Secure Video recognizing Based on Pixel Integration Technique

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Abstract-This paper focuses on implementing a secure video technique that enables to select one of the several videos displayed with a unique security key for each image. This process involves applying a block based interleaving, followed by integrating the image matrix using the pixel based integration technique and encrypting the videos with elliptical curve cryptography algorithm. With the key specifically generated for the image, the original image is decrypted from images. This method is useful when access permissions needs to be restricted to certain viewers.

Keywords- Pixel Integration, Elliptical Curve Cryptography Algorithm, Encryption, Frame conversion, Frame Extraction.

I.INTRODUCTION

The Recent trends in Digital Image Processing is a multimedia applications. Security is an important issue in image storage and communication. Encryption algorithm plays as major role for security. In communication network, data exchange presents certain risk factor ,which requires the existence of appropriate security measures. For example, the images are transmitted and can be copied or saved during their transmission without loss of image quality. During an exchange images can be hacked in time of digital information storage and reproduce illegally. It is therefore necessary to develop software for effective protection of transferred data against arbitrary interference. Data encryption with image merging is very often the only effective way to meet these requirements. Similar to the image the videos or multimedia data sharing on network need privacy and security to transmit into the destination.

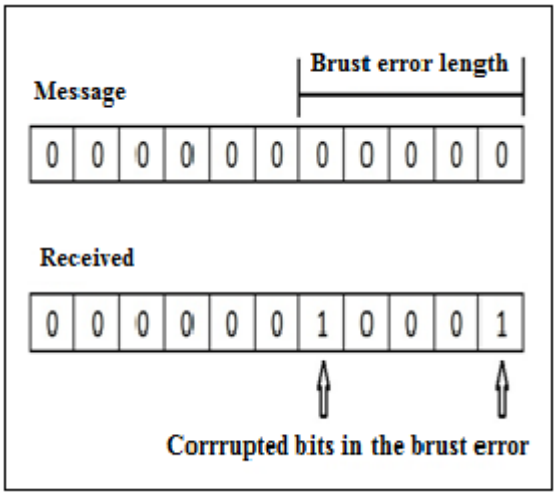


Fig.1.Transmitted and Received Bits

Recently, mobile devices such as smart phones and tablets have become the most important medium for delivering internet traffic, especially multimedia content, to end users. However, mobile embedded memory incurs large power consumption owing to the highly frequent access and extensive computation. Wireless networks are becoming more popular in the recent days and the demands of the users are increasing rapidly especially for different type of multimedia applications. These applications have very stringent quality of service requirements such as high data rate, low delay and low delay jitter. Examples of such applications are multimedia conferencing, MPEG video streaming, simultaneous transmission of multiple HDTV signals, audio and online gaming etc. To meet these requirements currently the IEEE 802.11 task group is working on the next generation of WLAN standard which will support at least 130 Mbps, and potentially goes beyond 600 Mbps, which is about ten times higher than the current IEEE 802.11a/g.

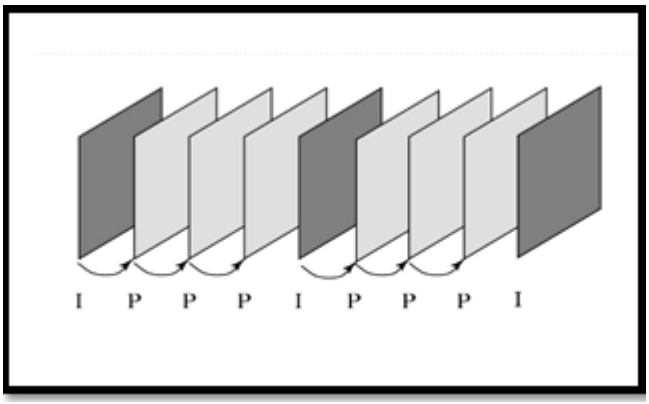


Fig.2.Frame Sequence of H.261

A).Image Processing

Image processing is a method to convert an image into digital form and perform some operations on it, in order to get an enhanced image or to extract some useful information from it. It is a type of signal dispensation in which input is image, like video frame or photograph and output may be image or characteristics associated with that image. Usually Image Processing system includes treating images as two dimensional signals while applying already set signal processing methods to them.

It is among rapidly growing technologies today, with its applications in various aspects of a business. Image Processing forms core research area within engineering and computer science disciplines too. Image processing basically includes the following three steps.

- Importing the image with optical scanner or by digital photography.
- Analyzing and manipulating the image which includes data compression and image enhancement and spotting patterns that are not to human eyes like satellite photographs.
- Output is the last stage in which result can be altered image or report that is based on image analysis.

