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Secure Image Encryption and Decryption in Full Motion Video

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Abstract: Encryption and Decryption is mainly used to transfer the data between the two communication channels. This paper explains the normal approach of the encryption as well as decryption by using chaotic algorithm and also tried to implement this in video frames. Here the basic chaotic encryption algorithm used to encrypt the images by using the three dynamic chaotic systems (Lu or Chen or Lorenz) to shuffle the pixel positions (permutation) and changing the pixel values (scrambling) to confuse the relationship between the plain image frame and cipher image frame by changing this it automatically increase the resistance to attacks.

Keywords: chaotic algorithm, frame shot video image capture, image encryption , decryption, gray scale image.

1. INTRODUCTION

In present situation security of digital images draws more attention, especially when these digital images are stored in memory or send through the communication networks. Many different image encryption techniques have been proposed to save the security of images. Image encryption and decryption techniques try to convert an image and change the image that is hard to understand by changing the pixel positions and also by changing the values of the pixel.

This paper, a new image encryption scheme which employs one of the three dynamic chaotic systems (Lorenz or Chen or LU chaotic system) to shuffle the position of the image pixels (pixel position permutation) and uses another one of the same three chaotic maps to confuse the relationship between the cipher image and the plain-image (pixel value diffusion), thereby significantly increasing the resistance to attacks.

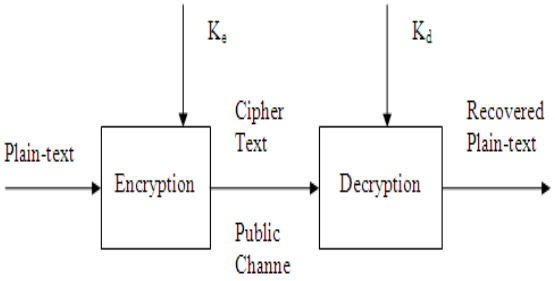
The feature of this approach includes high security and high feasibility for easy integration with digital image transmission applications. The experimental results of the proposed technique confirmed that high throughput rate required for real time data protection was achieve. By using this algorithm it takes more time to encrypt the images in video frame.

2. ENCRYPTION AND DECRYPTION BY USING CHAOTIC ALGORITHM

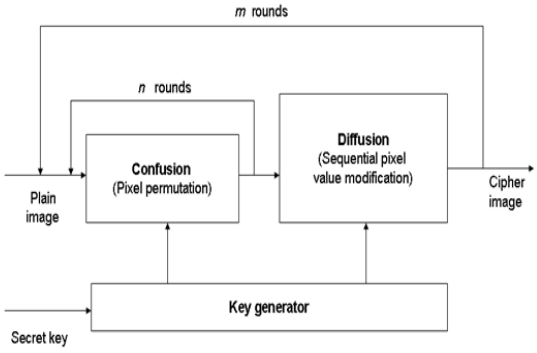
The chaotic image cryptosystem mainly it consists of two stages. The plain image is given at its input and another image as key. In confusion process we are going to change the pixel positions and the image will disturbed without changing the value of the image and the image will change to unrecognizable.

Second stage of encryption process is to change the value of the particular pixel so that we can provide security over the image the pixel values are modified sequentially by generating one of three chaotic systems by using external key. The whole confusion-diffusion round repeats for a number of times to achieve a satisfactory level of security.

The process will be for normal images, we are trying to implement the same algorithm for motion video.



