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# A New Reversible Data-Hiding Algorithm for Encrypted Image

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**ABSTRACT:** The concept of mosaic steganography was proposed by Lai and Tsai for information hiding and retrieval using techniques such as histogram value, greedy search algorithm, and random permutation techniques. In the present paper, a novel method is attempted in mosaic image steganography using techniques such as Genetic algorithm, Key based random permutation. The creation of a predefined database of target images has been avoided. Instead, the randomly selected image is used as the target image reduces the enforced memory load results reduction in the space complexity. GA is used to generate a mapping sequence for tile image hiding. This has resulted in better clarity in the retrieved secret image as well as reduction in computational complexity. The quality of original cover image remains preserved in spite of the embedded data image, thereby better security and robustness is assured. The mosaic image is yielded by dividing the secret image into fragments and embed these tile fragments into the target image based on the mapping sequence by GA and permuted the sequence again by KBRP with a key. The recovery of the secret image is by using the same key and the mapping sequence. This is found to be a lossless data hiding method.

## I. INTRODUCTION

Steganography is the art of hiding information in other information. Cryptography is also a technique for securing the secrecy of communication and many different methods have been developed to encrypt and decrypt data in order to keep the original message secret. Since in cryptography the encrypted code itself is visible, the concept of steganography has been introduced to embed the message either encrypted or not to make it invisible during communication to secure from eavesdroppers. In other words, Steganography differs from cryptography in the sense that the cryptography focuses on keeping the contents of a message secret whereas the steganography focuses on keeping the existence of a message secret. But, once the presence of hidden information is revealed or sensed or even suspected, then the purpose of steganography is partly defeated. The strength of steganography can thus be amplified by combining it with cryptography. Digital images are the most popular because of their frequency on the Internet. For hiding secret information in images, there exists a large variety of steganographic techniques some are more complex than others and all of them have respective strong and weak points. Different applications have different requirements of the steganography technique used. For example, some applications may require absolute invisibility of the secret information, while others require a larger secret message to be hidden. In image steganography the information is hidden exclusively in images. The main issue in these techniques is the difficulty to hide a huge amount of image data into the cover image without causing intolerable distortions in the stego-image. Recently, Lai and Tsai proposed a new type of computer art image, called secret-fragment-visible mosaic image, which is the result of random rearrangement of the fragments of a secret image in disguise of another image called target image, creating exactly an effect of image steganography. The above mentioned difficulty of hiding a huge volume of image data behind a cover image is solved automatically by this type of mosaic image.

## II. RELATED WORK

### PROPOSED METHOD

A new type of art image, called secret-fragment-visible mosaic image, which contains small fragments of a given source image is proposed in this study by Observing such a type of mosaic image, one can see all the fragments of the source image, but the fragments are so tiny in size and so random in position that the observer cannot figure out what

the source image looks like. Therefore, the source image may be said to be secretly embedded in the resulting mosaic image, though the fragment pieces are all visible to the observer. And this is the reason why the resulting mosaic image is named secret- fragment-visible.

## MODULES DESCRIPTION

### DATA COLLECTION

The input image to be uploaded is obtained from the dataset.

### IMAGE SELECTION

The user can upload the image. The watermarking information is embedded in the uploaded image. The information is hidden.

