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Lossless Record Troucing based on reversible transform

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ABSTRACT: Data hiding is still an important research topic due to the design complexities involved. Steganography is the technique of hiding confidential information within any media. Steganography is often confused with cryptography because the two are similar in the way that they both are used to protect confidential information. But because of loss in quality of original image we propose a Reversible Contrast Mapping (RCM) is a simple integer transform that applies to pairs of pixels. For some pairs of pixels, RCM is invertible, even if the least significant bits (LSBs) of the transformed pixels are lost. The data space occupied by the LSBs is suitable for data hiding. The embedded information bit-rates of the proposed spatial domain reversible watermarking scheme are close to the highest bit-rates reported so far. The scheme does not need additional data compression, and, in terms of mathematical complexity, it appears to be the lowest complexity one proposed up to now

KEYWORDS: Reversible Contrast Mapping(RCM), Stegnography, Data hiding, Confidentiality ,Peak Signal To Noise Ratio(PSNR),Mean Square Error(MSE).

I.INTRODUCTION

Most of the reversible watermarking approaches proposed so far incorporate a lossless data compression stage. The use of an elaborate data compression stage increases the mathematical complexity of the watermarking. There are some watermarking schemes that do not rely on additional data compression, as for instance, the circular histogram interpretation schemes, but they have the drawback of a low embedding capacity. Here, we discuss a spatial domain reversible watermarking scheme that achieves high-capacity data embedding without any additional data compression stage. The scheme is based on the reversible contrast mapping (RCM) transform, is a simple integer transform defined on pairs of pixels. RCM is perfectly invertible, even if the least significant bits (LSBs) of the transformed pixels are lost. The data space occupied by the LSBs is suitable for data hiding. The mathematical complexity of the RCM watermarking is further analyzed, and a very low cost implementation is proposed. Finally, the RCM scheme is compared with stegnography and is proved that the results obtained by RCM are better than stegnography. It is shown that the RCM scheme provides almost similar embedding bit-rates when compared to the difference expansion approach, but it has a considerably lower mathematical complexity.In general the process of lossless image compression is as shown in fig 1

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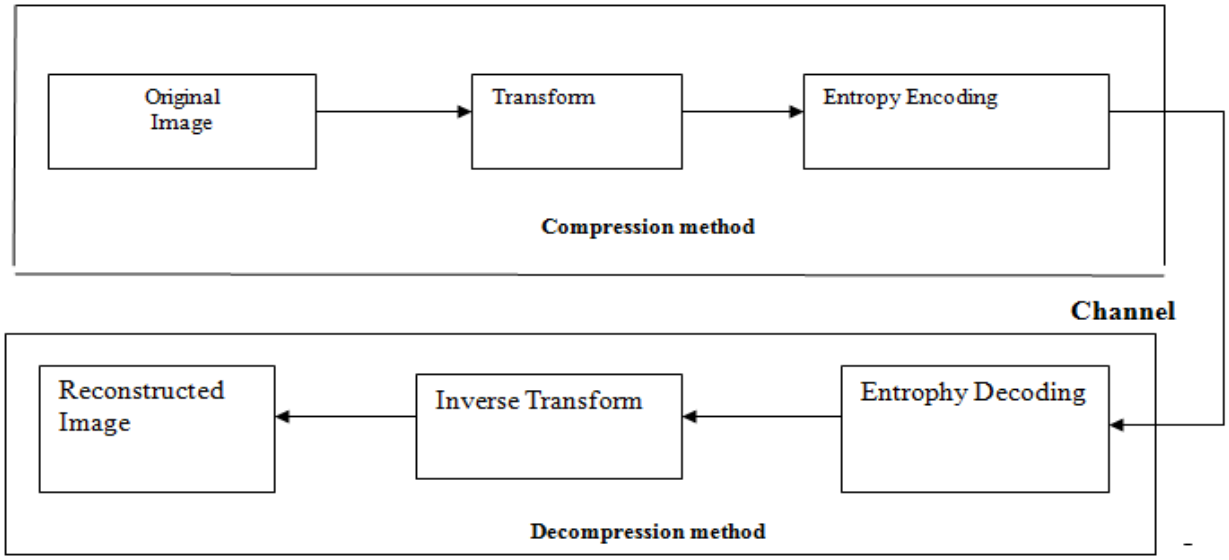

fig 1. Lossless Image Compression

II.SYSTEM MODEL AND ASSUMPTIONS

Assumptions:The project is related with the image processing so from the implementation point of view it will be good if we use the MATLAB for programming. The system model is as shown below:

