# ENHANCED SPREAD SPECTRUM WATERMARKER USING DISCRETE MULTIWAVELET

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***Abstract :*** In this paper, a multibit, multiplicative, watermarking using the texture area transform is presented. Performance improvement is obtained by means of a new Just Perceptual Weighting (JPW) model than existing one. The new model incorporates various masking effects of human visual perception by taking into account the eye's sensitivity to noise changes depending on spatial frequency and texture of all the image area. The area with dense high brightness and dense low brightness is taken for watermarking. The quality of the watermarked image and robustness of the watermark are improved by this proposed system compared with a variety existing algorithms. The application for implementing the algorithm is developed using MATLAB 7.6

***IndexTerms*** **- watermark, texture.**

## I. Introduction

The Digital image processing plays an important role in processing of digital images by using computer algorithms. Compared with analog image processing, Digital image processing has many advantages. It can avoid build-up of noise and signal distortion during processing by providing various types of algorithms to the input data.

Digital image processing operates on images coming from digital camera to improve the visibility of features. To enhance raw images received from sources such as cameras and sensors, suppress Image imperfections and defects.

In Digital cameras, in order to convert the raw data from the image sensor into a color-corrected image in a standard image file format, digital image processing is required. So what,quality of the image to be improved . Using some special software programs, we can manipulate the images in many ways.

Digital image processing is used in many applications. In some Security applications like banking software to IT solution, it is an important factor. Face recognisition, finger printing and many advanced technologies provide security. It is used in wide range of applications from small image enhancement to advanced Face recognisition. Some of them are are Military Applications, Document Processing, Non-Destructive Evaluation, Graphic Arts, Intelligent transportation systems such as automatic number plate recognition and traffic sign recognition.

**Digital watermarking** is the act of hiding information into a digital signal (i.e. an image, video, audio) which may be used to verify its authenticity or the identity of its owners [5]. Also, watermark is applicable for visible identification. If the signal is copied, then the information also is carried in the copy. A signal can able to carry several watermarks at the same time.

The watermarking is widely used in many applications [2]. This is mainly intended to prevent or deter unauthorized copying of digital media. In this, before making a copy, the copy device retrieves the watermark from the signal and the decision is made by the device by checking the contents of the watermark. Other applications are in source tracing, broadcast monitoring.In broadcast monitoring, we are able to track when a specific video is being broadcast by a TV station. This is important for advertising agencies.

Watermarking can be used for this purpose. Due to this, broadcast monitoring is easier. In owner identification, identify the owner of a specific digital work of art, such as a video or image can be quite difficult. Instead of including copyright notices with every image or song, watermarking is used to embed the copyright in the image itself.

Another interesting application of watermarking is Transaction tracking. Here, for recording one or more transactions, the watermark is embedded in a digital work. When we use watermarking to record the recipient of every legal copy of a movie, it is used to identify which recipient of the movie was the source of the leak in the internet. So it is an important tool for the movie producers for identifying illegal recipients.

## II.OVERVIEW

In this paper, a multi bit, multiplicative, spread spectrum watermarking using unbalanced and balanced multi wavelet transform is proposed [4]. A new just perceptual weighting (JPW) model [1] obtains the performance improvement.

In this new model consists of different masking effects of human visual perception including the eye's sensitivity to noise changes [6]. It depends on the following factors. They are spatial frequency, luminance and texture of all the image sub bands.

In the presence of geometric attacks like frame shift, cropping, scaling, rotation, and change of aspect ratio, digital video watermarking recovery faces difficult problems. This paper considers the context of uncompressed video , and so geometric attacks tend to be less severe.

Here, for the typical spread spectrum (SS) watermarking system[7], blind retrieval is performed via cross-correlation between the marked video and the secret pseudo-noise (PN) sequence used to spread the watermark at the embedding stage. Perfect synchronization between the attacked video and the PN sequence is recovered, but is difficult to detect the geometric attacks which destroy the synchronization.

