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RESEARCH ARTICLE

SECURE TRANSMISSION OF UNIVERSITY EXAM QUESTION PAPER BY IMAGE MOSAICING

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ABSTRACT

The rapid spread of the information and media through the digital world nowadays which is powered by ever faster system demands greater speed and security. As the world changes, technology is changing rapidly. Progress in the domain of network technology, multimedia and confidential information, relatively large amounts of images, videos are broadcast on the Internet easily. There are various chances for the attackers to steal or to leak these information while sending it over the internet. Therefore, to cope with this concern, it is necessary to process the new image data hiding techniques. In this paper new data hiding technique called image mosaicing is used to fulfill our goal. By using this method the secret exam question paper is not only transmitted by overlapping with another target image but also it is recovered losslessly from the overlapped mosaic image. Thus a very novel system is proposed in this paper by which complete security of question paper is maintained successfully and efficiently.

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INTRODUCTION

A data or information security is now a very important day for the world. And everybody, a good secure network that transmits information to a secure network, data hacking is also a chance, but it is also the most treacherous of online banks and other organizations where data security is important and safe. So we need more high security data safe environment. Mosaic materials, such stone, glass, tile, etc. is a type of artwork created by composing small piece invented in ancient times, they are still used in many applications. Computer artwork images created in recent years is a new way to search. Several methods are proposed. Computer to create images of various types of artwork. A mosaic image is applied to a new computer fragment- visual art image, it is automatically created. The visible image to a target image in the form of a mosaic made of small pieces of the mosaic image but also achieve an effect of embedded images, resulting in the secret. Although the source of the image, resulting mosaic pieces are visible for all private inspector can be called embedded images. And this is the resulting image is a mosaic of private-volume-visible name. A new secure image transmission technique is proposed (Lai *et al.,* 2011), which transforms automatically a given large-volume secret image into a secret visible mosaic image of the same size. The mosaic image, which looks similar to target image and may be used as a cover of the secret image, is yielded by dividing the secret image into fragments and transforming their color characteristics to be those of the corresponding blocks of the target image. Skillful techniques can be designed to conduct the color transformation process so that the secret image may be recovered nearly losslessly. In this system our secret image is question paper and it is covered with target image to form mosaic image which looks like exactly similar to target image. This mosaic image is sent to the receiver. At the receiver side the mosaic image is recovered by decryption key only. If the person with no correct key or wrong key is unable to recover the original image from the mosaic image. Thus the original question paper is separated from mosaic image with correct password only. Mosaic of colored glass, stone, or other materials to create images together pieces of art. It is a technique of decorative art or interior decoration. The mosaics of small, flat, are made in different colors, pieces of glass around the square, known as the stone or tesserae; But some, especially the floor mosaics, and stone can be small circular pieces, and called "Pebble mosaics".

Related Work

Moses mosaic image has been proposed by the secret-volume-visible image of the original idea of a new computer and his art, and the application of information hiding by Lai and Tsai

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(Lai *et al.,* 2011). You can see all the pieces of the mosaic image of a source image such monitoring, but the small size of the pieces of the inspector is not able to figure out what looks like a source image and a random position. So when the source image resulting mosaic pieces are visible for all private inspector can be called embedded images. And this is the reason why the resulting mosaic image is the name of the secret-visible-break. This consists of two phases.

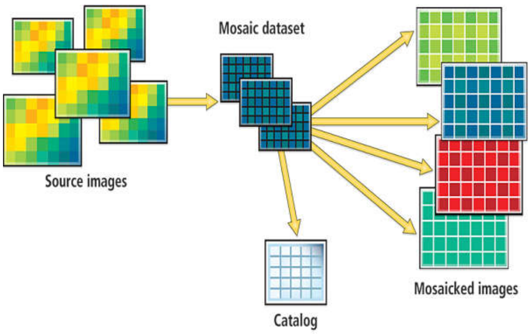


Figure 1. Mosaic images from source images

Figure 1, Shows the concept of mosaic images formed using source images and target dataset.

