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Review of Watermarking and Color Image Retrieval

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Abstract- The development of information technology and network technology is increasing rapidly. In network technology, multimedia communication applications are used in various formats such as text, image, audio and video. These formats are spreading very fast over the internet without any security and they can be easily copied by anyone without any prior protection and their feature can be easily copied. Nowadays the copyright infringement and piracy become very serious problem. Because of this problem, watermarking technology is used to protect the color image. In a recent year, several watermarking techniques are available such as spatial watermarking technique and frequency based watermarking technique. Frequency watermarking technique is used to differentiate the transformation of the wave and the discrete cosine transformation but transform watermarking techniques cannot provide adequate protection of image or data. This provides a weak answer to the problem of geometrical attack such as noise attack, rotation attack and translation attack. Therefore the use of spatial watermarking technique is recommended through the use of least significant bits, patch work and coding to reduce the problem of geometrical attack. This technique is comparatively simple. It can survive simple operations such as cutting and adding noise. In this document, we propose the watermark scheme based on spatial domain for color images. This scheme uses the Sobel and Canny edge detection methods to determine border information of the Luminance and chrominance components of the color image.

Keywords- Digital watermarking, color image based retrieval system(CBIR),Least significant bits(LSB),Discrete Fourie Transform(DFT), Discrete Cosine Transform(DCT),Discrete wavelet Transform(DWT).

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I. INTRODUCTION

A digital watermark is a type of hidden marker hidden in a noise-tolerant signal ,such as an audio, video or image data. It is usually used to identify the copyright owner of signal. The Watermarking is the process of hiding digital information in a carrier signal, the hidden information must but must not contain a relationship with carrier signal[1].It is important to use it to monitor authentication of copyright infringements.The digital watermark can be used for various purposes, such as copyright protection,source tracking, transmission tracking. There are several techniques of information concealment[3]. The watermark must be difficult to remove without any damaging the vector signal. In watermark, the actual coupling of message to the ship, which is the digital data and data protection,is extremely important. It will have more development in the future. A watermark is as normally divided into three phases: embedding, attacking and detection. Figure 1. Shows the phases of the digital watermark.

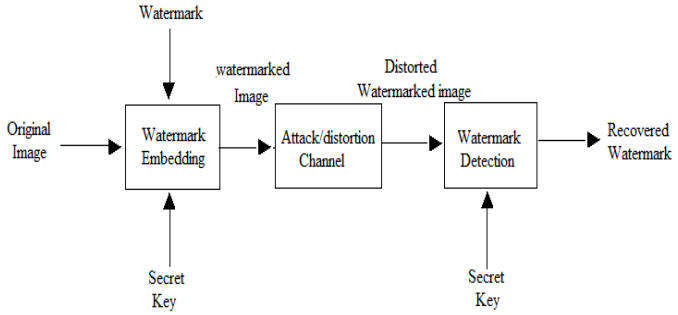

Figure.1 Digital watermarks scenarios with embedding, attack and detection.

The operation of digital watermark with embedding, attack and detection are as follows:

*A. Embedding/Incorporation of the phase:*It is a first stage of digital watermark. In which, the original image is incorporated with a watermark and secret key, then it creates the watermarked image and this watermarked image transmitted over the network.

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B. Attack/Distortion channel: When watermarked image is transmitted over the network, some attacks or distortions such as noise is added with watermark image.Because to this image of the watermark is to demolish or recast sometimes.

C. Detection phase. In this phase, the noise is extracted and the watermark is detected using a secret key. Verifying digital information is a very difficult task. So, the solution for this is to access data using cryptographic techniques, but encryption does not provide perfect protection here. If once encrypted information is decrypted, it spreads very quickly through the network. The steganography technique is an imperceptible way to incorporate data. In any form of digital data (image, audio, video, text, multimedia documents) it can be covered to hide information. Steganography is the technique to hide the secret message in an original message and extract it to its destination. Steganography takes the encryption one step further by hiding an encrypted message so nobody suspects it exists. In modern digital steganography, data is first encrypted with the usual means and then inserted, using a special algorithm, into redundant data that is part of a particular file format, such as a JPEG image. Think of all the bits that represent the same colored pixels repeated in a row. When we apply encrypted data to these redundant data in a random or non-visible way, the result will be data with regular and unencrypted data noise patterns. Sometimes a registered trademark or other identifying symbol hidden in the software code is referred to as a watermark. A secret key is the information or parameter that is used to encrypt and decrypt messages in a symmetric key. The secret key is also known as a private key [2].

