Abstract

We proposed the unseen visible watermarking using haar wavelet transform. In this paper we use the advantages of both visible and invisible watermarking. After the watermarking is done it is difficult to perceive the differences between the original work and stego work (hiding message) under normal viewing conditions. When the hidden watermark is takeout, the in detail watermark extracting module is not required. Unseen message details can be clearly visible by adjusting the contrast settings. Meaningful watermark patterns can be directly recognized such as gamma correction or even simply changing the user viewing angle relative to the LCD monitor are performed. If we hide some patterns into darker areas of images by performing minute modification to gray level values of selected pixels then the patterns will clearly recognizable when gamma correction are applied to the watermarked images.

When LCD is viewed from different viewing angles, its screen will show different contrast behaviour. This can also be utilized to achieve the unseen visible watermarking. And the robustness, fidelity, capacity, embedding complexity, content versatility are compared with the visible water marking scheme and invisible watermarking scheme as well as the proposed UVW method.

Introduction:

Advanced interactive media watermarking has gotten an expanding level of enthusiasm from scientists in both scholarly and reasonable settings. The crucial test in the computerized watermarking is to conceal a bit of data into an advanced picture record or a video or sound stream (spread) such that the data is not saw and can't be evacuated without bringing on critical perceptual debasement to the spread. Subsequent to the watermark is inserted into the media, it has the property that it will experience the same changes as the media and can in this manner be utilized as a pointer of what those changes might have been. Computerized watermarking plans are grouped into two methodologies: imperceptible and noticeable. Undetectable watermarking plans install messages into mixed media content in a manner that substance clients can't perceptually tell the contrasts in the middle of unmarked and checked
substance. Imperceptible watermarks don't change the sign to a perceptually incredible degree, i.e., there are just minor varieties in the yield signal. With respect to the undetectable watermarking, however great devotion is constantly ensured.

Undetectable watermarking are a greater amount of a guide in getting the hoodlum than disheartening the robbery in any case. In unmistakable watermarking the watermarked picture can be distinguishable to the ordinary eye, for example, charges, organization logos and TV logos and so forth. Obvious watermarks change flag out and out such that the watermarked sign is very surprising from the real flag. Unmistakable watermarks are particularly valuable for passing on a quick claim of proprietorship.

In this paper, we propose watermarking plans, called inconspicuous noticeable watermarking (UVW) utilizing haar wavelet transform. Visual substance set apart with Unseen Visible Watermarking plans have the same perceptual quality as those set apart with imperceptible watermarking plans. In any case, when sufficient operations, similar to picture upgrade operations (histogram leveling, gamma amendments) are performed then the data covered up in the stamped substance will be uncovered and perceived by substance clients.

**Existing Method:** In this method watermarking is done using spatial domain.

**Proposed Method:** In the proposed method we are using haar wavelet transform.
A) Watermarking:

Digital watermarking embed data stealthily in noisy signals. The data which is to be hidden in the image is called the cover image or host. The watermarking process has to be resilient against tampering attacks, making the content of a watermark readable in order to recognize when the recipient is extracted the watermarked image.

B) Embedding of Watermark:

In the embedding of watermark the algorithm should intelligently embed a watermark in the host without damaging the host image or cover image. And it should be difficult for an attacker to find the location of watermark and to extract or destroy the embedded watermark.

C) Histogram Equalization:

The histogram in the context of image processing is the operation by which the occurrences of each intensity value in the image is shown. The histogram is a graph which shows the number of pixels in an image at each different intensity value found in that image. For an 8-bit gray scale image the possible intensities are 256 and the histogram will graphically display 256 numbers showing the distribution of pixels amongst those gray scale values. Histogram equalization requires only the probability of each intensity level of image.