The second phase includes the construction of the original latent image on the image of Moses is the first phase of the mosaic image decrypted. In this section we have focused on the implementation of the various applications of this author proposed system. Soumi C.G, Joona George, Janahanlal Stephen, "Genetic Algorithm based Mosaic Image Steganography for Enhanced Security" ACEEE Int. J. on Signal and Image Processing, Vol. 5, No. 1, January 2014 in this paper authors used this mosaic image method and Genetic Algorithm for enhanced security and robustness (Soumi *et al.,* 2014). Tom Botterill, Steven Mills, Richard Green, "Real-time aerial image mosaicing", IEEE Trans.2010 in this paper scheme for real-time mosaicing of aerial images is described (Tom Botterill *et al.,* 2010). Armagan Elibol, Nuno Gracias, Rafael Garcia, Art Gleason, Brooke Gintert, Diego Lirman and R. Pam Reid, "Efficient autonomous image mosaicing with applications to coral reef monitoring", in this paper the authors proposed a generic framework for feature-based image mosaicing capable of obtaining the topology with a reduced number of matching attempts and to get the best possible trajectory estimation (Armagan Elibol *et al.,* ?). Vinay Pandey, Manish Shrivastava, "Secure Medical Image Transmission using Combined Approach of Data-hiding, Encryption and Steganography", International Journal of Advanced Research in Computer Science and Software Engineering, Volume 2, Issue 12, December 2012, This paper presents securing the transmission of medical images (Vinay Pandey and Manish Shrivastava, 2012).

Proposed System Development

Figure 2 represents flow diagram of our actual proposed system. The flow diagram describes the overall process. The system comprises two main tasks such as mosaic image creation and second is decoding of secret image question paper from mosaic image. The first step in task in our process is the selection of secret and target image. Then in the next step both secret and target images are embedded together to form mosaic image. This mosaic image is exactly similar to the target image. The secret image is covered with target image of relatively same size.
Now the task 2 is decryption of secret image from mosaic image is done. For separation of secret image from mosaic image we need to put decryption key or password. At the time of decoding user has to enter the password. If user is failed to enter correct password then the secret image is not decoded. That means at the receiver side the original secret image is separated from the mosaic image only if user has correct key or password.

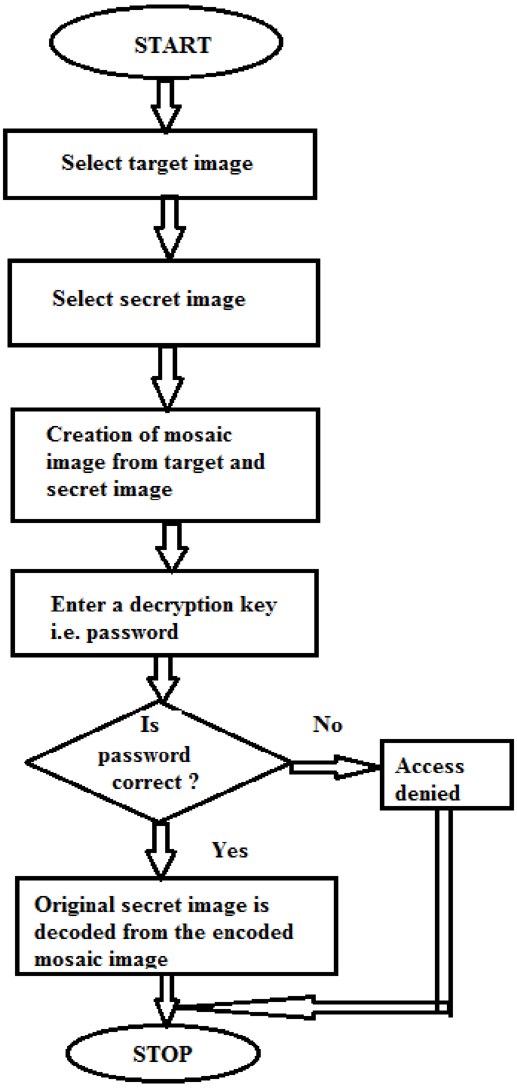

START
Select target image
Select secret image
Creation of mosaic image from target and secret image
Enter a decryption key i.e. password
Is password correct ?
No
Access denied
Yes
Original secret image is decoded from the encoded mosaic image
STOP

