

Enhanced Image Steganography Technique for Hiding Multiple Images in an Image Using LSB Technique

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Abstract:

In this paper present an enhanced design of the image Steganography in which take multiple images that are hiding one by one into the cover image using the LSB technique. Using the LSB technique, first hide the secret image 1 into the secret image 2 and after that get setgo image 1 that is hide into the cover image using the LSB technique and get the final stego image. The final stego image is shown same as the cover image but it also consist of the stego image 1 and in the stego image 1 consist of the secret image 1 and secret image 2. This method makes hiding or embedding robustness. Secret image 1 hiding with this technique makes difficult to access by the unauthorized user. So it enhanced the security of the hidden images. The security of the hiding is measure in the term of the MSE and PSNR. For better hiding low MSE and High PSNR Value is better. In this work obtained the low MSE and High PSNR value then the previous work done

Keywords: secret image, cover image, stego image, Steganography, LSB

1. Introduction

Images are the most well-known methods of correspondence utilized in different fields, for example, clinical, research, mechanical, and military. Large image transfers are made over an unstable Internet organize. Consequently, it is important to set up sufficient security so the picture keeps unapproved people from getting to significant data. The advantage of the picture is that it needs to cover and secure more interactive media information. Stenography is one of the best forms of image security. Gives a safe method to send and spare pictures over the Internet. Security is the fundamental worry of the framework to safeguard the honesty, classification and genuineness of the picture [1]. Data protection has come to be a heavy digital verbal exchange drawback through the internet or the alternative

medium. Cryptography and Steganography of facts is hired to attend to the confidentiality of the facts, but records concealment is a extra green way, as a resultof a hidden message isn't always noticed. Hiding records performs a critical function in speaking private messages [2]. Information security has been a serious challenge in communications since the arrival of the internet. This may be achieved by securing info or channel. Cryptography has been introduced as a technology to make sure communication confidentiality and lots of completely different techniques are developed to cipher and rewrite info so as to stay the message confidential. Sadly, it's not enough to stay the knowledge confidential, it should even be necessary to stay the knowledge confidential. The technique accustomed to implement this is often referred to as Steganography [3]. Information hiding or

Steganography and cryptography are widely known and methods are used that process information to encrypt or hide their existence, severally. To cover information is the art and science of communication in a very manner that hides the existence of communication. Encrypt a message so that it cannot be understood, hide information. Hide the message so that it is not visible. Although both methods provide security, a study was conducted to combine encryption and concealment in a single system to provide greater privacy and security. Hide triple information, watermarks and encryption serve an equivalent purpose to shield information and conceal it from unauthorized access [4].

2. Image Steganography

The word Steganography comes from the Greek word "stegos", which meaning "cover" and "graphia" meaningful writing, that designates it as a cover writing [5]. In image Steganography, info is hidden solely in photos. Steganography is the art and science of secret communication. It's a follow to cipher / introduce sensitive information in such the way that the existence of knowledge is invisible. Supply files could also be brought up as cowl text, cowl art or cover art. Once inserting a secret message, it's known as the Steno medium. The steno secret's used for concealment/coding to limit the detection or retrieval of embedded information [6].

The purpose of Steganography is to hide the very confidential data into the cover image or cover data. Hide data involves a good vary of confidential communication strategies that hide the existence of hidden information. Ancient strategies embrace the employment of invisible inks, small dots, etc. Fashionable data concealment techniques arrange to exploit digital pictures, audio, video, etc. There are mainly four types of Steganography

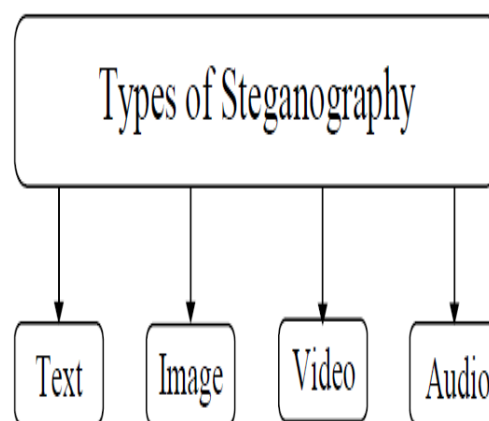


Fig 1: Types of Steganography

3. LSB Technique

LSB is one of the most frequent and simple facts overlaying methods. The LSB algorithm replaces the least sizable bit of the coil following the message bit. This is the most popular method used to cover information to conceal the message. This is commonly a wonderful technique; due to the fact the alternative of LSB does not reason an extensive deterioration in quality [7]. This is the most straightforward and amplest recognized strategy to cover measurements from pictures. This reality hiding algorithm works for eight bits (grayscale) or 24 bits (shading pictures). With this algorithm, picture decent can be kept up via modifying insignificant shapes for each pixel in the image so the deceivability is clear. In light of the consistent interaction, the algorithm combines the pixel cost from the mysterious picture to the bit substantially less important than the pixel estimation of the cover picture. The utilization of this algorithm favors sped up successfully in light of the fact that it endorses low intricacy count [8].