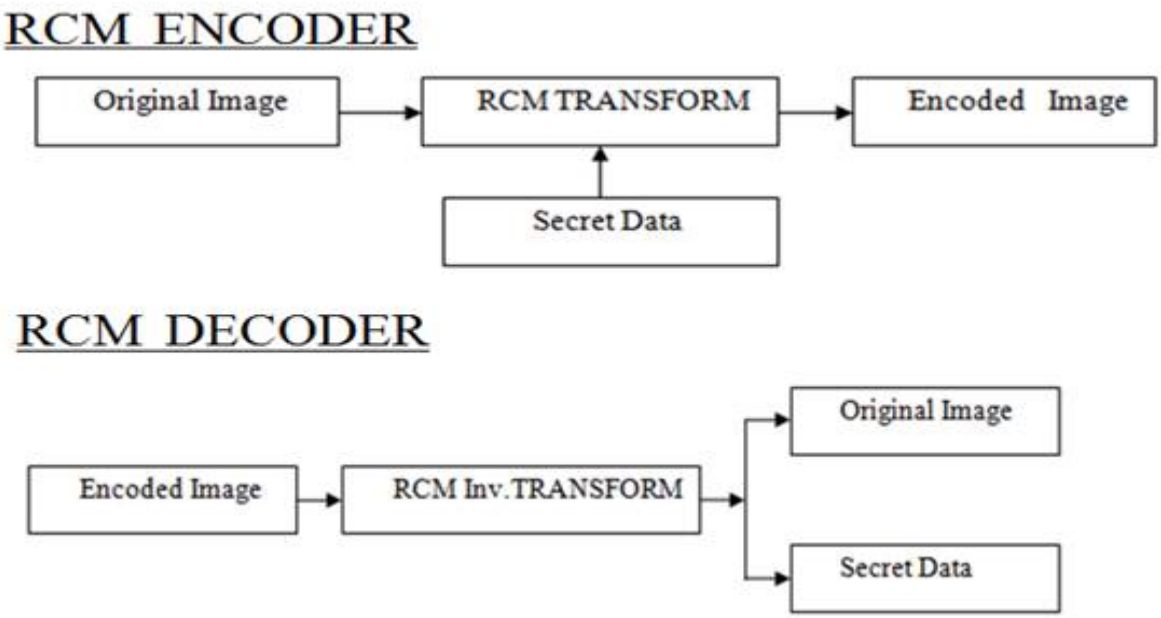

Fig 2.System Model

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III. NEED OF THE PROPOSED SYSTEM

The limitations of stegnography can be removed by proposed work of data hiding using RCM. This project is developed for hiding information in any image file. The scope of the project is for hiding secret information includes any type of information file and image files and the path where the user wants to save Image and extruded file. In this project, the proposed approach finds the suitable algorithm for embedding the data in an image using reversible contrast mapping which provides the better security pattern for sending messages through a network.The typical scenario is as shown below