Figure 2. Flow diagram of proposed system

Thus next chapter focuses on the actual simulation of proposed system experimentally.

Performance Analysis

The proposed methodology is implemented using MATLAB programming. It has mainly two phases. In the encryption phase, first we select our secret image which is question paper and then arbitrarily select target image.

A. Task-I : Mosaic image Creation
B. Task-II : Secret Image Recovery

Figure 3 gives the GUI design or outline of the actual system. From this GUI it is clear that we can refresh the system or we can exit from the system at any instant of time. It is a very novel, systematic and sophisticated system

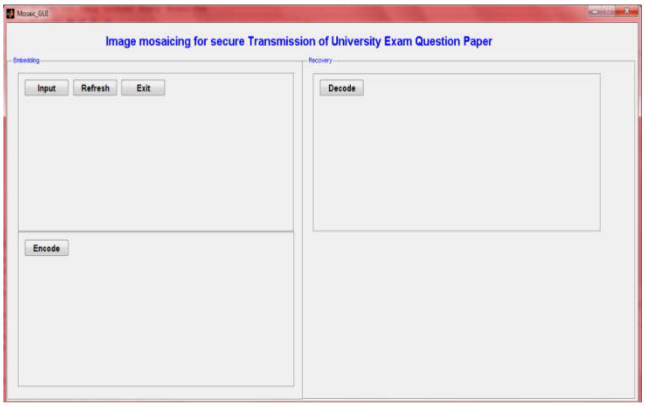

Mosaic_GUI
Image mosaicing for secure Transmission of University Exam Question Paper
Embedding
Recovery
Input
Refresh
Exit
Decode
Encode

Figure 3. GUI of proposed system

A. Task-I : Mosaic image Creation (Encode)

Step 1] Input target image and secret image

Pressing the input button target and secret image is selected one by one from our database.

