Digital Halftoning Visual Cryptography

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Abstract: Halftone is used to refer the image that is produced by this process. Tone imagery contains a range of colors or grey, the halftone process reduces the visual reproduction to image that is printed with only one color of ink, in dots of differing in sizes. In this paper, a novel technique named as halftone visual cryptography is proposed to achieve the visual cryptography via digital halftoning. The Visual cryptography encodes a secret binary images into shares of binary patterns. Digital halftoning means deciding to place the dots by using computer algorithms, as opposed to the old-fashioned analog methods. Halftoning is a method for creating the illusion of continuous tone output. Effective digital halftoning can substantially improves the quality of rendered image at minimal cost.

Keywords: Halftoning, digital Halftoning, visual cryptography, Blue noise Halftoning, digital watermarking.

I. INTRODUCTION

Since the early days of visual arts there were drawing techniques for displaying shades using only one color tone. The hatching technique in drawing, etching or in woodcut to simulate continuous tones thin lines varying in thickness, spacing. In another print technique, mezzotint, tonality is simulated by selective roughening and smoothing of the metallic print plate surface. With the advent of photography came the need to print photographs via traditional press. In second half of 18th century screening was invented. A photograph was exposed to a metal photogravure plate through a silk screen, or later a ruled glass , which in turn produced small dots, varying in size.

Digital halftoning has been replacing photographic halftoning.since the 1970s when "electronic dot generators" were developed for the film recorder units linked to color drum scanners made by companies such as Crosfield Electronics, Hell and Linotype-Paul.

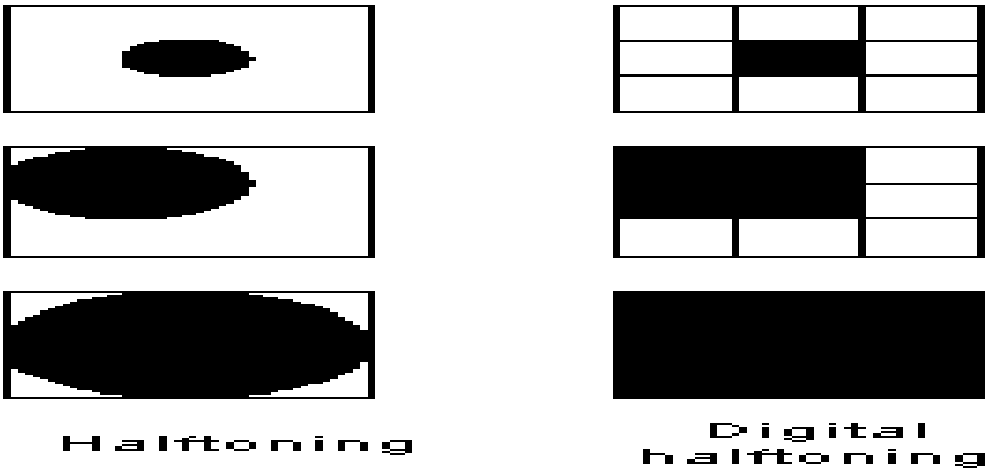

Fig 1 . Haltoning and Digital Halftoning

Digital halftoning use a raster image within which each monochrome picture pixel. To emulate the photographic halftone cell, the digital halftone cell must contain groups of monochrome pixels within the same-sized cell areas. The fixed location and size of monochrome pixels compromises the high frequency/low frequency dichotomy of the photographic halftone method. Clustered multi-pixel dots cannot "grow" incrementally.

HALFTONE VISUAL CRYPTOGRAPHY

Visual cryptography are based on combinational techniques. In the halftoning a secret binary image is encrypted into high quality halftone images, or halftone shares. This method applies the rich theory of blue noise halftoning to the construction mechanism used in conventional VSS schemes to generate halftone shares. The halftone shares carry significant visual information to the reviewers, such as landscapes, buildings, etc. the visual quality obtained by the new method is significantly better than that attained by any available VSS method known to date.

