

## Dual Watermarking Framework for Industrial Digital Images

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### Abstract

Watermarking is a technique that has been proposed to give authentication to digital images since it has the capability of embedding hidden information within the host (digital images). Many technique of watermarking has been proposed, are using spatial, transform domain and others but most of them focused on the invisible watermarking that are unknown to the attacker. Previous research paper has been proposed a technique that consist both visible and invisible watermarking but it is lack of the functionality on the visible part. In this paper, a new dual watermarking technique framework has been proposed that consist of both visible (logo) and invisible watermarking within the host. Both watermarks will act to give better authentication to the image instead of single watermark. Even though the visible watermark is merely being targeted for the image processing attack, in this paper certain mechanism is proposed to avoid and to minimum the risk of being attacked. But still the main goal is to give better authentication for the image. The new proposed dual

watermarking technique framework is improved so that it can meet the requirement of the industrial digital image's needs.

**Keyword:** watermarking framework, dual watermarking, logo

### Introduction

The dual watermarking technique proposed in 1999 that consist of both visible and invisible watermark. The technique used an image as the visible watermark and in the invisible part, the technique used spatial domain watermark [1]. This technique generally is a good idea when joining both watermark to give better authentication to the image but the visible watermark does not has any function accept for being merely an image. And another major weakness, is the use of spatial domain technique, the invisible watermark is easy to be removed or destroyed by common image processing technique. For these reason, this paper will propose a new framework technique that improve the visible watermark part and also the invisible part so that it will

address the major problems of the previous technique.

The need for this technology is increased to support the industrial digital images. This type of image is produced by the machines such as the microscope electron or other machine which normally in the form of grayscale format. And the details of the image are very important which cannot be tolerated. One more important element for the industrial's digital image is that it needs a logo or any trademark image of the producer or the organization. This paper is proposing a framework of watermarking that fulfills the requirement of the trademark and also the authentication functions in the industrial's digital image.

### **Objectives of Using both Visible and Invisible Watermark**

It is a very fundamental discussion between the visible and invisible watermarking. As both are the classification of watermarking, the nature of both is totally different. We should see the visible watermarking as a way to identify the ownership of a document or image. This is the fastest way to recognize the image as it is visualized by human perception [2].

The invisible watermark in the other hand acted like a "magic ink" that is hidden and stays as a secret until the owner extract the hidden information for image authentication. This can be given a second step of authentication after the visible watermark. But still the application of visible watermark is only suit certain needs. If the digital image needs recognition of brand or the

producer of the image, then the use of logo comes in the place.

### **Framework of Dual Watermarking for Industrial Images**

Since the dual watermarking technique used the visible and invisible watermark, the framework should come out with the use of two separate technique and algorithm for different watermark. For the embedding process, two processes will be applied to the image, first is the embedding of the visible watermark (logo) on the image. Then the second step is to embed the invisible watermark within the image.

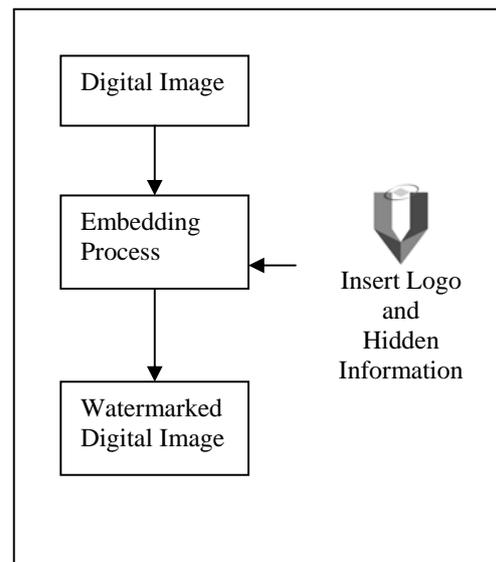


Figure 1: Watermark Embedding Process

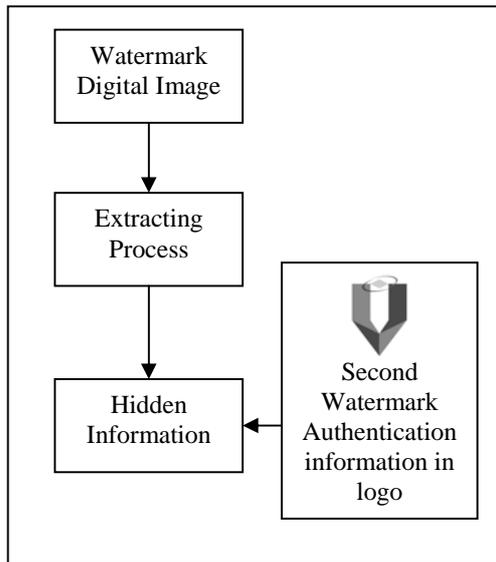


Figure 2: Watermark Extracting Process

### How the proposed dual watermarking framework works?

The logo used is an image which is already watermarked with hidden information. The information later will match the information within the main image. The first step is to embed watermark (W) into the original logo image (I) that can be presented,  $I+W=L$ . In this process, time produced and information about the image is inserted as the watermark information.

This logo will work as an authentication mechanism to detect any unauthorized copy by the original hidden information. But this only work by assuming that the image is not tampered and copied as its original condition.

The second step is to embed watermark into the main image. This watermark is invisible and unnoticeable to human visualization. This step is a normal process of inserting hidden information into the image.

The second step will work as an authentication mechanism for any unauthorized copy of the image assuming the image is tampered. The watermark will always available and resist to any image processing activities. It's a must for a robust watermarking to have such characteristics [3]. If the logo is tampered, the invisible watermark within the logo will give second level of detection.

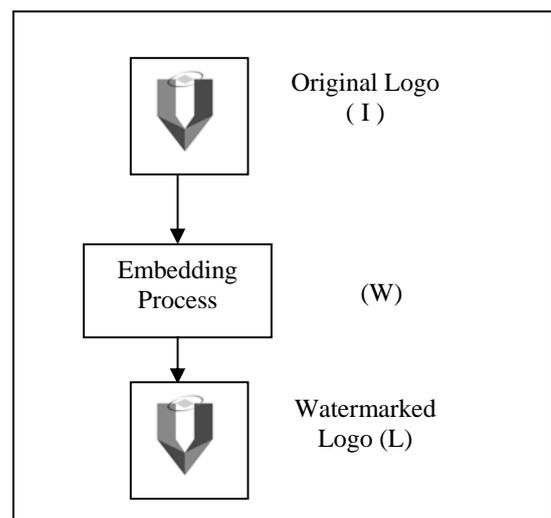


Figure 3: Watermark Embedding Process into Logo

### Conclusion

As the conclusion, the visible and invisible watermarks are both important for industrial digital image watermarking. New algorithm is implemented into the logo. The logo functions as a trademark. The invisible watermarks function as the hidden information used for the authentication process. Second level of authentication is available through the watermark hidden in the logo. This dual watermark will provide dual level of authentication if the attacker able to remove the first

watermark. This proposed framework will meet the requirement of industrial digital images watermarking that requires the logo as its trademark.

## **Reference**

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