# Visible Watermarking Using Genetic Algorithm

*1.B.Sambasiva Rao,2.Dr. P. Ramana reddy*
*1.Dept. of electronics and Communication Engineering, AITS-Hyderabad,Hyderabad.*
*2. Dept. of electronics and Communication Engineering, JNTUA-Anantapur*
*ecesambasivarao@gmail.com[1], prrjntu@gmail.com[2]*

***Abstract:A method of visible watermarking with lossless recovery has been proposed in this paper using genetic algorithm. This method makes use of one-to-one compound mappings of image pixel values which is used to embed a variety of visible watermarks of different sizes on cover images. The compound mappings method is reversible, thus provides lossless recovery of original image from watermarked images. Different types of visible watermarks like opaque, monochrome and translucent are embedded based on genetic methodology in this paper. A monotonically increasing compound mapping is created which are more distinctive visible watermarks in the watermarked image.***

***Index Terms: Lossless recovery, visible watermarking, genetic algorithm mapping, reversible, opaque, monochrome, one-to-one compound mapping, translucent***

## I.INTRODUCTION

The cost effectiveness of software selling and high quality art work which are in the form of digital images and video sequences, which are transmitted over World Wide Web (www) are highly enhanced, consequent to the improvement of technology. Though the commercial exploitation of the www is steadily being more appreciated, apprehension on the

Security aspect of the trade has only funneled the exploitation to be restricted to the transmission of demo and free versions of software and art. The ease by which digital information can be duplicated and distributed has led to the need for effective copyright protection tools. To address these growing concerns various software products have been introduced. It should be possible to hide data (information) within digital audio, images and video files. The data (information) is hidden in the sense that it is perceptually and statistically undetectable [3]. The way to protect multimedia images against illegal recording and retransmission is embed a small signal in the form of text or image, called digital signature or watermark that characterizes the ownership and marks it as his intellectual property. Watermarking techniques are particular embodiments of Stenography [2]. Digital Watermarking is the solution to the need to provide value added protection on top of data encryption and scrambling for content protection [4]. Watermarking is the process that embeds data called a watermark or digital signature or tag or label into a multimedia object such that watermark can be detected or extracted later. Digital watermarking methods for images are usually of two types: invisible and visible. Visible watermarking is generally clearly visible after common image operations are applied. The visible watermarks convey ownership information directly on the media and can deter attempts of copyright violations. Embedding of watermarks, either invisible or visible, degrade the quality of the host media in general. The techniques of reversible watermarking [8]–[12], allow legitimate users to remove the embedded watermark and restore the original content.But mostly the reversible watermarking techniques do not guarantee lossless image recovery, i.e. the recovered image is identical to the original image.Lossless recovery is important in many applications where serious concerns about image quality arise.

## II.LOSSLESS RECOVERY

Lossless recovery is important in many applications where serious concerns about image quality arise.Many lossless invisible watermarking techniques have been proposed in the past. The common approach is to compress a portion of the original host and then embed the compressed data together with the intended payload into the host [8]. Another approach is to superimpose the spread-spectrum signal of the payload on the host so that the signal is detectable and removable. Another approach is the manipulation of a group of pixels as a unit to Existing methods embed a bit of information. Though it is possible to use lossless invisible techniques to embed removable visible watermarks, due to the low embedding capacities of these techniques there is no possibility of implanting large-sized visible watermarks into the host. In case of lossless visible watermarking, a common approach is to embed a monochrome watermark using deterministic and reversible mapping of pixel values or DCT coefficients in the watermark region. Another approach is to rotate consecutive watermark pixels to embed a visible watermark. An advantage of these approaches is that watermarks of any sizes can be embedded into any host image. But, only binary visible watermarks can be embedded using these techniques, which is restrictive since most logos are colorful.

## III.SPREAD SPECTRUM COMMUNICATION

The watermark should not be placed in perceptually insignificant regions of the image or its spectrum since many common signals and geometric processes attack these components. For example, a watermark in the high frequency spectrum of an image can be easily eliminated with little degradation to the image by any process that directly or indirectly performs low pass filtering. The major problem is to insert a watermark into the most significant regions of a spectrum. Clearly, any spectral coefficient can be changed, provided such modification is small. But very small changes are susceptible to noise [3].

To solve this problem, the frequency domain of image is a communication channel, and the watermark acts as a signal that is transmitted through it. Attacks and signal distortions can be treated as noise that the immersed signal must be immune to. Thus, the watermarking can be considered as an application of spread spectrum communications. In spread spectrum communication, a narrow band signal over a much larger bandwidth such that the signal energy present in any single frequency is imperceptible. Hence, the watermark is spread over many frequency bins so that the energy in any one bin is very small and certainly undetectable. Since the watermark verification process knows the location and context of the watermark, it is possible to concentrate these weak signals with a high signal to noise ratio (SNR). However, to destroy such a watermark we would require noise of high amplitude to be added to all frequency bins.

Spreading of the watermark throughout the spectrum of an image ensures a large measure of security against unintentional or intentional attack. First the spatial location of the watermark is not obvious, and also the frequency regions should be selected in a fashion that ensures severe degradation of the original data following any attack on the watermark.

## IV.PROPOSED METHOD

This paper proposes a new method for lossless visible watermarking using compound mapping, through which mapped values can be controlled. The mappings are reversible for lossless recovery of the original image. The technique leads to the possibility of embedding different types of visible watermarks into cover images.

The original image can be recovered from a resulting watermarked image by using the corresponding reverse mappings without any loss.

### ALGORITHM FOR LOSSLESS WATERMARKING:

Let Input image be I and let the watermark image be W then the Output watermarked image is WL.