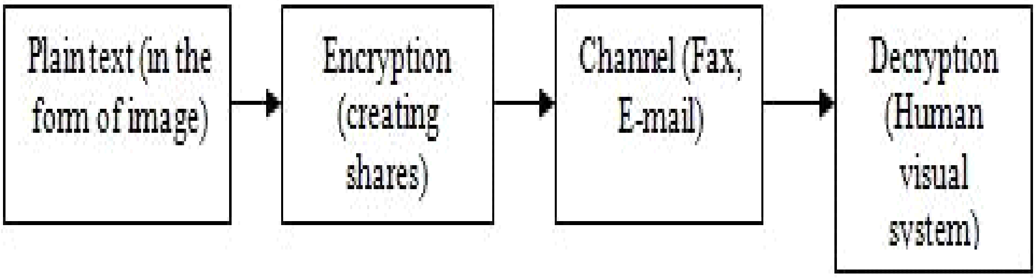

Fig. 2 Block diagram of basic visual cryptography

II. LITERATURE SURVEY

Visual Cryptography Scheme

The best known technique is to protect data such as biometric Template is cryptography. It is the art of send and receive encrypted messages that can be decrypted by the sender or the receiver. Encryption and decryption are accomplished by using mathematical algorithm in such a way that no one but the intended recipient can decrypt and read the messages.

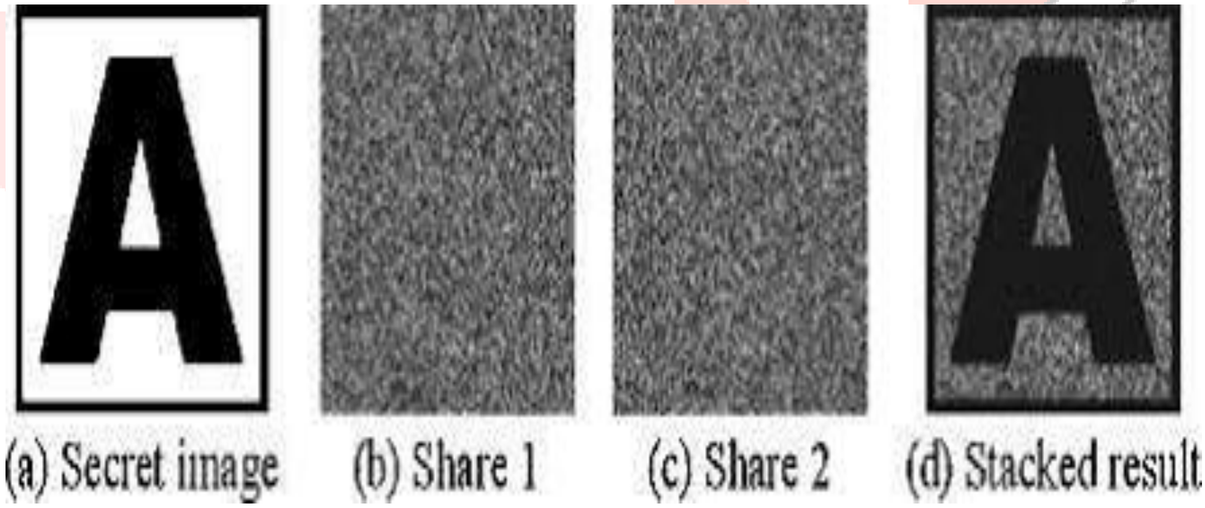

Fig. 3 Implementation of a VCS

Related Work

1. Digital Watermarking

A **digital watermark** is a kind of marker covertly embedded in a noise-tolerant signal such as an audio, video or image data. It is typically used to identify ownership of the copyright of such signal. Modulating the orientation of elliptically clustered dots in the each halftone cell enables binary data to be embedded into the clustered halftone dots. In this paper, a new decoding method is proposed for the recovering hidden binary data from clustered halftone dots by using learned dictionaries, which are optimized to represent clustered dots with different elliptical shapes. The basic idea is that the reconstruction errors of the clustered dots in a halftone cell are to be differentiable according to the dictionaries used. The experimental results showed that determining which of the learned dictionaries provides a minimum reconstruction error in a halftone cell can reveal the orientation of the clustered dots and thus indicate the embedded binary data

Watermarking is an image data hiding scheme. Here the hiding or embedding of invisible data in the image without affecting the actual image quality. Digital watermarking aids owners in asserting their intellectual property rights on the works of art they create. These rights are particularly difficult to enforce with the digital images, since it is easy to copy and distribute perfect copies of an original image.

