary importance to protect information[1]. Cryptography is the method to hide secret data by scrambling so that it is unreadable, however it does not assure security and robustness as the hacker can obviously guess that there is a confidential message passing on from the source to the destination. Steganography is *concealed writing* and is the scientific approach [2] of inserting the secret data within a cover media such that the unauthorized viewers do not get an idea of any information hidden in it. Steganography is an alternative to cryptography in which the secrete data is embedded into the carrier in such way that only carrier is visible which is sent from transmitter to receiver without scrambling. The combination of cryptography and steganography provide high level security to the secrete information. Cover image is known as carrier image and is the original image in which the secret data ie., the payload is embedded. The unified image obtained after embedding the payload into the cover image is called the stego image. The recent boom in IT industry facilitates embedding data and security issues effectively.Image Steganography includes several techniques of hiding the payload within the cover image. The most popular hiding techniques are Spatial Domain[4] based Steganographic Techniques and Transform Domain based Steganographic Techniques. Spatial domain based steganography includes the Least Significant Bit (LSB) technique, and Bit Plane Complexity Steganographic (BPCS) technique. The LSB technique [1] is the most significant example of spatial domain embedding wherein the LSBs of the cover image is replaced by the MSBs of the payload. BPCS steganography hides secret data by means of block replacing. Each image plane is segmented into the same size pixel-blocks (a typical size of 8x8) which are classified into informative and noise like blocks. The noise like blocks is replaced by the secret blocks. In transform domain the cover image or the payload is transformed into frequency domain viz., Fast Fourier Transform, DCT, Discrete Wavelet Transform (DWT) and Integer Wavelet Transform. The DCT is used in common image compression format MPEG or JPEG, wherein, the LSBs of the DCT coefficients of the cover image are replaced by the MSBs of the payload. The Discrete Wave Transform [2] is used for hiding the secret message into the higher frequency coefficient of the wavelet transform while leaving the lower frequency coefficient sub band unaltered. The various ways of using transform domain techniques in steganography are (i)The cover image is transformed into frequency domain and LSBs of transformed domain are replaced by the spatial domain payload bit stream. (ii)The payload is converted into frequency domain and the coefficients are embedded into the spatial domain LSBs[5] of cover image. (iii) Both the cover and payload are transformed into frequency domain for embedding process. In contrary, steganalysis is a process of detecting the secret communication, against Steganography. Steganalysis is achieved by detecting any alteration in the carriers or the presence of some unusual signatures or any form of degradations. A hidden message can be attacked in different phases like stego-only attack, known cover attack, known message attack, known chosen cover or chosen message and known stego attack.

Steganography is an important area of research in recent years involving a number of applications[4]. It is the science of embedding information into the cover image viz., text, video, and image (payload) without causing statistically significant modification to the cover image. The modern secure image steganography presents a challenging task of transferring the embedded information to the destination without being detected. In this paper we present an image based steganography that combines Least Significant Bit(LSB), Discrete Cosine Transform(DCT), and compression techniques on raw images to enhance the security of the payload. Initially, the LSB algorithm is used to embed the payload bits into the cover image to derive the stego-image. The stego-image is transformed from spatial domain to the frequency domain using DCT. Finally quantization and runlength coding algorithms are used for compressing the stego-image to enhance its security. It is observed that secure images with low MSE and BER are transferred without using any password, in comparison with earlier works.

Contribution: In this paper we proposed a Bit Length Replacement Steganography Based on DCT Coefficients, where the number of payload bits L is embedded into the DCT coefficient of cover image based on the DCT coefficient of cover image in order to maximize the hiding capacity.

The following algorithms are used in the stegnography filed .

a)Preservation Type Algorithms

b)Detection Type Algorithms

c)Response Type Algorithms

d)Recovery Type Algorithms

DCT : Like other transforms, the Discrete Cosine Transform (DCT) attempts to decorrelate the image data. After decorrelation each transform coefficient can be encoded independently without losing compression efficiency. This section

describes the DCT and some of its important properties.[6]

There are two kinds of DCT techniques :

a)One Dimensional DCT

b)Two Dimensional DCT

The general equation for a 1D (*N* data items) DCT is defined by the following equation:

$$F(u) = \left(\frac{2}{N}\right)^{\frac{1}{2}} \sum_{i=0}^{N-1} \Lambda(i).cos\left[\frac{\pi.u}{2.N}(2i+1)\right] f(i)$$

and the corresponding ***inverse*** 1D DCT transform is simple $F^{-1}(u)$, i.e.

where

$$\Lambda(i) = \begin{cases} \frac{1}{\sqrt{2}} & \text{for} \xi = 0 \\ 1 & \text{otherwise} \end{cases}$$

The general equation for a 2D (*N* by *M* image) DCT is defined by the following equation:

$$F(u,v) = \left(\frac{2}{N}\right)^{\frac{1}{2}} \left(\frac{2}{M}\right)^{\frac{1}{2}} \sum_{i=0}^{N-1} \sum_{j=0}^{M-1} \Lambda(i).\Lambda(j).cos\left[\frac{\pi.u}{2.N}(2i+1)\right] cos\left[\frac{\pi.v}{2.M}(2j+1)\right].f(i,j)$$

and the corresponding ***inverse*** 2D DCT transform is simple $F^{-1}(u,v)$, i.e.:

where

$$\Lambda(\xi) = \begin{cases} \frac{1}{\sqrt{2}} & \text{for} \xi = 0 \\ 1 & \text{otherwise} \end{cases}$$

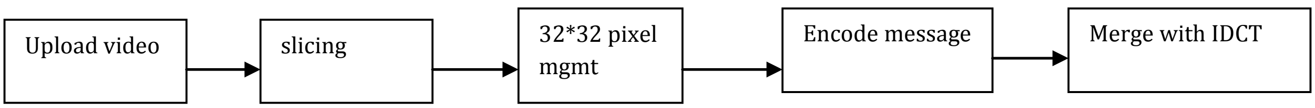
The basic operation of the DCT is as follows:

Vector Quantization

Vector quantization (VQ) is a lossy data compression method based on the principle of block coding. It is a fixed-to-fixed length algorithm. In the earlier days, the design of a vector quantizer (VQ) is considered to be a challenging problem due to the need for multi-dimensional integration.[7]

Proposed Scheme :

In our proposed work first of all the video has been sliced into different number of images. Then all the sliced images are passed to the 32*32 pixel management procedure followed by the LSB quantization method thorough which we find the vacant spaces of the images. The text message to be embedded is converted to the ascii encoded bits to make it compatible according to the vector table of the current segment of the video.The idea is to fill those bits first which occupy low intensity and if still there are bits left to be embedded then it to be embedded into high intensity bits .The scheme of embedding bits are finally performed by IDCT .



Results and Conclusions :The results obtained with the experimental setup is as follows . The results have been calculated using 3 size of video whose results have been categorized below.

Video Size in MB	Avg PSNR	Time to decode message in seconds
1.1<file<1.5	43.12	1.023
1.5<file<2.0	42.56	1.430
2.0<file<2.5	41.11	1.578

The experimental setup has been performed only using DCT quantization matrix. The current work scheme opens up a lot of possibilities for the future research workers. In future , the researchers can combine DCT with Back Propagation Algorithm of Neural Network for the betterment of the results as

BPA consists a whole rule set to identify the vacant positions of the image segment .

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