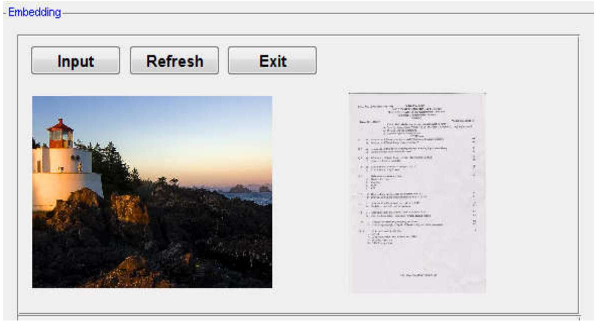


Figure 4: Selection of target image and secret image

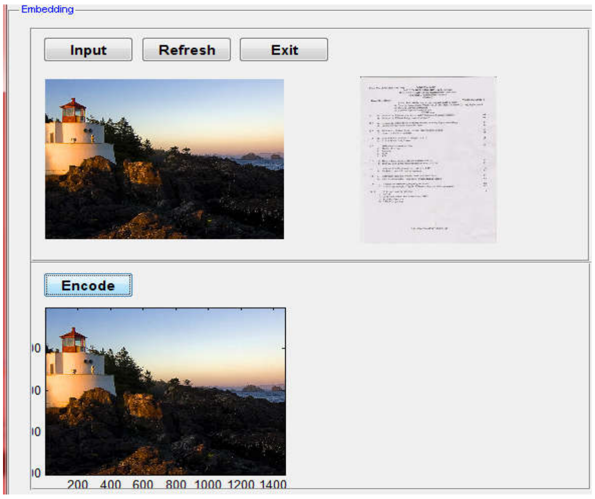


Figure 5. Generation of encoded mosaic image

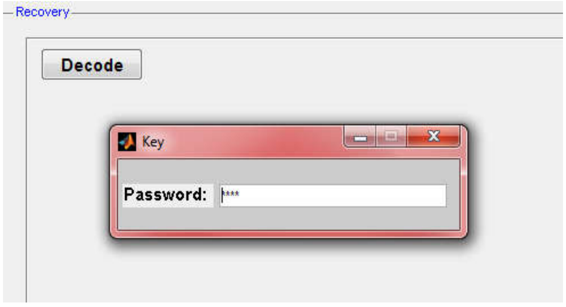
Step 2] Mosaic Image Creation

Then by clicking on encode button both target and secret images are encoded together to form a mosaic image which looks exactly similar to the target image as shown in figure 5.

B. Task-II: Secret Question Paper Recovery(Decode)

The task 2 is to be done at the receiver side. As we covered our secret image of question paper with target image and transmitted successfully that covered image to receiver. Now at the receiver the user has to separate the hided question paper from covered mosaic image. For this decoding the system asks the user to enter a password.

Step 1] Entering a password



Password: ***

Figure 5. Entering a decryption key i.e. password

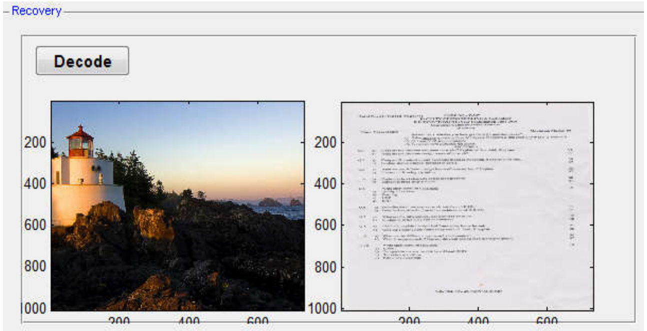


Figure 6. Recovery of original secret question paper

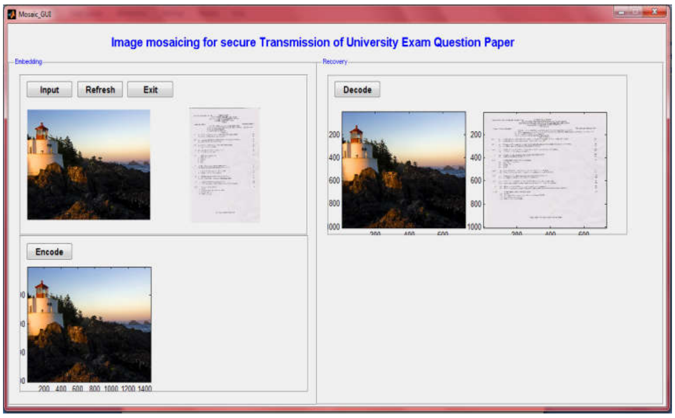

Mosaic_GUI
Image mosaicing for secure Transmission of University Exam Question Paper
Embedding
Recovery
Input
Refresh
Exit
Decode
Encode

Figure 7. Complete system which represents generation and recovery of mosaic image

Step 2] Recovery of original secret question paper from mosaic image

If the password entered in above step is correct then only the original secret question paper is recovered completely else the access is denied. That means the user will fail to recover the secret image.

Thus the secret question paper is successfully transmitted securely and again it is recovered from mosaic image. But for the recovery of original secret paper at the receiver side the user need to enter correct password otherwise the paper will never recovered successfully. That means if the user has correct password for decoding then only the secret paper is recovered. Thus our system is novel so that the question paper is totally and completely secured. Thus as illustrated above we can number of question papers by overlapping them with another image.