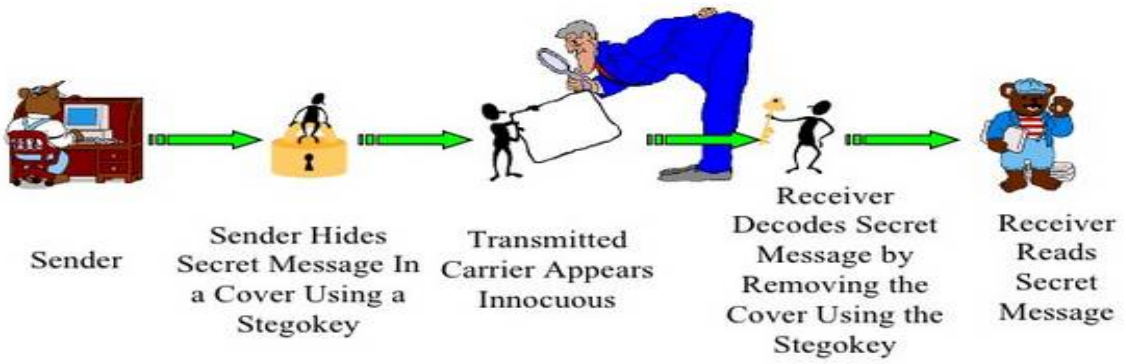

Fig 3 Typical Scenario

IV.REVERSIBLE CONTRAST MAPPING

Most of the reversible watermarking approaches proposed so far incorporate a lossless data compression stage. The use of an elaborate data compression stage increases the mathematical complexity of the watermarking. There are some watermarking schemes that do not rely on additional data compression, as for instance, the circular histogram interpretation schemes, but they have the drawback of a low embedding capacity. Here, we discuss a spatial domain reversible watermarking scheme that achieves high-capacity data embedding without any additional data compression stage.

The scheme is based on the reversible contrast mapping (RCM) transform, is a simple integer transform defined on pairs of pixels. RCM is perfectly invertible, even if the least significant bits (LSBs) of the transformed pixels are lost.The data space occupied by the LSBs is suitable for data hiding. The mathematical complexity of the RCM watermarking is further analyzed, and a very low cost implementation is proposed.. It is shown that the RCM scheme provides almost similar embedding bit-rates when compared to the difference expansion approach, but it has a considerably lower mathematical complexity.

A bit plane of a digitaldiscrete signal (such as image or sound) is a set of bits corresponding to a given bit position in each of the binary numbers representing the signal. For example, for 16-bit data representation there are 16 bit planes: the first bit plane contains the set of the most significant bit, and the 16th contains the least significant bit. It is possible to see that the first bit plane gives the roughest but the most critical approximation of values of a medium, andthe higher the number of the bit plane, the less is its contribution to the final stage. Thus, adding a bit plane gives a better approximation. Bitplane is sometimes used as synonymous to Bitmap; however, technically the former refers to the location of the data in memory and the latter to the data itself. One aspect of using bit-planes is determining whether a bit-plane is random noise or contains significant information. One method for calculating this is compare each pixel (X,Y) to three adjacent pixels (X-1,Y), (X,Y-1) and (X-1,Y-1). If the pixel is the same as at least two of the three adjacent pixels, it is not noise. A noisy bit-plane will have 49% to 51% pixels that are noise

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V. MATHEMATICAL MODEL OF RCM AND RESULTS

RCM Methodology

- Let [0,L] be gray level of the image(L=255 for eight-bit gray level images).
- And Let(x,y) be a pair of pixels.

FORWORD TRANSFORM

- Here below are two variables used for forwordtransform
  x'=2x-y , y'=2y-x
- To preventoverflow and underflow , the transformisrestricted to belowlevels
  0<= 2x-y <=L , 0<= 2y-x <=L

INVERSE TRANSFORM

- Inverse transform is define as follows
  x=[2/3 (x') + 1/3(y')] , y=[1/3 (x') + 2/3(y')]

CONDITIONS

1) If pair of pixels are composed of X=ODD, Y=EVEN values.(O,E)
2) If pair of pixels are composed of X=EVEN, Y=ODD values. (E,O)
3) If pair of pixels are composed of X=EVEN, Y=EVEN values.(E,E)
4) If pair of pixels are composed of X=ODD, Y=ODD values.(O,O)