Genetic algorithm:

Steps to Implement:

1. Select any set of pixel values p from input Image I and let L be the watermark to be embedded, then WA is called the watermarking area. Also let the set of pixels in P in WL be R.
2. For each pixel x with value p in WA and let the corresponding pixel in B be Y and the value of the corresponding pixel in Y as L as l , and then apply the following steps:

   a) An estimation technique is applied to get a value close to the values of the neighboring pixels (excluding it).
   b) Set b = l.
   c) Map p to a new value by using the below formula $q = F_b^{-1}(F_a(p))$
   d) Set the value of Z to R
   e) Set the value of each pixel in L, which is outside the region WA such that it is equal to that of the corresponding pixel in I.

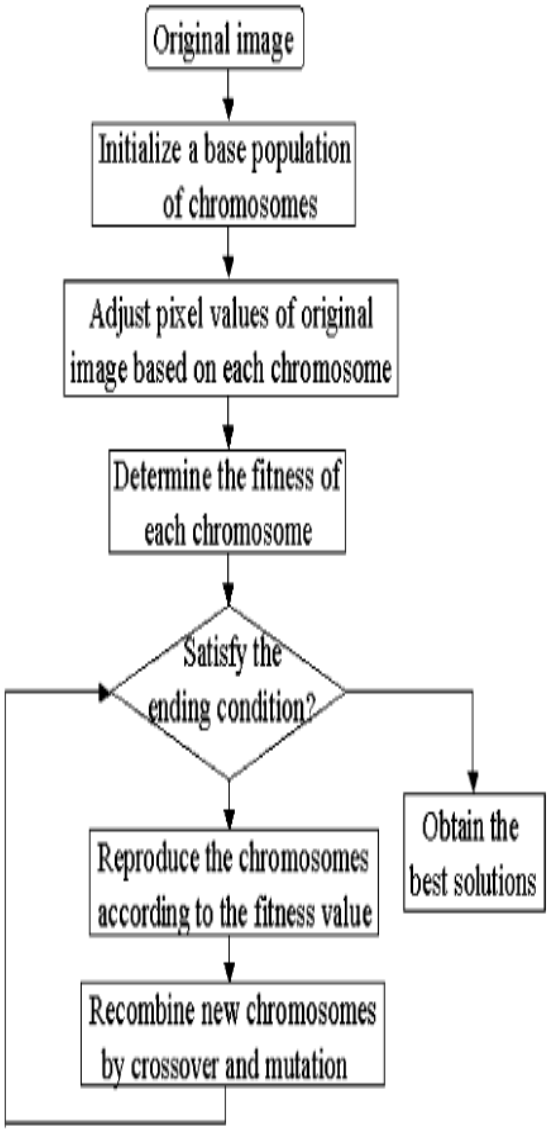


Fig.1. Genetic algorithm Implement

Fig.2.Cover Water Mark Image

Fig.3.Watermarked Image

Fig.4.Watermark cover image

**Algorithm:Generic Watermark Removal for Lossless Image Recovery (decoding):**

Here the input is a watermarked image WL, and L is the watermark then the recovered output image is B.

STEPS:

a) Select a watermarking area Q in WL.
b) Set the value of each pixel in B , which is outside the region R, such that it is equal to corresponding pixel in WL.
c) For each pixel z with value q in R, let the corresponding pixel in the recovered image B be A and the value of the corresponding pixel y in L be l,
d) Obtain the value derived in Step 3 of Algorithm 1 by applying the estimation technique.

Fig.5.Decoded Output

**Monochrome Watermarking:**

Let Input image be I and let the watermark image be L then the Output watermarked image is WL. Steps:

a) Select any watermarking area WA which is the set of pixels corresponding spatially to those in L with no transparency (with alpha values larger than zero).
b) Denote the set of pixels corresponding to P as Q.
c) For each pixel x with value p in A, let the corresponding pixel in R be Z and the value of the corresponding pixel Y in L is l, and then apply the following steps.
    1) A neighbor based parameter is set which estimates the color value by using colors of neighboring pixels.
    2) Get this parameter with alpha blending accor ding to the formula $b = l \times \alpha + a \times (255 - \alpha)$
    3) Map this value to a new value $q = F_b^{-1}(F_a(p))$.
    4) Set the value of z to be s.
d) Set the value of each pixel in WL, which is outside the region WA, to be equal to the corresponding pixelin I.

Fig.6.Cover Image

Fig.7.Watermark converted to binary image

**Watermark and Watermark dash Translucent: watermarking:**

Let Input image be I and let the watermark image be L then the Output watermarked image is WL.

STEPS:

a) Select the watermarking area WA as the set of pixels corresponding spatially to those in L which are not transparent (with alpha values larger than zero).

b) Let the set of pixels corresponding to WA in WL as R.

c) For each pixel X with value p in WA, let the corresponding pixel in R be z and the value of the corresponding pixel Y in L be l, then apply the following steps.

1.neighboring pixels.

Get this parameter with alpha blending according to the formula

$$b = l \times \alpha + a \times (255 - \alpha)$$

2.Map this value to a new value using

$$q = F_b^{-1}(F_a(p)).$$

3.Set the value of z to be q

4.Set the values of the remaining pixel in WL, which are outside the region WA to the corresponding pixel in I.

Fig.8.Translucent Watermarked Image

## CONCLUSION

In this paper, a new method for visible watermarking with lossless image recovery has been proposed. This paper uses one-to-one compound mapping that maps image pixel values to the desired visible watermarks. This allows different visible watermarks to be embedded and an example has been presented for embedding opaque and monochrome watermarks as well as translucent full-colour watermarks. A translucent watermark is clearly visible which is more appropriate than traditional transparent watermarks in applications like advertising, copyright protection. Experimental results have show that the proposed system is more feasible and effective.

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