DATA HIDING USING INTEGER WAVELET TRANSFORM
(Solution to Today’s Energy Crisis)
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ABSTRACT
Steganography is an art of hiding the secret information inside digitally covered information. The secret information can be text, image, audio or video and accordingly the cover medium can be chosen as image or video. We shall perform steganography on video and hide the encrypted message; by this we get two times more security. Hiding of message is done using LSB (Least significant bit) technique, but before that the message is encrypted using AES algorithm. The proposed approach will utilize both video and audio components to hide the message, in video component we will hide the encrypted Message and in audio we hide the length upto which the message is hidden in video. The integer wavelet transform is applied to the video components and data is stored in the coefficients of video component. Experimental results show that the proposed technique has high payload capacity and low computational requirements.

Keywords: AES Algorithm, LSB, Integer Wavelet, Data Hiding & Retrieving, Sub Bands.

INTRODUCTION
Steganography and cryptography are the two main methods for information hiding and security today. Information hiding (steganography) aims at hiding the very existence of the secret message itself. It is done by hiding the secret data in any medium, so that is it not apparent that there is any data hidden in the cover medium. Cryptography is the technique which scrambles the secret information itself so that it cannot be understood without unscrambling it. Multimedia files such as image, audio and video are widely used today. Image and audio are good medium for hiding information, but both these mediums have very less storage capacity as compared to video, since video can be taken as collection of frames (Images) and audio. There are many cryptography algorithms which have been created to turn data into unreadable ciphers (encrypted data). The two basic methods are: Symmetric key cryptographic and Public key cryptography.

We will use symmetric key cryptography, Advanced Encryption standard to convert the plain text message into cipher text. Symmetric key cryptography uses same key for encryption and decryption of the message. This key should be known to both the sender as well the receiver. These algorithms are less complex and executes faster as compared to other algorithms.

In this paper, we have implemented a new method of steganography along with cryptography which will be applied to the video as a cover medium. We shall perform steganography on video files and hide the
message in encrypted format. The most commonly used is Least significant bit (LSB) steganography, but instead of LSB we will use a modified encoding technique which will first transform the video using Integer Wavelet transform and then apply LSB in the sub bands of the video.

II. PROPOSED TECHNIQUE
A. Cryptographic Model
In this, we will use the AES (128 bits key) symmetric key algorithm, which will convert the readable text into cipher (unreadable) text and this data is stored in the frames of the video. At the receiving end the cipher text is retrieved and decrypted using the shared key and is converted to plain text.

B. Hiding Procedure
A video is consisted of multiple frames. This methods uses some frames (or images) of the video to hide the secret message. The secret data is hidden in sequential frames. Each frame is treated as a different image and an image steganography method is applied to them. We use the 2DInteger Wavelet transform on each frame to get four sub bands. The data is hidden in these four sub-bands using LSB to hide 3 bits in each element of the sub-band. The length of the data stream which is encoded into the video is stored in the audio using simple LSB. The proposed method consists of the following phases:

C. Encryption of Secret Data into a Stream of Bits
To secure the data, we first apply the encryption on it so that it is converted into cipher text and is unreadable. The encrypted data is then read character by character and is converted into stream of bits. This stream of bits is encoded into the frames.

D. Applying Integer Wavelet Transform on the frames of video
The video consists of no. of frames, hence we apply image transformation on each frame. Wavelet transformation is use to convert the spatial domain into frequency domain, but most of the wavelet techniques produce real values which can result in data loss while hiding and retrieving the data. So to overcome this drawback we use Integer Wavelet Transform which gives integer values. Thus after applying Wavelet transform we get four sub bands.

E. Hiding bits in transform coefficients of four sub bands
Each frame of video consists of four sub bands, for each sub band we will find out RGB components and encode the message in RGB components in
sequential order for each sub band of each frame using LSB technique.

**F. Hiding the total length and number of bits in the last frame in Audio using LSB**

As we are storing the data sequentially in the frames, it might happen that the last frame will have less number of bits hidden in it. When we decode the original message at the receiver end we need to extract the message with exact length, also the total number of frames must be sent along with the message. So we will store this numbers sequentially in the audio using LSB technique.

**G. Histogram**

By comparing the histograms of the original and Stego image, we observe that the middle frequencies are affected the most when using this method, while the higher frequencies are unchanged. Thus video with higher frequencies remains unchanged.

**III. CONCLUSION**

The paper provides the new method for video steganography. The method which we have used considers the visual part of the video as set of images and the data is encrypted to make it secure and is hidden into the frames of the video, while the length of the data is hidden in the audio of the video. This changes we made to the video and audio part are hardly unrecognizable.

The Integer Wavelet transform is used to convert the frames of video into four sub bands, this proposed algorithm is highly robust. The algorithm can be tested in future with some more transform techniques to improve the performance. This implementation is simple and also provides two-layered security.

**REFERENCE**

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