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Camera image captures and secure graphical password DWT data authentication using LabView

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Abstract - The use of digital media applications , and copyright protection has obtained tremendous importance. Real time camera image digital Watermarking is a technology used for the copyright protection of digital applications. digital encryption and decryption, its history, requirements, and application. Due to piracy of data the need to have some technique to prevent piracy and illegal copying of data arises. This need give rise to a new technique, known as Digital Watermarking. While proposing any algorithm some parameters are needed to keep in mind on which the proposed algorithm must be consistent. These parameters are discussed in following section. Following sections are dedicated to watermarking application and attacks. A lot of work is going on for making watermarking techniques immune towards attack to retain the originality of image in receiving end and assuring successful extraction of encryption image to receiving the decryption image Iin receiving side with low error probabilities so to sort out disputes, if any, over copyrights or ownership of image.

Key Words: Real time camera image watermarking, DWT, DCT, PCA. Digital Watermarking, DCT, DWT, DFT. LabVIEW (2020), IMAQ NI-Vision & Advance Signal Processing Tools.

I.INTRODUCTION

The rapid growth of Internet and networks technique, multimedia data transforming and sharing is common in today's world. Multimedia data is easily copied and modified, so necessity for Copyright protection is increasing. Digital Watermarking has been proposed as technique for Copyright protection of multimedia data. The process of Digital Watermarking involves embedding and extraction of watermarked data in order to provide security. The embedding method must leave the original data perceptually un-changed, yet should impose modifications which can be detected by using an appropriate extraction algorithm. The digital content could be any data that the user likes to protect. The watermark is mainly used to authenticate the owner to ensure copyright protection. Digital watermarking refers to embedding of watermarks into a digital content. However, a technique named DWT method for digital video watermarking is divided in two parts; they are Embedding watermark and Extracting watermark.

This presents a new image encryption algorithm, which can improve the security of image during transmission more effectively. As a result, it's important for creators and distributors to protect their copyright and ownership of their digital media. In this background, watermarking technique is an effective method to solve the problem, and it has been widely used in the copyright protection. Now the digital video watermarking technique has become the focus of the theoretical research and practical application. Many schemes have achieved good results both in security and

robustness. However, some practical technical problems have not been a better solution. Many schemes are at the cost of complex theory and large computational quantity in order to obtain a better robust scheme, which is difficult to meet the real-time requirement, such as the broadcast monitoring, digital television system, etc. **NI LabView**

The NI LabVIEW stands for National Instrument Laboratory Virtual Engineering Workbench. LabVIEW offers a graphical coding to create an application. It offers a platform for designing a system virtually. It is also called as "G" which refers that coding is to be done in a graph form. LabVIEW programs are called as virtual instruments because it creates the hardware design/model on software platform. LabVIEW can be categorized into two main programming: Data flow programming and Graphical programming. The components of LabVIEW consist of namely acquisition, analysis and display. The three major aspects are required to complete a VI are,

- front panel of LabVIEW
- Block diagram of LabVIEW
- Icon/connector

The LabVIEW files are not any text files but they use an extension called Virtual Instrument file or VI file. This VI is only executable in LabVIEW only.

Fig1: Block Diagram of proposed method

In this method first wavelet transform decomposition is obtained over noisy image to get sub divided components then by thresholding the coefficient is adjust according to thresholding and filter out unwanted noise components. different digital image processing algorithms using LabView and IMAQ vision toolbox. IMAQ vision toolbox presents a complete set of digital image processing and acquisition functions that improve the efficiency of the projects and reduce the programming effort of the users obtaining better results in shorter time. Therefore, the IMAQ vision toolbox of LabView is an interesting tool to analyze in detail and through.