RESULTS AND DISCUSSIONS

Simulation is done by means of MATLAB. The output is tested with various inputs. A comparative study with different tile image sizes is done and the root mean square error (RMSE) and peak signal to noise ratio (PSNR) of the mosaic image is checked.

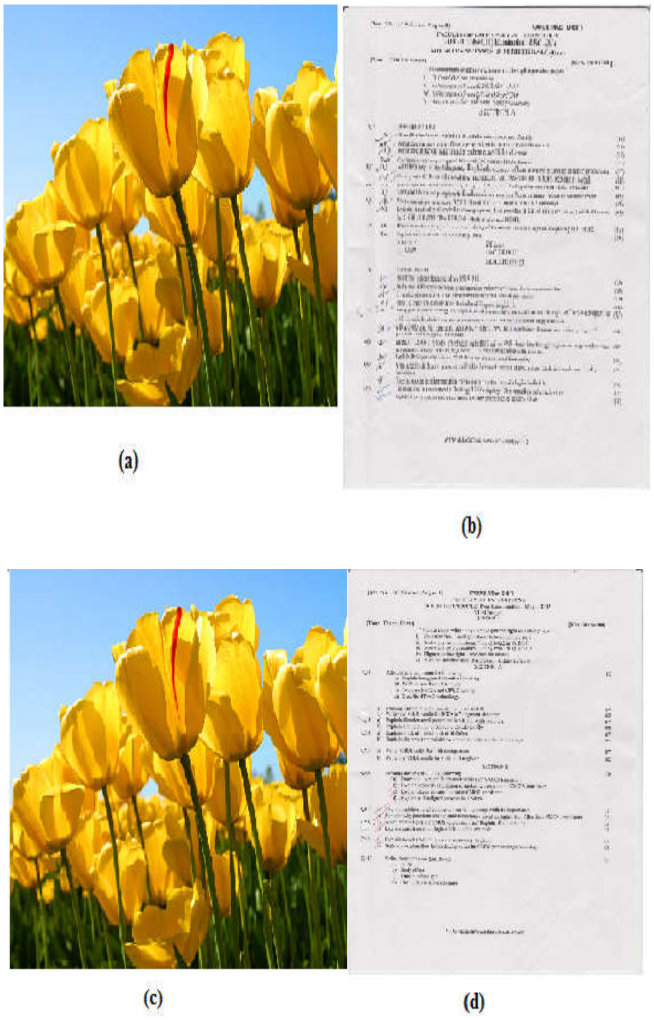


Figure 8. (a) Target image (b) Secret image (c) mosaic image looks like target image (d) recovered secret image from the mosaic image

The result shown in figure.8, where figure 8a) represents a target image having the size 1024×768 and figure 8b) represents the secret image as the same size as the target image and figure 8c) shows the created mosaic image using figure 8a) and figure 8b). Figure 8d) represents the recovered secret image from the mosaic image. The signal to noise ratio i.e. SNR of figure 8d) is 18.9609 peak signal to noise ratio i.e. PSNR=Infinite dB and RMSE=0.00 with the secret image. We cannot figure out the difference between the original secret image and recovered secret image from mosaic image. The PSNR= Infinite dB and RMSE=0 indicates that the recovered secret image from mosaic image is completely noise free. The human visual system is difficult to differentiate between input secret image at the transmitter side and the secret image recovered back at the receiver side. Thus providing a high degree of hiding information and must be visually pleasy. It is possible to communicate in secret. The method proposed in this novel is the lossless techniques and the secret image.