B. Purpose of Image Processing

The purpose of image processing is divided into 5 groups. They are:

- Visualization - Observe the objects that are not visible.
- Image sharpening and restoration - To create a better image.
- Image retrieval - Seek for the image of interest.
- Measurement of pattern – Measures various objects in an image.
- Image Recognition – Distinguish the objects in an image.

C).Types

The two types of methods used for Image Processing are Analog and Digital Image Processing. Analog or visual techniques of image processing can be used for the hard copies like printouts and photographs. Image analysts use various fundamentals of interpretation while using these visual techniques. The image processing is not just confined to area that has to be studied but on knowledge of analyst. Association is another important tool in image processing through visual techniques.

Digital Processing techniques help in manipulation of the digital images by using computers. As raw data from imaging sensors from satellite platform contains deficiencies. To get over such flaws and to get originality of information, it has to undergo various phases of processing. The three general phases that all types of data have to undergo while using digital technique are Pre- processing, enhancement and display, information extraction. Many of the techniques of digital image processing, or digital picture processing as it often was called, were developed in the 1960s at the Propulsion Laboratory, Massachusetts Institute of Technology, Bell Laboratories, University of Maryland, and a few other research facilities, with application to satellite imagery, wire-photo standardsconversion, imaging, videophone, characterrecognition, and photograph enhancement. The cost of processing was fairly high, however, with the computing equipment of that era. That changed in the 1970s, when digital image processing proliferated as cheaper computers and dedicated hardware became available. Images then could be processed in real time, for some dedicated problems such as television standards conversion. As general-purpose computers became faster, they started to take over the role of dedicated hardware for all but the most specialized and computer-intensive operations. With the fast computers and signal processors available in the 2000s, digital image processing has become the most common form of

image processing and generally, is used because it is not only the most versatile method, but also the cheapest.

Digital image processing technology for medical applications was inducted into the Space Foundation Space Technology Hall of Fame in 1994.

In 2002 RaananFattel, introduced Gradient domain image processing, a new way to process images in which the differences between pixels are manipulated rather than the pixel values themselves.

II. RELATED WORK

Pixel integration

The input images are represented as pixel values ranging from 0-255 in the mxm matrix. Create a pixel integration table with the pixel values forming the columns with values 1-266 and the input images are taken along the rows. We consider the color depth of the images as 16-bit, thus dividing the image matrix into sub-blocks of 4x4.

For instance, considering a 64x64 image and dividing it into 4x4 blocks will produce 16 blocks, each of 4x4 size. The pixel integration table is created by assigning the pixel index to the corresponding pixel value for the first block of every image, later the second block of every image, and so on till the last block. In case of multiple indices with the same pixel value in a block, the value is calculated by representing them in the 16-bit color RGB palette and finding their corresponding value.

This process is carried on for all the blocks of the image and the results are noted. Image Integration is finally done by summing up the pixel indices.

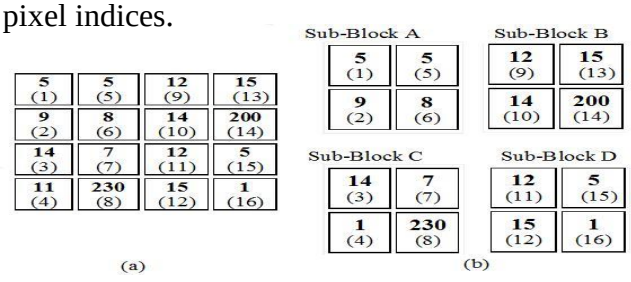


Fig. 3. (a) Image Pixel value for 4*4 Image Size (b)Sub-blocks image pixel value for (a)

III. PROPOSED METHOD

A).Frame Extraction

The gray value of a frame is within a certain range to allow viewers to have subjective perception about the video content. Four images with low gray values are extracted from a single video, which is difficult for almost viewers to recognize the content. The final frame sequence must be arranged in chronological order consistent with original video sequence, in order to satisfy temporal features and to be different from the short promotion trailer. Appropriate redundancy of some key frames is allowed to ensure the periods or intervals along the processing of video content indicates the condition by selecting four images from a tested video, which are with similar content. Frames are extracted from a tested video, which are always too dark for viewers to perceive the video content. The phenomenon is sometimes with gradual transitions of shots. In order to distinguish and program trailers and other programs, the intervals between extracted key frames must be consistent with the frames from the original video. As online video piracy is often divided into smaller video files for playback, thus mastering the frame extraction should allow appropriate redundancy to ensure a period of time.