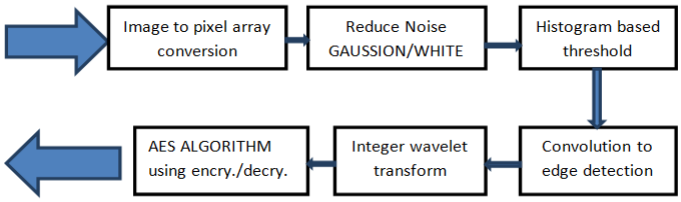
Sadik. A.M .Al-Taweel et al. proposed a novel DWT-based video watermarking algorithm based on a three-level DWT using Haar filter which is robust against geometric distortions such as Downscaling, Cropping, and Rotation. It is also robust against Image processing attacks such as low pass filtering (LPF), Median filtering, and Weiner filtering. Furthermore, the algorithm is robust against Noise attacks such as Gaussian noise, Salt and Pepper attacks. [1]

Min-Jeong Lee et al. proposed a real-time practical video watermarking technique on the compressed domain for HD video that is robust against video processing attacks. They focused on commonly used video processing such as downscaling, resolution, frame rate changing, Trans coding and developed for the broadcasting service. Video sequences consist of a series of consecutive still images or frames. [2]

Suppat Rungraungsilp et al. proposed a method for adding watermark that is hiding information into QR Code and compare for measure of performance in DFT and DWT domain. QR Code (Quick Response Code) embedded technique for invisible watermarking by using Discrete-Fourier-Transform (DFT) compare with Discrete-Wavelet-Transform (DWT). [3]

Shanjun Zhang et al. proposed a novel watermarking method based on discrete wavelet transform (DWT) to embed QR codes into still digital images. Almost a technique embeds watermarks in the frequency domain, such as DCT and DWT. One of the most difficult problems in digital video watermarking is watermark recovery from images with possible perturbations, including, degradation due to noise or compression, transformation by filtering, re-sampling, and other intentional or unintentional operations. The watermark should be selected and be properly dealt with such that it does not corrupt t [4]

G. Langelaar et al. proposed an innovative practical video watermarking scheme based on MPEG-2.They check robustness and imperceptibility of the scheme. Robustness means that the watermarked data can withstand different image processing attacks and imperceptibility means that the watermark would not introduce any perceptible facts. Watermarking systems can be classified to three main types which are non-blind, semi-blind, and blind according to



whether the original media is required or not during the extracting procedure. Non-blind technique requires the original image semi-blind technique only needs the watermark; and blind technique requires neither the original image nor the watermark. [5]

Gaurav Bhatnagar et.al. proposed a method "Wavelet packet transform-based robust video watermarking technique" a wavelet packet transform (WPT)-based robust video watermarking algorithm is proposed. A visible meaningful binary image is used as the watermark. First, sequent frames are extracted from the video clip. Watermark is embedded in the robust sub-bands based on the relationship between wavelet packet coefficient and its 8-neighbour (*D*8) coefficients considering the robustness and invisibility. Experimental results and comparison with existing algorithms show the robustness and the better performance of the proposed algorithm.[6]

S.Nafees Ahmed et al. proposed video data embedding scheme the embedded secret data is randomly segmented and reconstructed without knowing the original host video. Secret data is embedded in individual video frames using

the frequency domains of DWT. In this paper, embeds different parts of a single watermark into different scenes of a video under the discrete wavelet domain. To increase robustness of the scheme, the watermark process is carried out in the video. In video data embedding scheme the embedded secret data is randomly segmented and reconstructed without knowing the original host video. Secret data is embedded in individual video frames using the frequency domains of DWT. [7]

Kesavan Gopal et al. proposed Watermarking of Digital Video Stream for Source Authentication Watermarking in real time will solve the source authentication issues. The parties involved in real time stream exchange, checks the authenticity of the data received, by extracting the watermark bits embedded in the stream. This watermark can be introduced into the video stream at source, channel or at the receiver side. In our work, we propose a simple video streaming authentication system using watermarking at the source principle rather than at video delivery or at channel.[8]

