

# Scrutiny of Digital Video Watermarking and QR Codes



N. Sri Prakash, K. Kiran Kumar

**Abstract:** The economic activity on the internet and media require safeguard to enhance the sanctuary to the data. Digital watermarking is an information masking technique wherever Associate in Nursing data or message is cloaked within a symbol clear to the user. This research includes the discussion about the watermarking concepts, Barcodes and QR codes, and algorithms used for the watermarking emerging better robustness, data security and increasing embedding capability. Here we also discussed about the software's used for watermarking.

**Keywords:** Watermarking, Barcodes, QR codes

## I. INTRODUCTION

The usage of the Internet in the past years has rapidly increased and the availability of information like audio, pictures and videos to the general public [1]. With the advanced technology in the real world today the people can share any information. Some of the organizations like medicine, military are sharing highly sanctuary and important data to the prescribed persons [2]. To secure the data transmission we have different types of security technologies are there. In that the crucial technologies are Steganography, cryptography and Watermarking. The Steganography methods doesn't provide enough security against removing or modification of hidden message [3]. In the Cryptography the data is transmitted through a public network as a secret code, in the encryption algorithm the cipher text called the original text in the coded format. In the cryptography the data is secured until it decrypts. One more disadvantage of the both steganography and cryptography is it only works on the text only [4]. In this water watermarking we can secure the data either in visible or Invisible. There are different watermarking techniques are there. They are (i). Text watermarking (ii). Audio watermarking (iii). Image watermarking (iv). Video watermarking

**(i) Text watermarking:** This watermarking is in the type of data will be in the form of Text either in numerical or in the alphabets, special characters[5].

**(ii) Image watermarking:** In this watermarking the image consists of the crucial information inside the image [5].

**(iii) Audio Watermarking:** It is an electronic identifier embedded in an audio signal, some of the audio signal is embed with the original audio signal [6].

**(iv) Video Watermarking:** This is the technique which we can embed text, image or audio as a watermark or we can add the multiple tasks of watermarks at a time [7].

There are two domains in the watermarking system. They are Spatial Domain and Frequency domain. In Spatial Domain Techniques, this technique will select the single pixel of the image and operated directly on it whereas the Frequency domain technique are operated on Image Frequency [2]. We can use the particular domain that we want it. Watermarking has many desirable properties. They are **Effectiveness:** It is the chance that the info in an exceedingly watermarked image are going to be correctly detected.

**Image fidelity:** Watermarking means adding some data into the image. That means the quality of the image will be degraded. We try to improve the image quality, so that no obvious distinction within the image's fidelity will be detected.

**Robustness:** This watermarking ought to be able to supplement Gaussian noise, rotation, compression, printing and scanning, scaling, cropping and lots of different operations.

In all these watermarking techniques we will discuss more on the video watermarking and algorithms used in it. The video watermarking is to develop a system with high sanctuary to the copyright protection, piracy tracing, content authentication, advertisement surveillance, information transferring from one user to the other.

## II. VIDEO WATERMARKING PROCESS

There are different steps that follows for embedding watermark into the video which was shown in figure 1.

Step 1: Firstly, we choose the video and then divide the entire video into frames.

Step 2: Select the frame which we want to watermark.

Step 3: Now Select the algorithm and embedded the watermark into the frame. Now the video consists of the watermark. It will be transferred to the other end.

Step 4: In the receiver ends the video is again divided into frames, then use the inverse algorithm with key and retrieve the original data.

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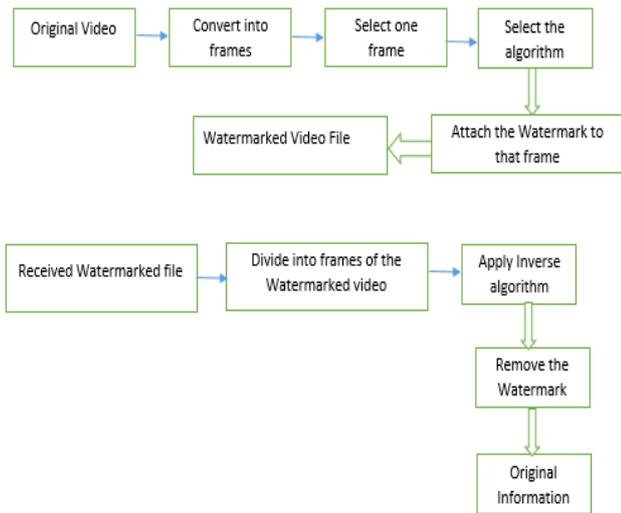


Figure 1: Transmitting and Receiving Path

III. GENERAL WATERMARKING STEPS

Figure 2 represents the general watermarking steps.

**3.1 GENERATION AND EMBEDDING:** Firstly, choose the data and convert it to the QR code. Now take the video and splits the entire video as a frames to embed the QR code in one of the frame as a Watermark. To embed the QR code in the frame by using different algorithms by getting the permission from the Host. Now the Watermarked signal is called the Host Signal.

**3.2 DISTRIBUTION AND POSSIBLE ATTACKS:** The host signal has the key which can be opened by only the prescribed person only. Now, the host signal is transferred to the watermark channel. Possible attacks may be intended or accidental.

**3.3 EXTRACTION:** In this process the receiver detects all the keys at the receiving end, and removes the watermark using the inverse algorithm.