By using the FMT approach, first undo geometric attacks and an additional spatial reference watermark used only for registration purposes. After determining the attack parameters , the geometric attacks are undone and the resulting frame is passed to the main watermark decoder. Multi-bit data which is carried by the main watermark, is inserted in the DWT domain and by using HVS model[3], the capacity is maximised by embedding. The complete system can be regarded as a noisy communications channel and so it is protected by turbo coding. The resulting system can withstand severe geometric attack, the limiting attack is defined by a threshold which gives a false detection probability of 10-8, and capacity being defined by a Bit Error Rate of 10-8.

## III. MODULE DESCRIPTION

The steps for describing the module are as follows:

1) Load image
2) Input watermark message and convert message to bits
3) Find texture segments using spatial data
4) Spread message bits in texture block
5) Write pixel array values to new watermarked image
6) Load watermarked image
7) Get message bits and prepare message content

First, load a new image which is checked for RGB or gray scale type. The texture identification will be different in both types of images. In a new figure window, the image is displayed and the information about the image is also displayed. Then, a message is keyed in. The watermark message characters are converted in to bits. Normal ASCII characters are taken so that 1 character contains 1 byte and so the total number of bits would be eight * total number of characters. From the spatial data, i.e., the color values of the adjacent pixels, if in a rectangular area of 8 * 8 pixels, the
total number of colors is more than 16, then the area is considered as texture or noise area. In addition, the color values of neighbor pixels should be different so that it can be declared as texture area.

After the texture segments finalized, the message bits are spread into the pixels with a predefined position, say 1 bit after two pixels. Information about the starting pixel position and the number of bits are also saved. The bit spreading may be in more than one texture area. So the information about the starting positions in various texture segments is also stored in some predefined position in the image.

In this module, after the new pixel values are derived, the values are written to new image array and save as the original image type with a new name. Load the watermarked image. Finally, the information about the message bits are found out and the bits are gathered accordingly. Then the message bits are converted to bytes and then characters and displayed.

The watermarking embedding algorithm steps are as follows:

a. Read the cover image (The image in which the text message is going to be embedded)
b. Read the message image (Image going to hide in the cover image).
c. Convert needed to spread the image values on a 256 gray-scale.
d. Get the size of cover image used for embedding.
e. Get the size of message object (message image) to embed.
f. Store the message bytes in array.
g. Store the LSB of message bits in MSB of cover image at the corresponding location.
h. Add noise (Gaussian Noise) to watermark image. (This is optional)
i. Write the MSB modified output image.
j. Write the noise applied image (This is optional).

**Texture analysis** refers to characterize an image by their texture content. Texture analysis describes the qualities of image such as rough, smooth, silky, or bumpy as a function of the variation in pixel intensities. The roughness or irregularities refers to variations in the intensity values, or gray levels. For texture analysis if 3x3 or 5x5 pixel area is repeated, then the area is treated as texture in our context.

**Input Design** is one of the important phases of the operation of computerized system . A large number of problems with a system can usually be tracked backs to fault input design and method. Needless to say, therefore, that the input data is the life blood of a system and have to be analyzed and designed with utmost case and consideration. The functions made by the input design are,

1 To provide low cost method of input.

2 To achieve the high degree of accuracy.

3 To ensure that the input is understand by the user.

System analysis decides the following input design details like, what data to be as input, what medium to use, how the data should be arranged or coded, data items and transactions needing validations to detect errors and at last the dialogue to guide user in providing input.