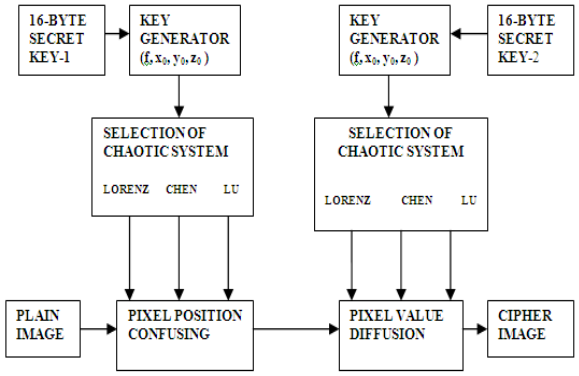
Encryption and Decryption Process



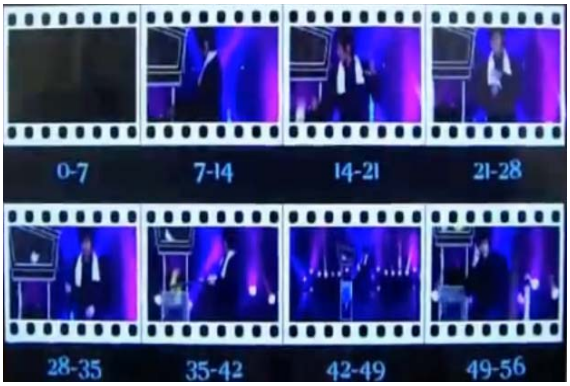
Architecture Chaos-Based Image Cryptosystem

a)Encryption process

By using chaotic algorithm we are trying to implement the same procedure for frames, here in the normal video it takes minimum of 30 to 60 fps to run a video if we take 1sec video it consists of 30 to 60 frames in this we are going to select one frame and applying the chaotic algorithm for this frame to encrypt the process.



Chaos encryption process



Dividing the full motion video into parts of frames

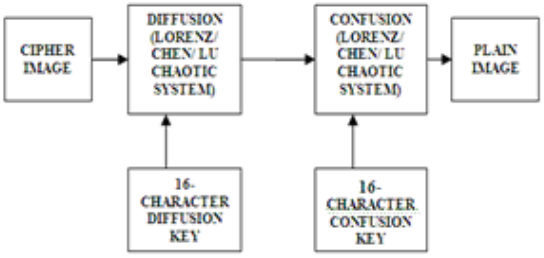
Dividing into individual frames

PLAIN IMAGE

This is the plain image frame by using another key frame we are trying to encrypt the frames randomly and after completion of encryption process we run it as the normal video. Key image will be applied to this particular frame and then apply chaotic algorithm to that particular frames.

B) Decryption Process

The first stage in the decryption process is the diffused image decryption stage. In the encryption process, the pixel value diffusion was carried out with any one of the three chaotic systems. Therefore, in the decryption process to retrieve the original pixel values, again any one of the chaotic system (Lorenz, Chen, Lu) is employed in the first stage of decryption.



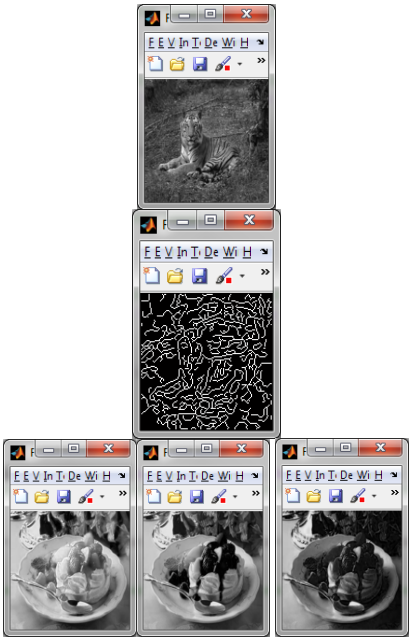
Chaos decryption process

CHAOS BASED DECRYPTION SYSTEM

In this decryption process will be reverse process of encryption. We divide the video into frames and try to decrypt the image based on the key and the image frame encrypted.

3. EXPERIMENTAL RESULTS

Plain image



Changing the images to RGB color formats

Confusing the pixels

Combining the images

The experiment results explains about the chaotic process and each step explains how it going work .It clearly explains about the step by step process of chaotic algorithm. Decryption is the reverse process for the particular plain image we try to implement this by using the another gray scale image as key and same process will be applied for frames in the video.

4. FUTURE ENHANCEMENT

By using this chaotic algorithm it takes more time to execute this process by using significant bit algorithm we can execute the process very fastly.

5. CONCLUSION

It can be concluded from the above results that the image was properly encrypted and decrypted. It takes less time to encrypt and decrypt the frame, but if we apply the same process for number of frames in a full motion video it takes more time to execute this process by using this algorithm. We can provide security by using this algorithm.

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