Histogram equalization is the technique by which the dynamic range of the histogram of an image is increased. In histogram equalization the input contains the intensity values of pixels and the output image contains a uniform distribution of intensities. This technique can be used on a whole image or just on a part of an image. Histogram equalization redistributes intensity distributions. If the histogram of an image has many peaks and valleys, it will still have peaks and valley after the histogram equalization, but that the peaks and valley will be shifted. Because of this, "spreading" is a better term than "flattening" to describe histogram equalization. In histogram equalization, each pixel is assigned a new intensity value based on its previous intensity level.
Below are the histogram representation of an rgb image. Of low data force will be mapped to a more extensive scope of yield power (i.e., contrast of the low intensity area is consequently increased). Therefore, on the off chance that we somewhat change pixels in dim uniform ranges of pictures as indicated by watermark designs (e.g., marginally expanding the force estimations of pixels whose positions relate to the white pixels in twofold watermark designs), individuals won't see the shift under ordinary survey conditions, however the installed watermark example will be obviously unveiled subsequent to applying gamma revision with a little esteem (under one), extending the separation in the middle of modified and unaltered force value. Each pixel in a image has brightness level, called luminance. This value is between 0 to 1, where 0 means complete darkness (black), and 1 is brightest (white). Different camera or video recorder devices do not correctly capture luminance. (They are not linear) Different display devices (monitor, phone screen, TV) do not display luminance correctly neither. So, one need to correct them, therefore the gamma correction functions. Gamma correction function is used to correct image’s luminance. Like this: output_luminance=gamma Correction Function [input_luminance] the luminance is a value between 0 to 1. Gamma correction. The solid red curve is typical CRT monitor's voltage and luminance ratio. The dashed red curve
is its inverse function, the gamma correction function. The gray dotted line is the corrected result.

D) Gamma Correction:
Numerous presentation gadgets have power-law input–output qualities; that is, the yield force and the information power take after the equation: where and are constants. Since numerous gadgets tend to produce darker images than should be, the value of usually varies between 1.8 and 2.5. Therefore, the so-called gamma correction is often applied to correct this power-law response phenomenon by applying another force law power change on the picture utilizing values under one. Fig. 4 demonstrates some specimen input–output mapping elements of the gamma remedy. Note that when is under 1, a tight scope.

E) Haar Wavelet Transform:
Lifting wavelet is the second era quick wavelet change. Interpretation and expansion are not basic for getting lifting wavelets. All over testing is supplanted basically by split and converge at every level amid lifting wavelet change. In correlation with general wavelets, recreation of picture by lifting wavelet is great since, it expands smoothness and declines associating impacts. Wavelet disentangles the recurrence space relation. Utilizing LWT decreases misfortune in data, expand the heartiness of watermark and expansions soundness of implanted watermark in the picture. Watermark can be partitioned into 3 bunches they are i) Robust ii) delicate iii) semi delicate. The principle inspiration of this work is to give a powerful computerized signature watermarking, utilizing joint methodology involving lifting wavelet change to ensure pictures against assaults and confirm responsibility for without debasing the nature of picture. LWT calculation is spread range, semi blind and non-invertible. It likewise accomplishes higher heartiness and enhanced loyalty, which is one of the essential difficulties of the watermarking. Watermarking is entirely identified with steganography in which they are just as worried with mystery correspondence and have a place with a more extensive subject known as information hiding.
The Haar wavelet's mother wavelet function $\Psi(t)$ can be described as

$$\Psi(t) = \begin{cases} 
1 & 0 \leq t < \frac{1}{2}, \\
-1 & \frac{1}{2} \leq t < 1, \\
0 & \text{otherwise.}
\end{cases}$$

Its scaling function $\phi(t)$ can be described as

$$\phi(t) = \begin{cases} 
1 & 0 \leq t < 1, \\
0 & \text{otherwise.}
\end{cases}$$

Alfred Haar presented the primary wavelet systems in the year 1910. Wavelet frameworks of the Haar have been summed up to higher request measurement and rank.

Two sorts of coefficients are gotten from the wavelet change. Averaging so as to scale coefficients are acquired two contiguous examples. These scaling coefficients speak to a coarse guess of the discourse. Wavelet coefficients are acquired from the subtraction of two nearby specimens. Wavelet coefficients contain the fine points of interest of the discourse signal.