RESULTS OF RCM:-

Fig 4 Input Image

Fig 5 Secret Image

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Fig 6 Encoded Image

Fig 7 retrived input image

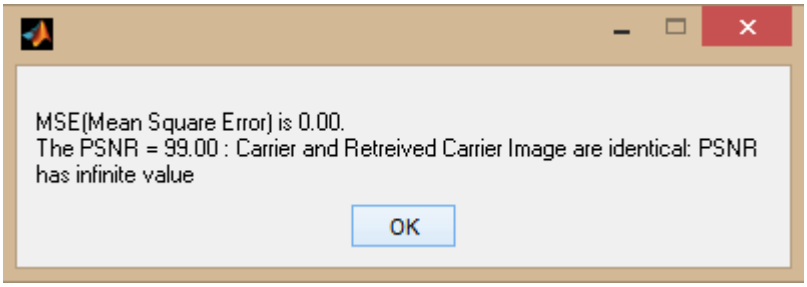

Fig 8 PSNR and MSE of retrived input image

Comparison of PSNR of stegnography and RCM

Images	RCM	Stegnography
Lena	99	62.14
Camera	99.31	62.25
Mandrill	99	61.09
Flower	99	62.21

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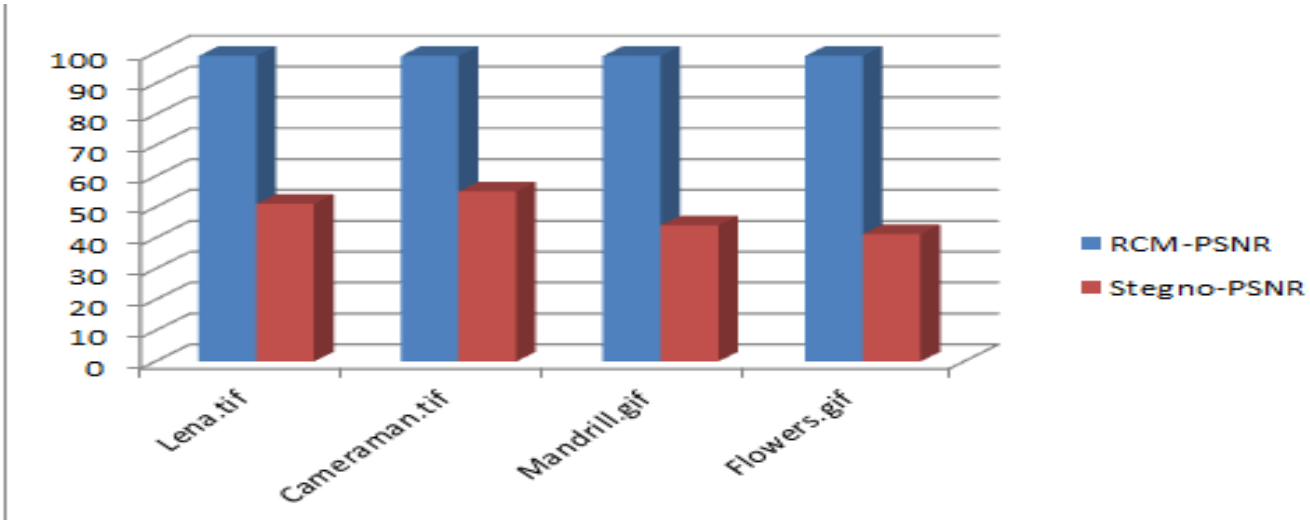
VI. GRAPHICAL ANALYSIS



VII.CONCLUSION

A spatial domain reversible watermarking providing high data embedding bit-rate at a very low mathematical complexity has been discussed. As there is loss in quality of original image by steganography we propose a Reversible Contrast Mapping (RCM) is a simple integer transform that applies to pairs of pixels . The proposed scheme does not need additional data compression. In Reversible Contrast Mapping there is no loss in quality of original image. In terms of mathematical complexity, the proposed reversible watermarking appears as being the lowest complexity scheme proposed so far. The computational complexity is reduced for both coding and decoding by using LUT access for each pair of pixels and some low complexity bit manipulation. This makes our scheme very appropriate for real-time applications. Finally, by distributing the location map and by storing the saved true values close to the corresponding pixel pairs, the RCM scheme provides robustness against cropping.

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