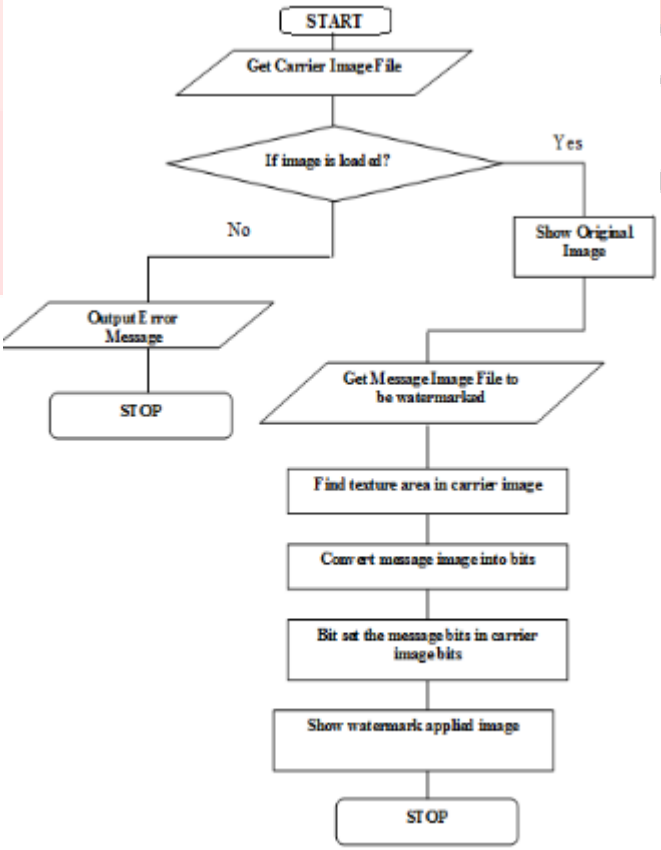
Input data of a system may be necessarily be raw data captured in the system from scratch and also the output of another system or sub system. The design of input covers all phases of input from the creation of initial data to actual entering the data to the system for processing. The design of inputs involves identifying the necessary data and specifying the characteristics of each data item, and preparing data for processing and error correction .

The following forms are used for input.

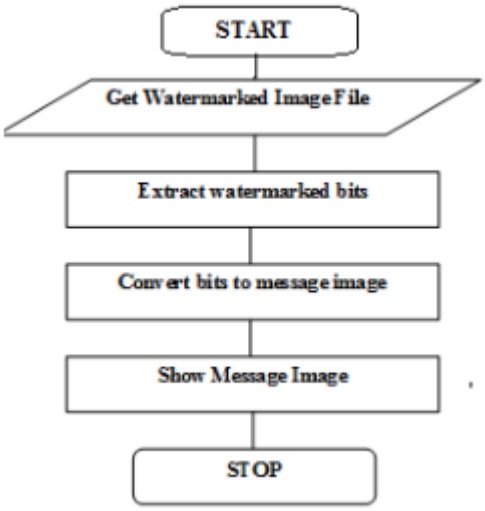
a) In watermark form, the carrier image and image to be watermarked path are selected. The open file dialog box provided in the operating system is called using uigetfile function and the select paths are displayed in the text boxes. The width and height is also retrieved. The dimensions are displayed using label controls.

b) In de-watermark form, the path of the image already watermarked is selected. The open file dialog box provided in the operating system is called using uigetfile function and the path is displayed in the text box. The width and height is also retrieved. The dimensions are displayed using label controls.

**Watermark Form**



**Dewatermark Form**




**Output design** plays a vital role for developing the system. The output generates the results and information . This is very much useful to evaluate a particular application. The main objective of a system is to determine its output. Outputs of a system can face various forms. The most common are reports, screen displays, printed forms, graphical drawings etc.,

The output can also be varied in terms of their contents frequency, timing and format. The user of the output from a system are the justification for its existence. If the output is inadequate in any way, the system itself is adequate. The output must be accurate, fast and appropriate, in terms of content, medium and layout for its intended purpose.

The following forms are used for output.

a) In watermark form, the after the carrier image and image to be watermark path is selected and the original images are displayed using figure windows. After watermarking is applied, the final image is displayed using a new figure window. It is verified that the final image looks similar as the original carrier image.

b) In de-watermark form, the after the watermarked image path is selected, the image is displayed using figure windows. After de-watermarking is applied, the final message image is displayed using a new figure window. It is verified that the final message image looks similar as the original message image.

The following section shows that the experimental results of Watermarking of a JPG Image. Fig.1 shows the carrier image. It can be converted into gray scale image which is shown in fig.2. Dewatermark image is shown in fig.3 After de-watermarking is applied, the final message image is displayed that is shown in fig.4.