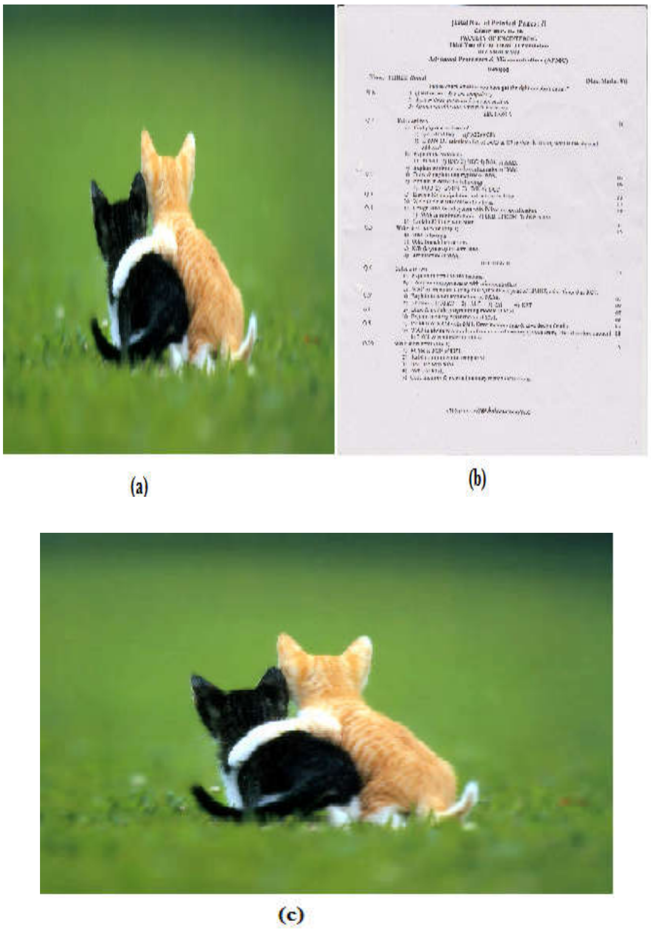


Figure 9. (a) Target image (b) Secret image (c) mosaic image looks like target image

The results of this method are compared with the previous method proposed by Lai and Tsai (Lai *et al.,* 2011) and Soumi C.G, Joona George, Janahanlal Stephen (Soumi *et al.,* 2004). This comparison study give the outcomes as the method proposed in (Soumi *et al.,* 2004) have RMSE=0.978 and PSNR=48.67 while according to method in (Lai *et al.,* 2011) have RMSE= 0.948. Thus both methods have smaller RMSE values with respect to the target images, implying that it is more similar to the target image in appearance. But according to the results which are yielded in this paper shows that the secret image recovered from mosaic image has RMSE=0.00 and PSNR=Infinite dB. The zero RMSE and infinite PSNR of an image proves that the recovered secret image is completely noise free. And also our method allows users to select their favorite images for uses as target images. This provides great flexibility in practical applications without the need to maintain a target image database which usually is very large if mosaic images with high similarities to target images are to be generated. Thus the system presented in this paper is successfully satisfies our aim. Only one difficulty arises in this method is that if size of the mosaic image exceeds 100 Mb then the decoding of this image will take much time to separate the secret image from mosaic image. So, for images with the large memory size the system is time consuming. Hence the selection of target images is should be properly done so that the sizes of available target images should match those of possible input secret images.

Conclusion

The security of question paper and to prevent the leakage of question paper is the main target objective and goal of every colleges in each universities in our country. In order to successful conduction of examinations the system presented in this paper helps completely. In this work the secret question paper is hide by a keeping another same size target image. The resultant image which is formed by overlapping the secret image with target image is encoded called as a mosaic image. The system is very novel such that the mosaic image is similar to target image by visual appearance that no one can distinguish between the mosaic image and target image. At the receiver side or at college side this mosaic image is decrypted by correct password only. Unless and until the person have correct decryption key he is unable to recover the question paper from mosaic image. Even if the third person or hacker has tried for several permutations and combinations of password he is failed to achieve the goal. Thus the system presented in this paper is completely secured for transmission of question paper to various colleges and its losseless recovery at receiver side. By using this method we can definitely try to maintain safe conduction of exams.

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