4. Proposed Design

In the previous work done they hide the single image or information in a cover image. In that case, only one step hidden security is used, it means that hide the secrete image or secrete information in the cover image directly.

In this work hide multiple images into the cover image using the LSB technique. In this hide the multiple senders or secrete images into carrier or cover image one by one. Using the LSB technique, hide the first hide the secrete image 1

into the secret image 2 and after that get setgo image 1 that is hide into the cover image using the LSB technique and get the final stego image. This method makes hiding or embedding robustness. Secret image 1 hiding with this technique makes difficult to access by the unauthorized user. So it improves the security of hidden images. This makes the image transferring between two users very robust.

The security of the hiding is measure in the term of the MSE and PSNR. For better hiding low MSE and High PSNR Value is better. In this work obtained the low MSE and High PSNR value then the previous work done.

In the Fig 2 show the flow chart of the proposed work done.

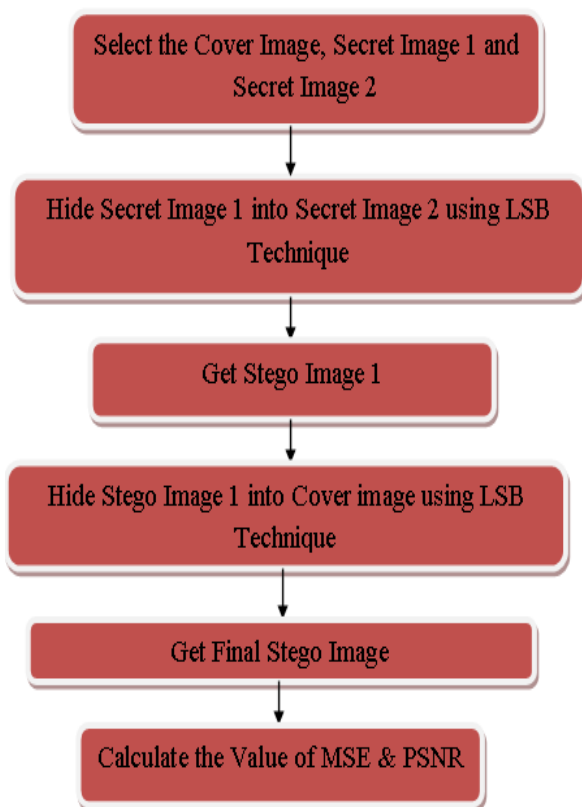


Fig 2 : Flowchart of the proposed Technique

In the Fig 3 shown the cover image of the cheetah and in the fig 4 and fig 5 shown the secrete image 2 and secret image 1 respectively. Now hide the secret image 1 into the secret image 2 using the LSB technique and Get the Stego image 1 shown in the fig 6. After getting the setgo image 1, hide the stego image 1 into the cover image and get the

final stego image that is seen same as the cover image (shown in fig 7) but it consist both the secret images. Here also shown the MSE and PSNR value of proposed process which is shown in the Fig 8. The MSE value of this process is 0.10451 and the PSNR value is 57.939.