## IV. Experimental Results

Fig.1 Carrier Image

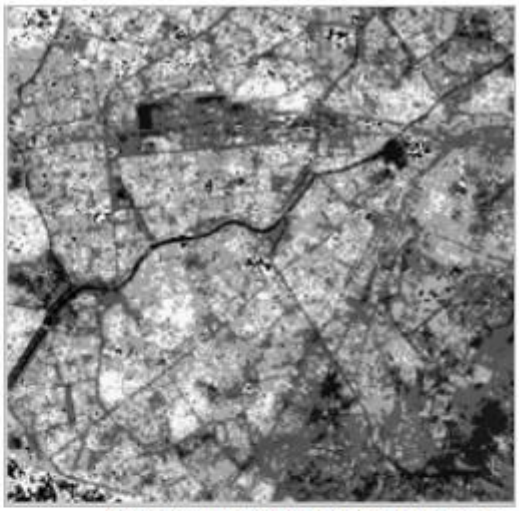


Fig.2 converted to Gray Scale Image

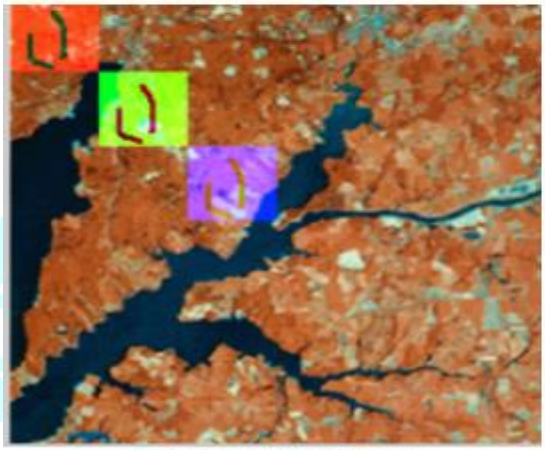


Fig.3 DeWatermark image

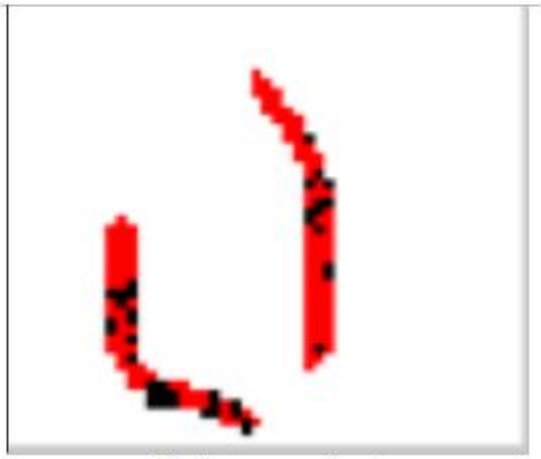


Fig.4 message input

The image is checked for RGB or gray scale type. The texture identification will be different in both types of images. An edge weight difference value is keyed in. If the two adjacent pixels are having pixel values more than this different value, then they are treated as in separate objects. If the collected pixels count is more than given count, then only the region is treated as new object. This option is given to prepare minimum number of objects. Otherwise more number of areas is separated out in the image and the image seems to contain more objects. If the value is given as -1, then there is no limitation in finding object segments. Otherwise, the number of objects found crosses the limit, the algorithm stops.

## V.CONCLUSION

The texture based watermarking approach helps to effectively watermark the messages into the image. The watermark area is controlled such that only the less sensitive area such as the texture area is found out and then the content is watermarked. The user is not able to view the content modified inside the carrier image. The carrier image as well as the watermark applied image looks similar. Thus the invisible watermarking is applied.

The application is well suited for adding as a module in further image processing software development and so the scalability is more. The time taken to watermark the images are analyzed and help in further analysis to improve the algorithms in future. A collection of images can also be given as input with same number of message images and the effect is studied.

In future, the luminosity, the opacity based pixel data can be selected to apply watermarking. In addition, from the video file, the frames can be split out and watermarking process will be carried out in all the frames with different message text or image data. The watermarking process may be carried out using the frequency domain values extracted from the image files.

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