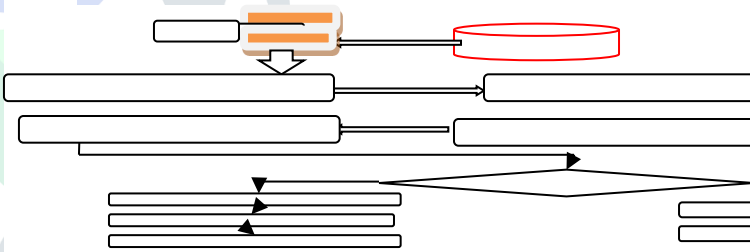


Fig4. Block Diagram of the proposed system

B)Frame Conversion

Step 1: Split the given frames into block with m rows & n Columns B(i,j,k) stands for the block at (i ,j) in the given frame.

Step 2: Computing the histogram matching difference between the neighboring blocks in consecutive frames for a video sequence H(i,j,k) and H(i ,j,k+1) stands for the histogram of blocks at (i,j) in the k^{th} and $(k+1)^{th}$ frames respectively the block difference is measured from frame theory.

Step 3: Evaluate the histogram difference between the two consecutive frames

*Step4:*calculating the threshold by the use of mean and standard variance of histogram which are

differ over the whole video sequence and is different for different kind of information extracted. Mean and standard variance can be calculating

Step 5: Calculating the total number of frames the main part of multiplier, which uses real partial products to calculate results; TP is the truncation part (Fig. 1, shaded region), which will be truncated using fixed-width multiplication; and σ represents the compensated bias of the MLCP estimator, which consists of TPmj and TPmi parts by performing the rounding operation Round()

Reference frame: it is a first frame of each shot. General frame: all other frame except the reference frame. Shot dynamic factor max(i): it is the maximum histogram within a shot i. Dynamic shot: if its max(i) is bigger than the mean value. Static shot: if max(i) is less than mean value.

Ahmed Bashir Abugharsa et al. [7] proposed an encryption algorithm based on the rotation of the faces of a Magic Cube.This process involves dividing the original image into six sub-images and further these sub images are divided into small blocks and attached to the faces of magic cubes.

Mitra A et al. [8] have proposed image encryption using a combination of different permutation techniques.

Sinha A et al. [10] proposed a new technique for image encryption and decryption in which the image is broken up into bit planes. A new method to jigsaw the image has been proposed in which every block is trans-located to a different location of the three dimensional cube.

Zhi-Hong Guan etal. [12] proposed encryption scheme based on position shuffling and changing the image pixel grey values are combined to confuse the relationship between the plain-image and the cipher-image. Rogelio Hasimoto Beltran et al. [9] proposed interleaving scheme where the de-correlation process is applied not only at a block, but also at a co-efficient or pixel level in the compressed domain.

Frank Dellaert et al. [11] proposed image-based tracking algorithm, which relies on the selective integration of a small l subset of pixels that contain a lot of information about the state variables to be estimated.

C).Elliptical Curve Cryptography

Elliptical curve cryptography (ECC) [3] function is based on public key encryption technique based on elliptic curve theory that can be used to create efficient cryptographic keys which is smaller and faster. Key generated through the properties of the Extraction of high-resolution frames from video sequences The human visual system appears to be capable of temporally integrating information in a video sequence in such a way that the perceived spatial resolution of a sequence appears much higher than the spatial resolution of an individual frame. While the mechanisms in the human visual system that do this are unknown, the effect is not too surprising given that temporally adjacent frames in a video sequence contain slightly different, but unique, information. This paper addresses the use of both the spatial and temporal information present in a short image sequence to create a single high-resolution video frame. A novel observation model based on motion compensated sub-sampling is proposed for a video sequence. Since the reconstruction problem is ill-posed, Bayesian restoration with a discontinuity-preserving prior image model is used to extract a high-resolution video still given a short low-resolution sequence. Estimates computed from a low-resolution image sequence containing a sub-pixel camera pan show dramatic visual and quantitative improvements over bilinear, cubic B-spline, and Bayesian single frame interpolations.