Tamanna Tabassum et al. proposed" A Digital Video Watermarking Technique Based on
Identical Frame Extraction in 3-Level DWT" In the proposed method, first the host video is divided into video shots. Then from each video shot one video frame called identical frame is selected for watermark embedding. Then the proposed watermark embedding process, including identical frame extraction technique is 3-Level-DWT, Watermark embedding, Watermark detection. Perceptibility expresses amount of distortion caused by watermark embedding. In other words, it indicates how visible the watermark is. It is measured by peak signal-to-noise ratio (PSNR). the time has been positions and their intensity level. [23]

Pik-Wah Chan et al. DWT-based Digital Video Watermarking Scheme with Error Correcting Code “digital video watermarking algorithm is proposed. We present a novel DWT-based blind digital video watermarking scheme with scrambled watermark and error correcting code. Our scheme embeds different parts of a single watermark into different scenes of a video under the wavelet domain.[10]

Mr Mohan A Chimanna et al. Digital Video Watermarking Techniques for Secure Multimedia Creation and Delivery digital media applications, multimedia security and the copyright protection has gained tremendous important. Digital watermarking is a technology used for the copyright protection of digital application. In this paper we have compressive approach for digital video watermarking is introduced, where watermark image is embedded in to the video frame each video frame is decomposed in to sub images using 2 level Discrete Wavelet Transform (DWT) and Principal Component Analysis (PCA) Transform is applied for each block in the two bands LL & HH combining the two transforms improved the performance of the watermark algorithm. In this paper we proposed an imperceptibility and robust video watermarking algorithm based on Discrete Wavelet Transform (DWT) and Principal Component Analysis (PCA).[11]

G.Prabakaran et al."A Robust QR- Code Video Watermarking Scheme Based on SVD and DWT Composite" Domain The 2D Barcode with a digital watermark is widely interesting research in the security field. In this paper propose a video watermarking with text data (verification message) by using the Quick Response (QR) Code technique. The QR Code is prepared to be watermarked via a robust video watermarking scheme based on the (singular value decomposition) SVD and (Discrete Wavelet Transform) DWT. In addition to that logo (or) watermark gives the authorized ownership of video document. SVD is an attractive algebraic transform for watermarking applications. SVD is applied to the cover I-frame. [12]

This paper suggests efficient methods for generating self-invertible matrix for Hill Cipher algorithm. These methods encompass less computational complexity as inverse of the matrix is not required while decrypting in Hill Cipher. This proposed method for generating self-invertible matrix can also be used in other algorithms where matrix inversion is required. Although the algorithm presented in this project aims at image encryption and decryption, it is not just limited to this area and can be widely applied in other information security fields such as video encryption. This provides the security against the different attacks like brute-force attacks. Proposed Advance Hill algorithm is more secure to brute force attacks as compared to original Hill cipher algorithm. A Brute Force Attack requires 27+8*(*n* / 2)2 number of key generations; where n is the order of key matrix. Advance Hill is a fast encryption technique which can provide satisfactory results against the normal hill cipher technique. The proposed scheme is resistant against known plaintext attacks. So, the image encryption with Advance Hill cipher is quick response encryption scheme.

In this chapter broad variety of image encryption technique has been categorized on the basis of the following:

1. Spatial Domain
2. Frequency domain

Encryption and decryption in image in spatial domain considered as a simple and low complexity method and usually is done in the luminance component and color component. However, there are some major limitations but still this method performs well. The brief introduction of this technique has been explained and they are as follows:

1. Least significant bit modification (LSB)
2. Correlation based techniques

The main strength of transform frequency domain techniques is addressing the restrictions of spatial methods, moreover special features to represent an alternative view of a signal. The main drawback with frequency domain

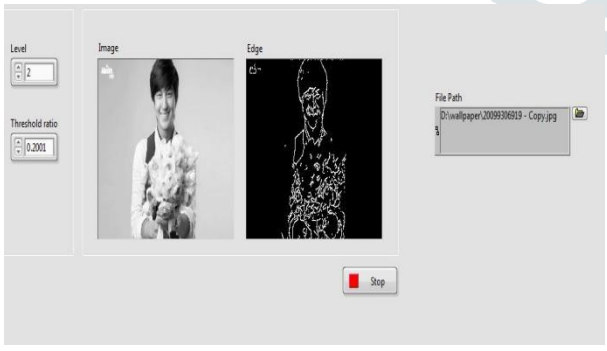
refers to high computational requirement. Methods of wavelet technique based on frequency domain are as follows:

1. Discrete Cosine Transform (DCT)
2. Discrete Fourier Transform (DFT)
3. Discrete Wavelet Transform(DWT)

A color mask is generally used (RGB Filter) for acquisition of color images. This filter allows decomposing the light in three bands, Red, Green and Blue. The three matrixes are generated and each one of them stores the light intensity of each RGB channel fig.(). The next example () shows to acquire image from a webcam using the **NI Vision Acquisition Express**.

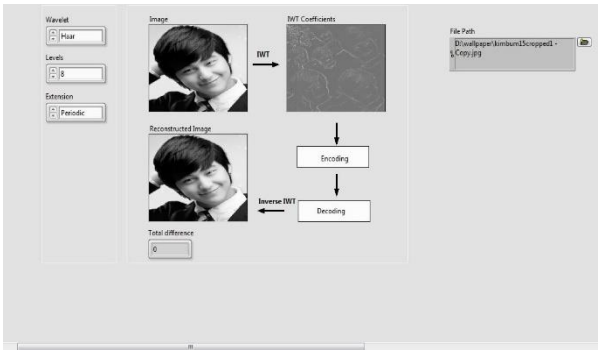
This block is located in Vision/Vision Express toolbox and it is the easiest way to configure all the characteristics in the camera. Inside this block there are four sections: the first one corresponds to the option of "select acquisition source" which shows all the cameras connected in the computer. The next option is called "select acquisition type" which determines the mode to display the image and there are four modes: single acquisition with processing, continuous acquisition with inline processing, finite acquisition with inline processing, and finite acquisition with post processing. The third section corresponds to the "configure acquisition settings" which represents the size, brightness, contrast, gamma, saturation, etc. of the image and finally in the last option it is possible to select controls and indicators to control different parameters of the last section during the process. In the example presented in fig. it was selected the continuous acquisition with inline processing, this option will display the acquired image in continuous mode until the user presses the stop button.

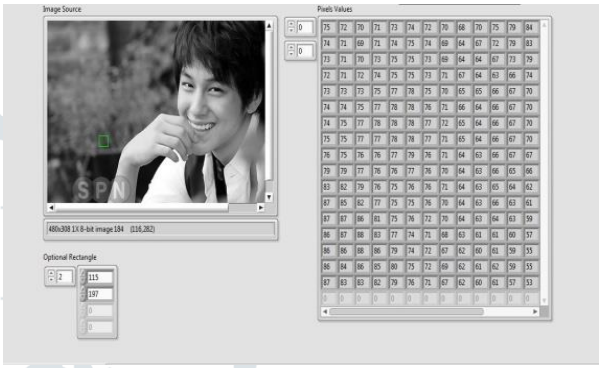
Fig2: Block Diagram of proposed process using lab view



Result

The proposed algorithm is applied to a sample camera password which has been taken from laptop from camera itself in JPEG format. The proposed algorithm shows a good





watermarking ability since the original sample frame and its corresponding watermarked frame looks quite identical. The performance of the proposed algorithm is used to hiding the defense data with high security. It is tested using real time image in frames. The size of the frame is 360x268.This algorithm is evaluated when varying the size of the watermark by changing the different level and wavelet function in embedded watermark. Peak Signal to Noise Ratio (PSNR) is used as a general measure of the visual quality of the watermarking system. The PSNR value of gamma, hue and brightness saturation varied. The PSNR value depends on this value.