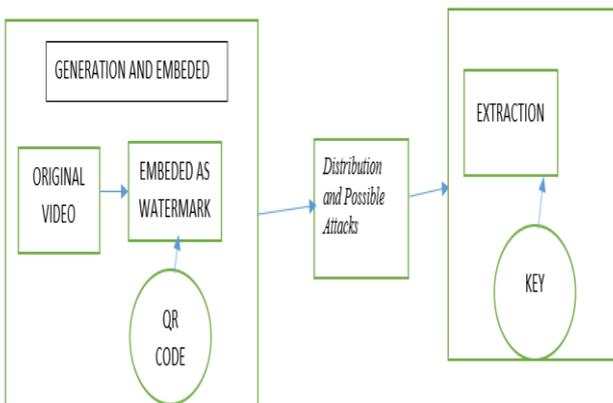


Figure 2: Embedding Watermark and Extraction

IV. GENERAL ALGORITHMS USED IN VIDEO WATERMARKING

There are different algorithms used for video watermarking. In that we kept some of the video watermarking algorithms.

**4.1 DWT-Discrete wavelet transform:** By using the successive high and low pass filter of a discrete time-domain signal the DWT produces a sparse time-frequency

representation of a signal [8]. The DWT splits the picture frames into four sub bands-LL, LH, HL, and HH by using the high pass filter and the low pass filter. The sub band LL gives the approximation to the input image while the LH represents the rows of the image that means it extracts the horizontal image, HL extracts the vertical features of the image, And HH extracts the edges along the diagonals of the image. Next Each small frame is divided to four sub-sub-parts and repeat the steps [3].

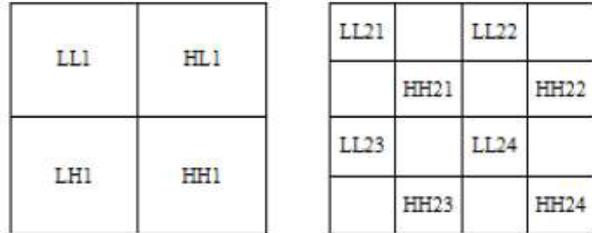


Figure 3: DWT steps

**4.2 SVD-Singular value decomposition:** The SVD is a technique which compresses the Image. It is used for factorization of a complex framework with different applications in different fields of image and video processing [9]. SVD contains a matrix A which has  $m \times n$  real values where  $m \leq n$ , performs orthogonal operations on A which results the matrix arranged in decreasing value and coincide with the square root of the Eigen values of ATA [15].

**4.3 DCT-Discrete Cosine Transform:** The DCT is mainly used for the compressing the Images. The DC changes the frequency coefficients. The Watermarking where the DCT is used can gets the robustness against noising, compression, sharpening, and filtering [14]. This DCT provides the good and best results in quality of the frames at high compression ratios. The DCT divides the image into three different frequency bands. They are High, Middle and Low. In this three bands the watermarking is done at middle band because it has Less visual information.

**4.4 PCA-Principal Component Analysis:** It is A mathematical method which gives an orthogonal transformation, which translates a correlated variables set into a set of values of uncorrelated variables called principal components. PCA transforms information to new coordinate system called the first principle component which plots the maximum covariance data together. Similarly, there are the second and third principal components also working like this only. The first principal component has the maximum energy concentration [11].

V. OPEN SOURCE WATERMARKING SOFTWARE'S

There are many open source watermarking software's are there. In that we are going to discuss some easy watermark software's.

**5.1 uMark:** By using the internet source we can use this watermark software. It is the easiest and commonly used software. It is also full free software. By using this software, we can include the visible watermarks to hundreds of images at one go [12].



The interesting features of this Software are it can do Text, Image, QR code watermark, Shape watermark [13].

**5.2 WatermarkLib:** It is a free tool that lets you watermark your images with text or images, to protect them from unauthorized use. It supports creating and editing watermarks by batch processing, with all image formats including JPEG, JPG, GIF, BMP, etc.. [12].

**5.3 CODING:** Beyond this software's we can use the MATLAB and OPENCV to operate the image and video watermarking's. In this two software's we can do all types of watermarks.

## VI. CODES

Generally, there are two types of codes. They are BARCODE and QR CODE.

**6.1 BARCODE:** A barcode holds the information in the HORIZONTAL direction only i.e., it is one-dimensional. Generally, it holds the numerical data or information. It represents the data of the product which was inferred by the machine. The barcode has the collection of parallel lines of fluctuating widths in the rectangular shape printed on the package. It is also called as the UPC BARCODES (UNIVERSAL PRODUCT CODE) [7].



Figure 4: Barcode

**6.2 QR CODES:** Quick Response code is similar to Barcode but it is in two-dimensional(2D) just like the matrix. It is an optical label which is understood by the machine contains information about the component which is attached. [7]. This QR code generally contains the identifier that points to a data or application. To store the data, the QR codes used four encoding approaches. They are numeric, alphanumeric, byte or binary and kanji. When compared the standard UPC barcodes with QR codes, the QR codes are more preferable because of its fast readability and greater storage capacity [10].



Figure 5: QR code

## VII. DISCUSSION

By studying all the watermarking techniques and codes we prefer the video watermarking and QR codes are preferable because in the video watermarking we can do the multiple watermarks at a time and in the codes QR code is easy to scan and control.

## VIII. CONCLUSION

In this paper we discussed about the different data security systems and problems in the steganography and cryptography techniques. To resolve that we discussed about watermark techniques and also discussed about different algorithms used for video watermarking techniques. By comparing the video watermarking with steganography or cryptography, the video watermarking is more achievable. We also discussed about the QR codes which can be embed as a watermark in videos. The QR codes can store any data compared to the barcodes. Furthermore, if we include the watermarking in IOT we can get the good results.

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