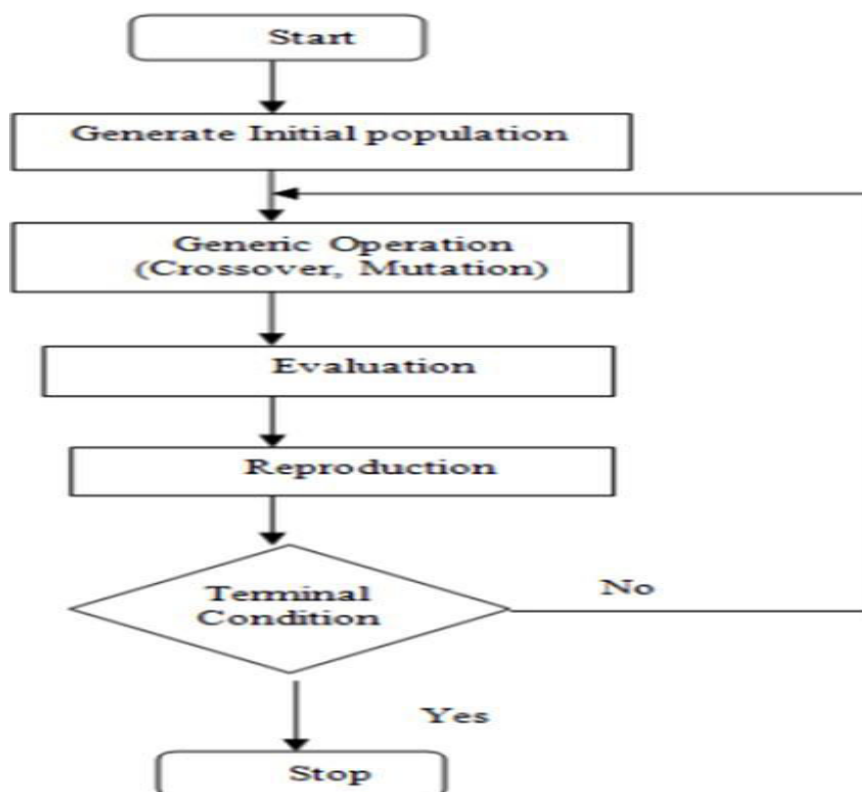
### ENCODING

The watermarking information is embedded in encrypted images by effective combination of homomorphism encryption scheme and reversible watermarking techniques. The efficiency and reversibility are ensured when watermarking information is embedded in encrypted image.

### DECODING

The watermarking information is completely extracted and the images are recovered based on computed difference histogram from left to right and from top to bottom. In order to effectively increase embedding capacity and completely extract the watermarking information in information hiding of encrypted images, a new reversible watermarking embedding algorithm based on rhombus prediction model and difference histogram shifting ideas is proposed.

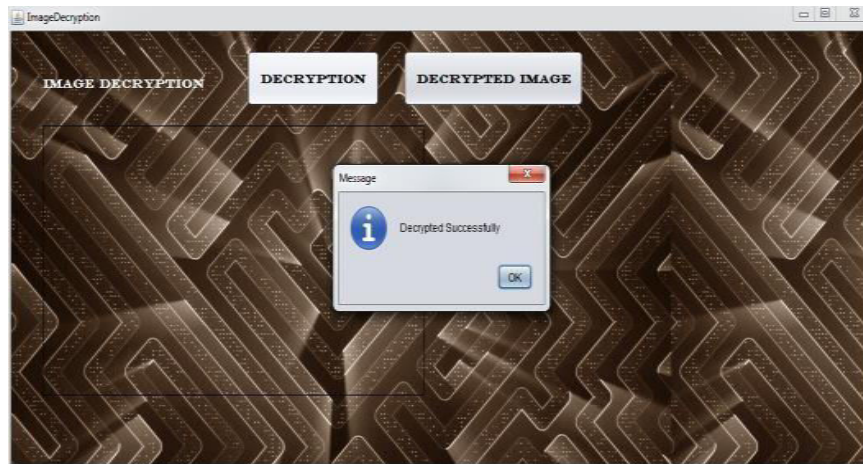
## III. BLOCK DIAGRAM





#### IV. EXPERIMENTAL RESULTS





## V. CONCLUSION

In this paper, a new image steganographic method has been proposed known as Mosaic image steganography based on genetic algorithms for enhanced security. Its application is not only restricted for covert communication but also handles huge volume of data behind target images. Another important thing is that the target image is selected arbitrarily and hence that no need of a database results saving the memory. Instead of using greedy search, the genetic algorithm reduces the computational complexity in terms of time complexity and space complexity. The original secret image can be retrieved losslessly from the created mosaic image. The mapping sequence is generated based on genetic algorithm. So the use of genetic algorithm enhances the two fundamentally conflicting requirements security and robustness. The tile image fitting information for secret image recovery is embedded into the first few pixels of the mosaic image by a secret key. The proposed system enhances the visual quality of the image and also focuses on to resist the human visual attack and reducing the statistical attack. The good experimental results shows the feasibility of the proposed method. As a future work I would like to incorporate the proposed method to images of various color models other than RGB.

## VI. FUTURE ENHANCEMENT

The tile image fitting information for secret image recovery is embedded into the first few pixels of the mosaic image by a secret key. The proposed system enhances the visual quality of the image and also focuses on to resist the human visual attack and reducing the statistical attack. The good experimental results shows the feasibility of the proposed method. As a future work I would like to incorporate the proposed method to images of various color models other than RGB.

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