Watermark Embedding

The block diagram of watermark embedding is as shown in Fig. 1, and each step is detailed described below. Watermark generation Our scheme exploits image hash as a fragile watermark. Image hashing is known as the problem of mapping an image to a short binary string. Image hash function has the properties that perceptually

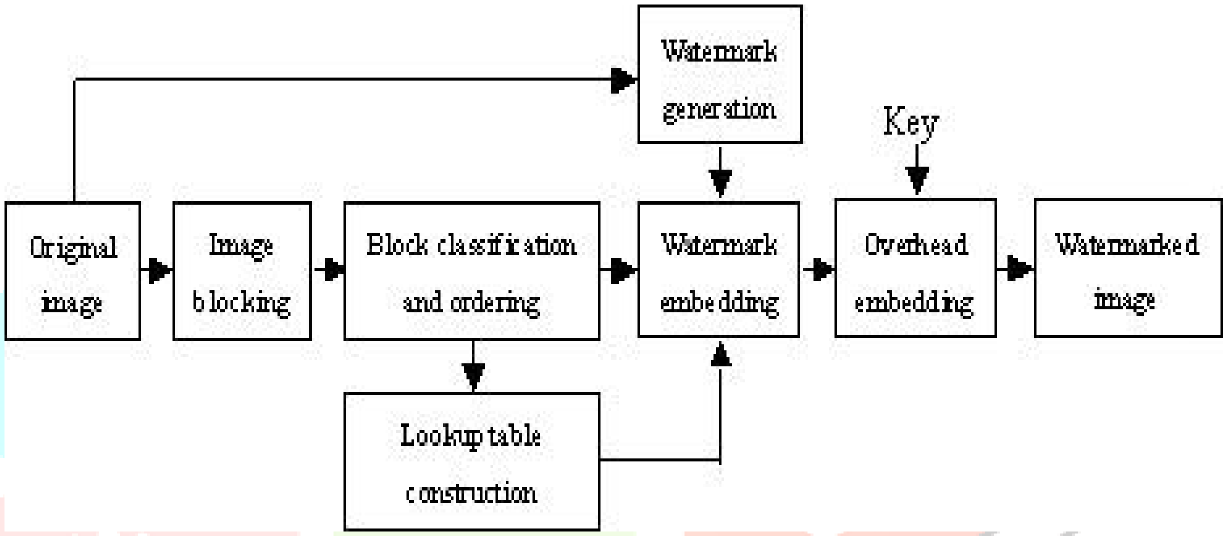

Fig 4.Block diagram of watermark embedding.

2. Blue-Noise Halftoning

Necessity is the mother of invention, and the BLUE NOISE MASK is no exception. In the late 1980s, researchers Kevin Parker and Theophano Mitsa of the University of Rochester developed the technology to provide high-quality halftones several times faster than the best algorithms available. Dr. Parker, an expert in imaging, wanted to improve the quality and production time of digital printouts from diagnostic equipment. Researchers often were unable to determine whether a spot on a medical image was an incipient tumor or merely an artifact added to the image during printing. The algorithm designed by Parker and Mitsa combines the superior imaging benefits of error diffusion halftoning techniques with the high speed and low complexity of other well-known halftoning methods.

Blue noise, which is sometimes considered high-frequency white noise, is a noise color with a spectral density (power per hertz) that is proportional to its frequency. This means that the power and energy of the signal increases as frequency increases. The process creates the illusion of gray by varying the density and arrangement of black dots on a white background. To accomplish this, a computer analyzes sets of pixel (picture element) gray-level numbers on a grid and calculates which numbers represent black printer dots and which numbers represent white printer dots. Each pixel has anumber from 1 to 256 that represents the grayscale(brightness) value. The numbers are compared against a threshold gray-level value; thethreshold values are placed in a halftone mask. Pixels with values below the threshold represent black dots while those equal to or greater than the threshold represent white dots

Properties of the **Blue-Noise Halftoning**

The properties of the blue-noise mask and establish its connection with error diffusion and ordered dither. Our motivation for building this mask was to combine the advantages of error diffusion and ordered dither, i.e., to combine the speed of ordered dither with the high-quality results of error diffusion.

This was done by building our mask as a 2-D single-valued function, i.e., giving it the structure of an ordered-dither mask and also giving it the blue-noise-producing properties of error diffusion. It should be noted here that blue noise refers to the spectral shape of the resulting halftone image and not of the mask itself.

Blue Noise Halftoning Key Features

- Produces high-quality images , eliminating computations required in other high-quality digital half toning techniques.
- Produces recurrent patterns than ordered-dithered methods.
- Free of scanning and start-up artifact of ten seen in error-diffusion technique.
- implemented in software and hardware.

CONCLUSION

In this paper, we review the various existing techniques for digital halftone processing. Now a day's researchers have generated both good quality and compressible halftones by looking at the problem of designing of halftoner. The advantage of visual cryptography is that it exploits human eyes to decrypt secret images with no computation required. The proliferation of networking and the exchange of digital data motivated watermarking and steganography for halftone images which are relatively new areas. We have reviewed a number of approaches in watermarking halftones and embedding halftones and watermarking. Certainly many more aspects of halftone processing this problem can be considered in the future.

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