II. CLASSIFICATION OF WATERMARK TECHNIQUES.

Water intake techniques are classified using spatial domain technique and frequency domain technique. The spatial domain technique includes less significant bits (LSB) and the technique based on SSM modulation, in which the frequency domain technique includes the discrete cosine transformation (DCT) and the discrete wavelet transformation (DWT) [4].

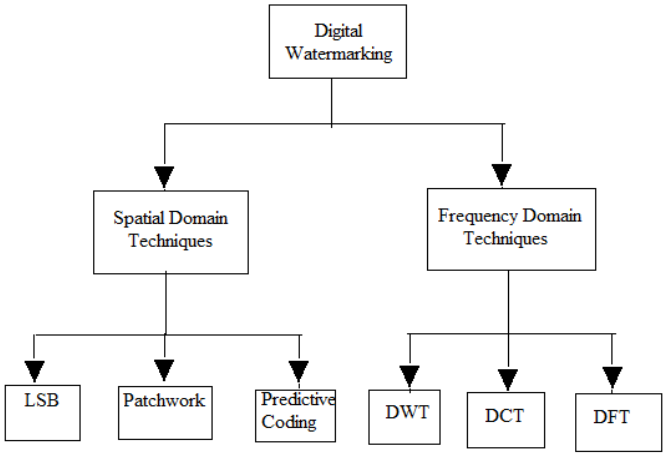

Figure.2.Classification of watermark techniques.

A.Spatial domain Techniques:

The spatial domain digital watermark is a technique for entering information about the watermark defined by the owner in the original image / video in the spatial domain. The watermark scheme based on spatial domain for color images. This schema uses the Sobel and Canny edge detection methods to determine border information of the luminance and chrominance components of the color image [5]. The most common algorithm for the spatial domain watermark is the less significant bit change. This method changes the least significant bits (LSB) of the pixels chosen in the image. You can use multiple LSB bits of the container image in a similar way.

Less significant bit (LSB).

The least significant bit is a very important spatial domain method [9]. In the calculation, bit numbering is the convention used to identify the positions of bits in a binary number or container for a value of this type. The number of bits begins with zero and increases by one for each successive bit position. Example of the least significant bit of the watermark as follows [2]:

Original image:

11101011 0100101 10110011 00101011 .....

filigree:

1 0 1 0

Image of the watermark:

11101011 0100100 10110011 00101010 .....

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Steps are used to create a watermark image of the original image using the least significant bit (LSB).

1. Convert an RGB image to a grayscale image.
2. Double precision for the image.
3. Change the most significant bits to least significant bits of the watermark image.
4. Make zero the least significant bits of the host images.
5. Add the modified version (step 3) of the watermarked image to the modified host image (step 4).

This method is easily modifiable with the image and provides high perceptive transparency. The main disadvantage of the LSB technique is its lack of robustness in the common signal processing operation, since using this technique, the watermark can easily be destroyed by signal processing attacks [8].

The watermark object can also be incorporated multiple times within the container image. Even if most of the watermarks are lost due to attacks such as elimination, geometric attack, cryptographic attack and protocol attack, only one survivor is sufficient [8]. This technique is relatively simple. It can survive simple operations such as cutting and adding noise. However, lossy compression will cause the watermark to fail. In addition, a simple attack that sets all LSB bits to "1" will cancel the watermark with negligible perceptual impact on the cover object. To extract the watermark, the LSB plane is extracted from the watermark image and a unique operation is completed using the watermark template. To avoid extracting information hidden directly from the chroma LSB, the cover image can be pre-processed. A pre-processing technique consists of dividing the cover image by blocks [7]. The built-in watermark is encoded by changing the relationship between neighboring blocks. This technique has a very low computational complexity and consumes less time.