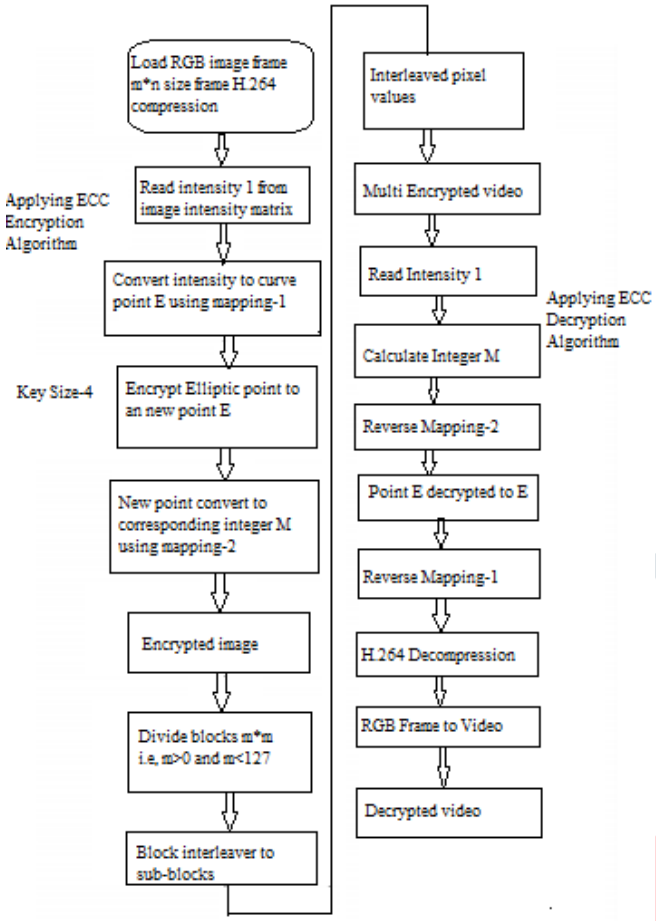


Fig.5. ECC algorithm

Visual and quantitative improvements are also shown for an image sequence containing objects moving with independent trajectories. Finally, the video frame extraction algorithm is used for the motion-compensated scan conversion of interlaced video data, with a visual comparison to the resolution enhancement obtained from progressively scanned frames.

i.Motion Analysis

Motion analysis has been investigated in many video applications especially for object tracking or object recognition. It studies methods in which two or more video frames from an image sequence are processed. As a preprocessing technique, motion vector analysis from temporal frames is believed helpful for video text detection. It produces time-dependent information about the motions of both the foreground objects and their backgrounds to provide hints for identifying texts from consecutive video frames.Their method proposed for motion analysis is based on the comparison of regions in successive frames.

ii. Text Tracking

This step is responsible for tracking the already detected text along the fames that constitute each text sequence targeting the formation of temporally related chains of characters. Each character chain here represents the same character during its existence in the video sequence and consists in a collection of similar regions, occurring in several contiguous frames. Every time a character region is detected for the first time, a position is stored and a signature is computed for that character region by using the features of luminance, size, and shape. Each frame contributes with one region classified as a character for the construction of a character chain.

iii .Text Integration

This step groups the character chains in order to form words based on the spatial and temporal analysis of each character chain. Three temporal elements are adopted: (a) temporary coexistence, (b) duration, and (c) motion. The chains not included in words at this phase are considered as noise and are discarded.

iv. Character Recovery

Video temporal redundancy is explored to complete the words with missing characters as least for some frames.

v. Elimination of Overlapped Words

It is important to improve the performance for scene text. Usually, overlapping of words occurs when false words are detected.

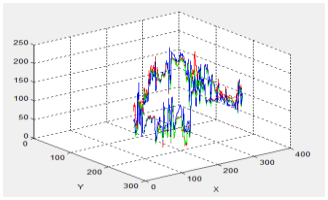
i. Text Rotation

This step performs the rotation of the text to the horizontal position in order to be recognized OCR systems.

IV.RESULT ANALYSIS

To increase 2% clarity of the gray color image. From By using histogram equalizer the intensity of the image is adjusted to enhance contrast.

Fig.6. Converting RGB Color Image Into Gray Color Image



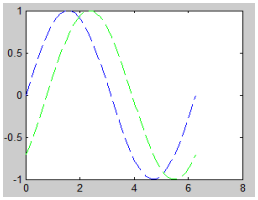


Fig.7. Graphical Representation of the increased Clarity Rate

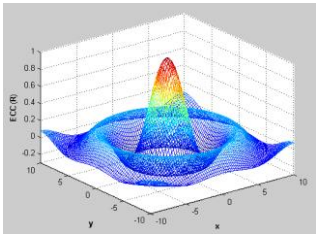


Fig.8.Graphical Representation ECC Algorithm

Fig.9.Boundary Extracted Image

V.CONCLUSION

Digital video security has become highly important since the communication by transmitting of digital products over the network occur very frequently. The elliptical curve cryptography algorithm is proposed, based on pixels interleaving with video integration in this paper. First, interleaving the image pixels, then through the method of pixel integration increasing the difficulty of decoded. At last, a camouflaged video for all the input images, getting the final encryption image. Experimental result shows good performance with low correlation and high entropy which shows that the pixel based algorithm is highly secure. With this approach it is also able to encrypt large volume of data more securely. Our new approach is expected to be useful for transmission applications and real time system.

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