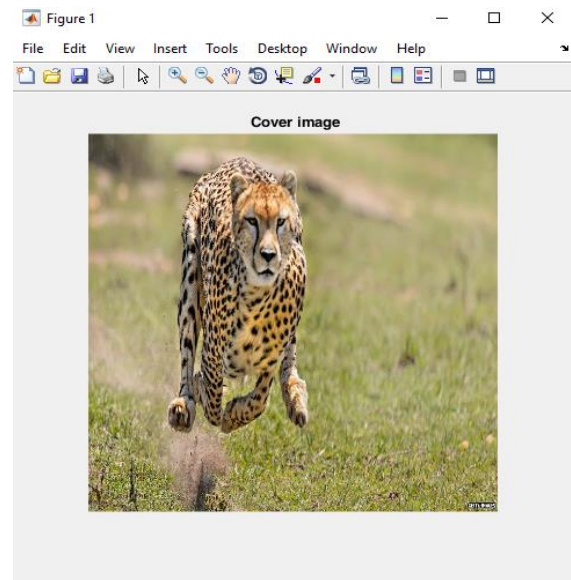


Fig 3: Cover Image of the Cheetah

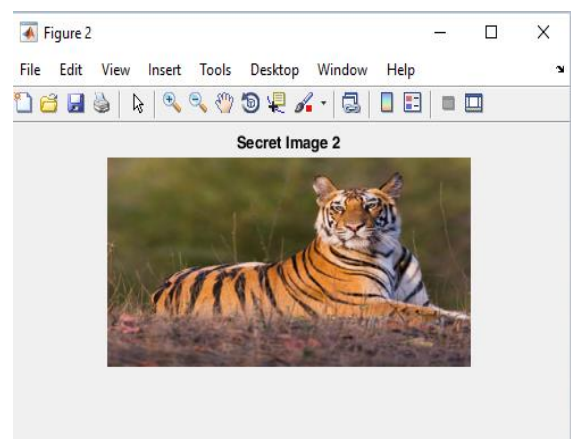


Fig 4: Secret Image 2 Tiger

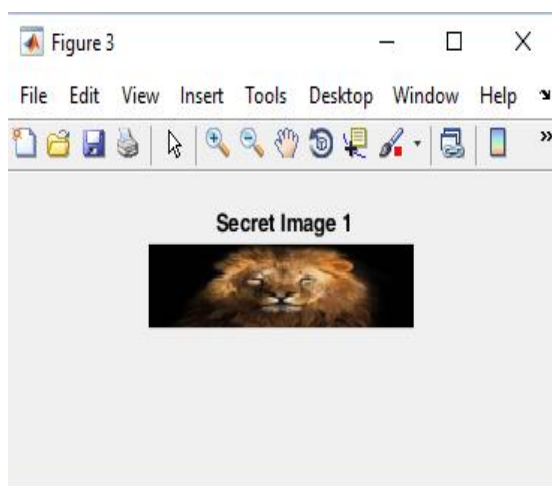


Fig 5: Secret Image 1 Lion

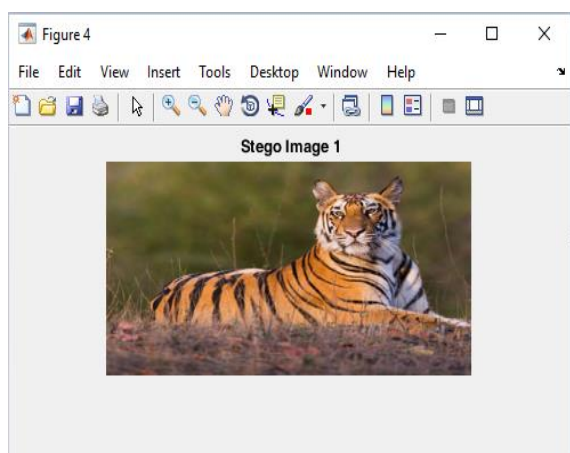


Fig 6: Stego Image 1

In the Fig 6, shown the Stego image 1 that shown same as the secret image 2 but it also consist of the secret image 1 that are hidden in it using the LSB technique. In Fig 7, shown the Final Stego image that is same as the cover image but it also consist of the secret image 1 and secret image 2 in it.

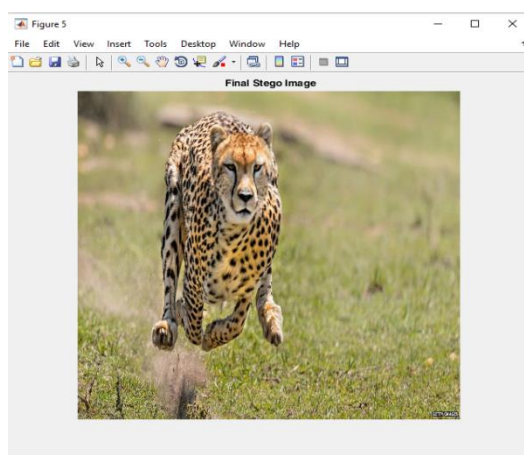


Fig 7: Final Stego Image

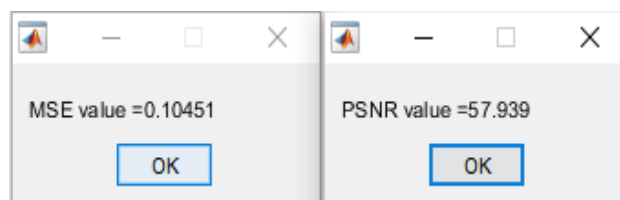


Fig 8: Obtained MSE and PSNR Values

In Table 1 shown the comparative analysis of previous work with proposed work in the term of MSE and PSNR. In proposed work the low MSE and high PSNR form the previous work done. So in the proposed work enhanced the security of the digital images using LSB technique.

Table 1: Comparison of MSE and PSNR Values of Previous Work With Proposed Work

	MSE	PSNR
Ref [2]	0.319	53.10
Ref [9]	0.337	52.45
Ref [10]	0.3789	51.9979
Proposed Work	0.10451	57.939

5. Conclusion

In the today going on technology advances in the computer security have shown that the most effective way to secure data is to hide the data rather than encrypt it. Hide data is that the art and science of hidden writing, it's a way of masking

data in an exceedingly completely different kind of data. Additionally, send a pictures masked by the cover image and change some elements of the initial bit to the recipient. An information or hidden image within the cover image will secure the attacker's original information. The LSB technique may be an unremarkably used technique of activity data and is prone to attack owing to its simplicity.

In this proposed work also add the multi level of hiding. In this proposed work hide multiple images into the cover image using the LSB technique. In this hide the multiple images into an image one by one. Using the LSB technique, hide the first hide the secrete image 1 into the secret image 2 and after that get setgo image 1 that is hide into the cover image using the LSB technique and get the final stego image. This method makes hiding or embedding robustness. Secret image 1 hiding with this technique makes difficult to access by the unauthorized user. So it improves the security of hidden images. This makes the image transferring between two users very robust. The security of the hiding is measure in the term of the MSE and PSNR. For better hiding low MSE and High PSNR Value is better. In this work obtained the low MSE and High PSNR value then the previous work done. . Hence the proposed design technique is more secure than the previous design.

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