B. Frequency Domain Techniques.

The watermarking scheme based on the transform domains can be further classified into the Discrete Fourier Transform (DFT), Discrete Cosine Transform (DCT) and Discrete Wavelet Transform (DWT) domain methods[6].

*1)Discrete Fourier Transform(DFT):*The discrete Fourier transform (DFT) converts a finite sequence of equally-spaced samples of a function into a same-length sequence of equally-spaced samples of the discrete-time Fourier transform (DTFT), which is a complex-valued function of frequency. The interval at which the DTFT is sampled is the reciprocal of the duration of the input sequence. An inverse DFT is a Fourier series, using the DTFT samples as coefficients of complex sinusoids at the corresponding DTFT frequencies. It has the same sample-values as the original input sequence. The DFT is therefore said to be a frequency domain representation of the original input sequence. If the original sequence spans all the non-zero values of a function, its DTFT is continuous (and periodic), and the DFT provides discrete samples of one cycle. A DFT based image watermarking technique is proposed in [10].

*2)Discrete Cosine Transform(DCT):*A discrete cosine transform (DCT) expresses a finite sequence of data points in terms of a sum of cosine functions oscillating at different frequencies. A spread spectrum-like discrete cosine transform domain watermarking technique for copyright protection of still digital images is analyzed in [12]. The DCT is applied in blocks of 8 × 8 pixels as in the JPEG algorithm. Simulation results vividly illustrated that their proposed technique performed well in terms of robustness against attacks and imperceptibility. The main steps which used in DCT[4]:

1. Segment the images into non-overlapping blocks of 8×8.
2. Apply forward DCT to each of these blocks.
3. Apply some block selection criteria.
4. Apply coefficient selection criteria.
5. Embedded watermark by modifying the selected coefficient.
6. Apply inverse DCT transform on each block.

*3)Discrete Wavelet Transform(DWT):*In numerical analysis and functional analysis, a discrete wavelet transform (DWT) is any wavelet transform for which the wavelets are discretely sampled. As with other wavelet transforms, a key advantage it has over Fourier transforms is temporal resolution: it captures both frequency and location information (location in time). The wavelet transform is based on small waves. The heart of wavelet analysis is multi resolution analysis. In two-dimensional DWT, each level of decomposition produces four bands of data, one corresponding to the low pass band (LL), and three other corresponding to horizontal (HL), vertical (LH), and diagonal (HH) sub-bands. A DWT based image watermarking technique is proposed in [11].

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III. COLOR IMAGE RETRIEVAL SYSTEM

Color image retrieval is one of the most important and interesting subject of technology from a last few decades. Color image retrieval was introduced in 1980s.color is most important properties in image retrieval system.

Image retrieval is not always gives proper result. Sometime they are gives regrettable result in many cases. In color retrieval methods include spatial information for solve this problem. Color image retrieval also called as query.

Color image retrieval is calculating similarities between image database and query image[13]. The tasks performed by CBIR can be classified into pre-processing and feature extraction stages. In Pre-processing stage, removal of noise and enhancement of object features which are important to understanding the image is performed and another is In Feature Extraction stage, features such as shape, color, texture etc. are used to describe the image. This feature is generated to accurately represent the image in the database. The color aspect can be achieved by thetechniques like moments and histograms.

IV. CONCLUSION

In this paper , we have reviewed work of watermark and retrieval of color image. The watermarking is a process to hiding digital information in carrier signal to protect from the piracy. In which it includes the techniques of image watermarking, this techniques are Least significant bits(LSB), SSM Modulation Based techniques. These are include in spatial domain technique and Discrete Cosine Transformation(DCT), Discrete Wavelet Transformation(DWT) these are frequency domain techniques and the retrieval of color image is done by using it's RGB color model and HSV color model. Review work presented in this paper is actually help researcher to study the past about the watermarking and color image retrieval. Also it helps for development in future works, using secret key for making watermark image encryption and also other security to avoid the problems like as piracy.

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