PSNR: The Peak-Signal-To-Noise Ratio (PSNR) is used to measure deviation of the watermarked and attacked frames from the original video frames and is defined as

Where MSE (Mean Squared Error) between the original and distorted frames of size m×n is defined as:

$$PSNR = 10 \log log \left(\frac{255^2}{MSE}\right)$$

$$MSE = \frac{1}{mn} \sum_{i=1}^{m} \sum_{j}^{n} [I(i,j)(i,j)]$$

Where *I* and I' indicates the pixel values at location (i,j) of the original sample frame and watermarked frame respectively. Higher the value of PSNR more the imperceptibility of watermarking. Its unit is in decibels (dB).

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NC: The normalized coefficient (NC) gives a measure of the robustness of watermarking and its peak value is 1. Since in this work no attack has incorporated hence the value is always been 1.

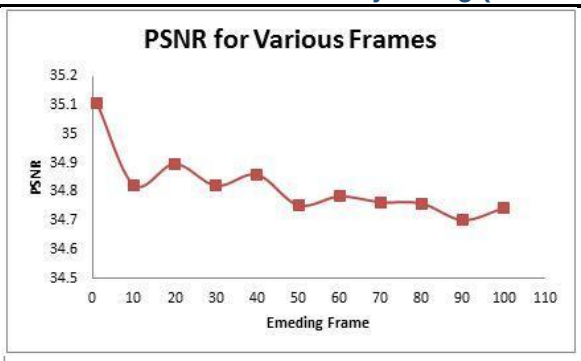
$$NC = \frac{\sum_i \sum_j W(i,j).W'(i,j)}{\sum_i \sum_j W(i,j)^2}$$

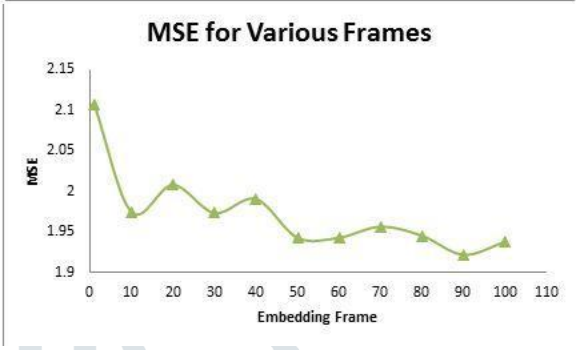
Where W and W′ represent the original and extracted watermark respectively.

Figure 03.Lab view front panel (GUI) of proposed method

The strength of watermarking depends on the value of wavelet function. By increasing the value of watermarking strength, we can increase the strength of watermark in the video but it decreases the quality of the video. The various values frame has been used in this work and the corresponding values of PSNR and MSE have been observed as follows in the table given below in table 1

Table 1. Various values of PSNR and MSE for different frames of real time image

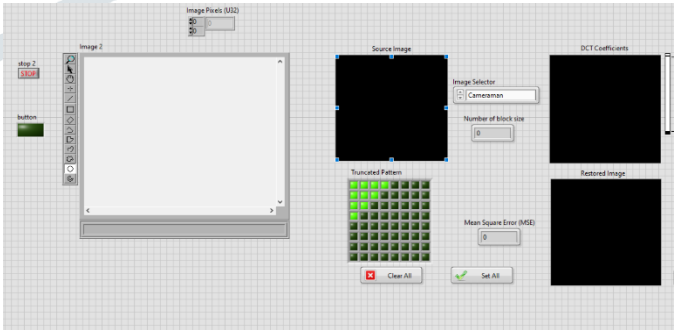




From figure 11 it is depicted that as the value of embedding strength increases the value of PSNR decreases and similarly fig 12 shows the value of MSE for each frame of the image.

V.CONCLUSION AND FUTURE SCOPE

In the current work implementation of digital video watermarking technique based on Discrete Wavelet Transform (DWT) is proposed. DWT technique is a robust among all due to its multi resolution capability. Graphical programming is created using LabVIEW . In this proposed technique watermarked frames are almost identical to original video frame for low values of embedding strength. The proposed technique is less time consuming since it does not require tedious programming.



For the future work various attacks can be applied in this proposed model and their effect on watermarking can be studied also this model can be compared with other watermarking along with the same platform will be used for other kind of watermarking techniques like DCT, DFT etc.

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