Results of haar wavelet transform:

For the above image psnr, mse, maxerr are as follows:
F) Comparing UVW, Visible

Watermarking and Invisible Watermarking:

The advantages and disadvantages of various assistant data conveyance plans, including general imperceptible watermarking plans, noticeable watermarking plans, and also the proposed UVW methodologies, are talked about in this area. Their benefits and burdens from different perspective are thought about, including fidelity, robustness against malignant removal attack, robustness against geometric assaults, installing unpredictability, sending cost, permissible message representations, content versatilities, and information limit. Note that all measurements were chosen to reflect imperative concerns in practical application situations.

Robustness:

All around arranged imperceptible watermarking plans must hold quickly to the impediment that complexities amidst checked and unmarked substance are unpretentious. Regardless of what may be normal, perceptible watermarking familiarizes unmistakable however unnoticeable illustrations with checked works. Concerning the proposed UVW arranges their fidelity presentations are the same as those of the impalpable arrangements under normal review conditions, and surpass those of evident philosophies. On account of the required picture update prepare, the seeing quality in the midst of metadata affirmation would be by the way more appalling. In any case, taking after the UVW arranges give the capacity to reveal the covered metadata openly, content customers will constantly have the ability to acknowledge wonderful audit experience.

Imperceptible watermarking plots consistently introduce clarified plans like cryptographic keys or perceptual hashes to shield the messages from threatening departure. Clear watermarking plans show extraordinary quality against geometric strikes, however may be removed by deliberate picture planning based attacks, as exhibited in [15]. UVW arranges show poor generosity against harmful departure ambushes, subsequent to direct picture get ready arrangements like clouding or tumult extension may annihilate the covered messages. In any case, for inhumane applications, for instance, passing on regard included metadata, the generosity inefficiency does not incite bona fide infeasibility since there is no poisonous need to evacuate metadata. For delicate applications, for example, steganography, without the help of effective steganalysis mechanical assemblies, a "take out all-suspects" departure attack is not achievable when the measure of passed on visual substance is gigantic

Embedding Complexity:

Most vague watermarking plans use current embeddings modules in perspective of human visual models or
predefined rules; however embedding evident watermarks are decently straightforward. Embeddings subtle unmistakable watermarks is in like manner efficient since the proposed arrangement is direct.

**Deployment Cost:**
The imperceptible watermarking plan must be connected to gadgets with upgrading or registering abilities, and are likewise restricted in device versatility. The messages passed on by noticeable watermarking plans can be seen among all presentation gadgets. Hence, no extra sending expense is required for passing on metadata by means of obvious watermarking. Essential UVW plans can be connected to all presentation frameworks fit for performing the broadly accessible gamma rectification usefulness, in this way prompting insignificant organization overhead.

**Content Versatility:**
Most imperceptible watermarking plans can be connected to all advanced visual substance. Obvious watermarking conspires and printed designs demonstrate the best substance materialness since watermark examples can be seen from all types of substance, for example, printed archives. The substance pertinence of UVW is more regrettable since just pictures containing satisfactory flat regions can be utilized.

**Capacity:**
Information limit of imperceptible watermarking plans is moderately large. The limit of obvious watermarking is restricted subsequent to just intelligible messages can be joined. UVW plans, the same as printed patterns, can give great limit the assistance of 2-D standardized identifications. It plainly synopses the correlation results. Note that the sizes of every execution records just show relative execution among various sorts of watermarking plans, as opposed to outright exhibitions.

It is obvious that imperceptible and noticeable watermarking schemes, as well as UVW methodologies, are focused for various execution measures, and can be utilized as a part of separate application situations. For instance, on account of conveying data to clients of legacy showcase frameworks, the center is higher fidelity and less arrangement cost; in this manner, it can be properly acknowledged by the proposed UVW.

**Applications:**
Due to its low computing requirements, the Haar transform has been mainly used for pattern recognition and image processing. Hence, two dimensional signal and image processing is an area of efficient applications of Haar transforms due to their wavelet-like structure. In this area, it is usually reported that the simplest possible orthogonal wavelet system is generated from the Haar scaling function and wavelet. Such a transform is also well suited in
communication technology for data coding, multiplexing and digital filtering. The advantages of computational and memory requirements of the Haar transform make it of a considerable interest to VLSI designers as well.

References:
