

An intelligent Logo for Video Copyright Protection

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Abstract

As a digital broadcasting technology progresses, the technology to protect digital products data (video, video clips, songs, etc.) from unauthorized users also needs to be enhanced. Because the data is in digital format, it can be copied, modified, deleted, etc., without proper authentication and authorization from the original owner of that data. Therefore, the digital broadcasting technology faces a number of challenges including copyright protection, data authentication, and data source tracing. These issues are obstacles and will restrict further usage of digital broadcasting technology. Some solutions are presented to overcome the above challenges. One of these solutions is done by adding a digital Logo (Visible Watermark) to the digital product. This logo is used as a tool for proving the ownership of the original owner of the digital product. This solution is not enough, since anybody can replace this Logo by a fake Logo and consequently, the original owner of that product can't prove his claim. This paper proposed a new watermarking algorithm by adding an intelligent Logo, which is a visible watermark, to the product. This Logo will distort the product if anyone replaces it with a fake Logo (the details of the algorithm are listed in the section of the paper). The proposed algorithm is applied in the digital video.

Keywords: Logo; Fake Logo; Digital Broadcasting; Visible Watermark

الخلاصة

كلما تطور البث الرقمي، أصبح من الضروري حماية البيانات الرقمية (أفلام، أغاني، الخ)، من المستخدمين غير المخولين. لأن البيانات تكون بصيغ رقمية، أصبح من السهولة جدا "استنساخها، تحديثها، الغاءها، بدون أخذ موافقة من قبل المالك الأصلي لتلك المنتجات. وعليه أصبحت تقنيات البث الرقمي تتعرض لعدد من التحديات منها مثلا "حماية الملكية الفكرية، موثوقية البيانات، متابعة مصادر البيانات.. الخ. هذه التحديات سوف تؤثر على تقنيات البث الرقمي مستقبلا". حيث انه من السهولة لأي جهة ان تقوم باستنساخ غير شرعي للمنتجات الرقمية والادعاء بأن هذه المنتجات تعود لها، وبالتالي تضيق حقوق الجهة المنتجة لتلك المنتجات. تم حل تلك المشكلة من خلال عدة حلول، منها وضع شعار (Logo) على المنتجات من قبل الجهات المالكة لها ليثبت احقية تلك الجهات للمنتج. من الواضح أن تلك الحلول لم تلب الطموح. حيث انه من الممكن ازالة تلك الشعارات ووضع شعارات مزيفة (Fake Logo) بدل الشعارات الاصلية التابعة للمالكين الاصليين للمنتج الرقمي، وبالتالي لا يستطيع المالك الأصلي لتلك المنتجات اثبات احقيته لها. هذا البحث يقدم حلا لهذه المشكلة. من خلال هذا البحث تم تقديم خوارزمية Watermarking تقوم باضافة شعار ذكي (Intelligent Logo)، والذي هو عبارة عن علامة مائية مرئية، تقوم بتخريب المنتج حال ابدالها بشعار آخر مزيف (تفاصيل الطريقة مذكورة في فقرات البحث). تم تطبيق الطريقة على ملفات الفيديو.

الكلمات المفتاحية: شعار، الشعار المزيف، البث الرقمي، العلامة المائية الظاهرية

1. Introduction

In general, digital watermarking means digitally adding a small amount of data (referred to as watermark) in a digital object (host). The information encoded in the watermark can be used to identify the copyright owner of the object or to detect any tampering performed onto the object [T.A.Abbas13]. It can be used in several applications, such as copyright protection, Copy Protection, Content Authentication...etc. [E.Muhar06]. Watermarking can be applied in several media such as image, video, audio, etc. [X.Liang08, Q.Guo12, M.D.Swan98].

The acquisition of digital product such as video, music, news is expensive and time consuming process as it requires lots of labor and information resources to acquire geospatial data. Because the digital product digital form, it can be copied and redistributed illegally. To avoid illegal duplication and distribution, one of the remarkable methods used for copyright protection is using a logo. This logo is used for showing the copyright of the product. Sometime this logo can be removed or replaced with a fake logo. In this case the owner of that product can't prove whether

the product is his or not. In this paper a new watermarking trend is proposed to protect the copyright of digital product.

The rest of the paper is organized as follows. In Section 2, a proposed watermarking algorithm is presented. Experimental results are shown in Section 3. Conclusions and suggestion for future works are drawn in Section 4.

2. The Proposed Watermarking Algorithm

In most of the applications of digital watermarking, the watermark is used to protect the digital product. The attacker of watermark is aim to do one of the following operations:-

- 1-Removing the watermark from the product.
- 2-Replacing the original watermark with a fake watermark.
- 3-Preventing the extraction of the watermark from the product.

If attacker can do one of the above operations, the owner can't prove whether the product is his or not. Consequently, the attacker can benefit from this product. In the other meaning, in the watermarking applications, the cover is important.

In this paper, the proposed algorithm is designed to overcome the attacking operation number 2. Where any replacing for the original watermark with fake watermark, the product will be distorted and the attacker can't benefit from it. In the proposed watermarking algorithm, the used cover is video file.

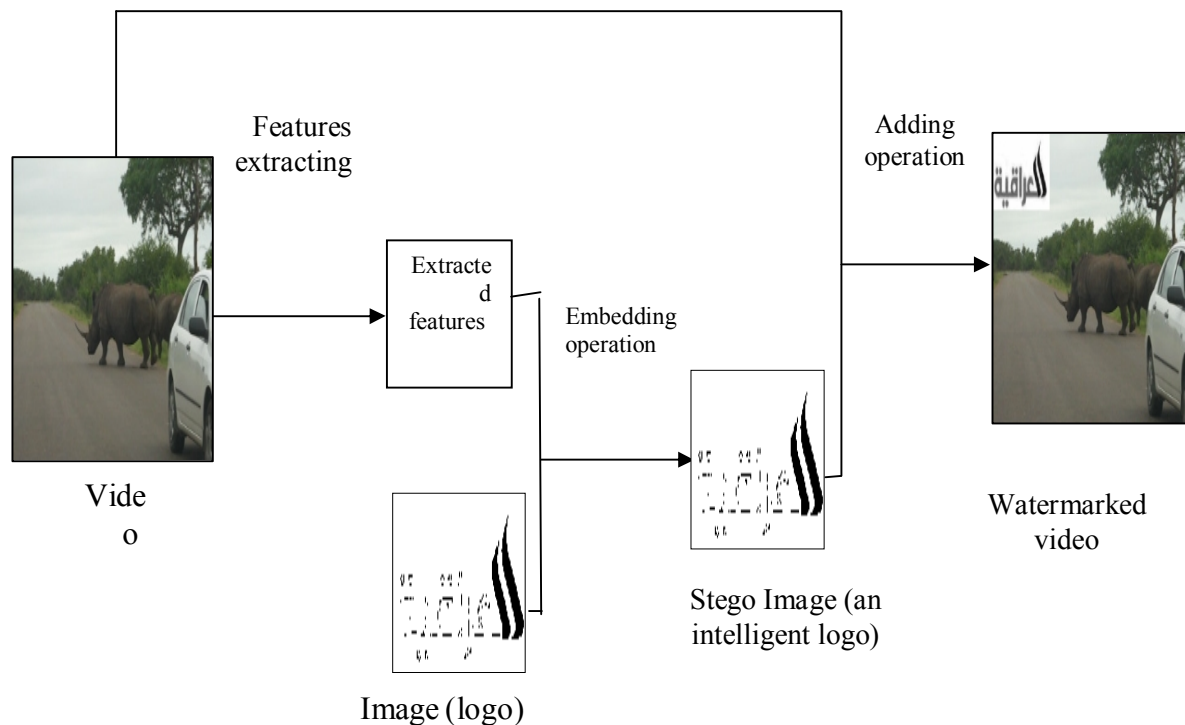
The proposed algorithm is listed in two sections as follows:-

2.1 Adding the Intelligent Logo to the Video

This operation is done by the following steps:-

- Choosing an image as logo (visible watermark).
- Choosing video file as cover.
- Extract some features from cover.
- Embed the extracted features in the visible logo. The result will be stego logo (an intelligent logo).
- Adding the stego logo (an intelligent logo) to the cover. The result will be watermarked cover.

Figure (1) illustrates the adding of intelligent logo.



**Figure (1) Adding intelligent logo
(visible watermark)**

2.2 Checking the Faking Operation

This operation is done by the following steps:-

- Getting the watermarked video file.
- Extracting the Stego visible logo (an intelligent logo).
- Extracting the embedded features from the intelligent logo.
- Comparing the extracted features with the features of the watermarked video file.
- If they are similar to each other, that means the logo is not faked otherwise the logo are fake and the watermarked video file will be distorted.

Figure (2) illustrates the replacing of the original logo with fake logo. Figure (3) illustrates the two cases (one for original logo and the other for fake logo).

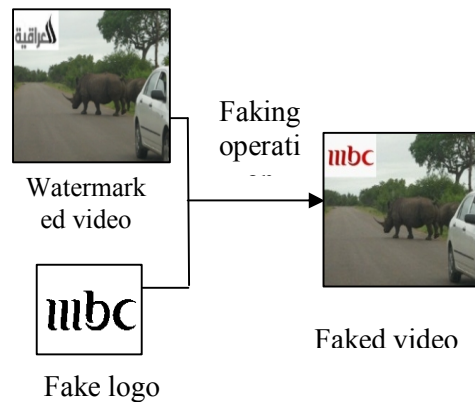


Figure (2) Replacing the original logo with fake

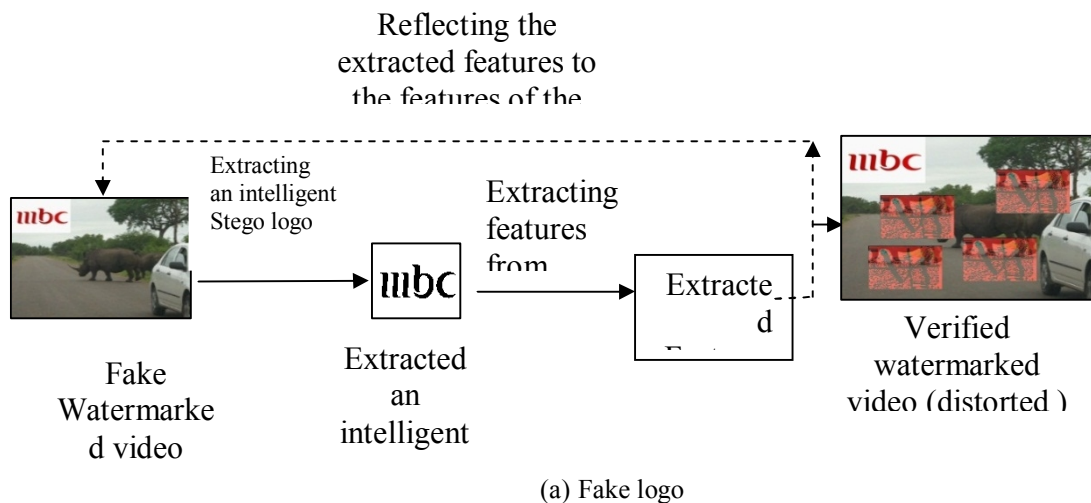
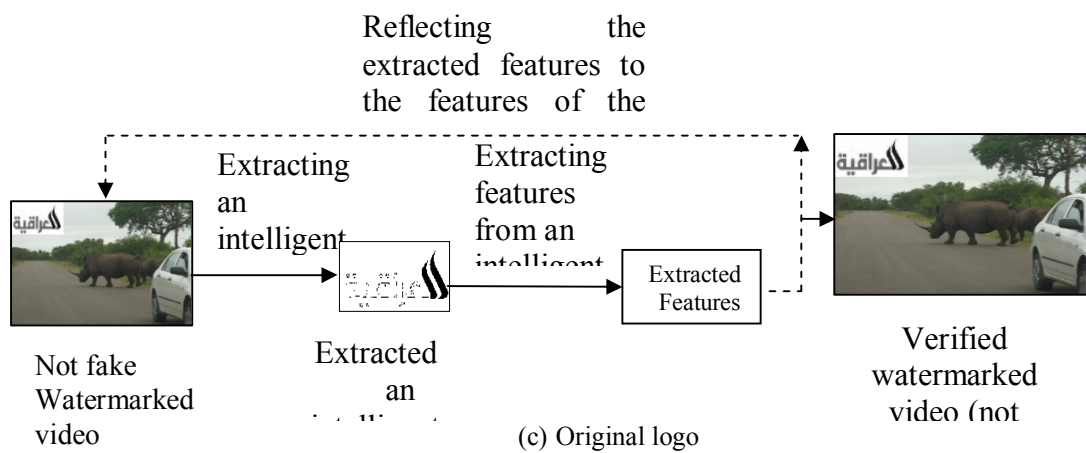


Figure (3) Verification cases

3. Experimental Results

An experiment has been conducted to test the performance of the proposed technique. Three elements of data are used with the experiments of the proposed method. These elements are set of grayscale images are used as a visible watermark (logo), a set of video files (of AVI extension) are used as a cover, and set of pixel's bits of the cover. The proposed technique consists of several steps. In order to understand the theme of it, some examples with the steps will be used.

3.1 Adding the Intelligent Logo to the Video

In this step several procedures are done

Getting a binary image as a visible watermark. Figure (4) illustrates the watermark.

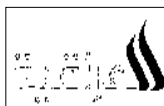


Figure (4) Visible watermark

Getting a video file as a cover. Figure (5) illustrates the cover.



Figure (5) Video file

Extracting features from the cover. These features are some bits. These bits are the most significant bit of current frame's pixels of the cover (video). For example, let us take the first frame of the video. Firstly the pixels of frame are extracted and converted into serial of bits. Secondly take the most significant bit for each pixel.

- Embedding these bits in the visible logo. We can use any embedding method. For simplicity, the LSB is used in embedding the bits.
- Getting the stego logo (an intelligent logo).

Figure (6) illustrates the extracting and embedding features

- Embedding the stego logo (an intelligent logo) in the cover (video).

Figure (7) illustrates the embedding of the intelligent logo.

3.2 Checking the Faking Operation

This operation consists of the following steps:-

- Extracting the intelligent logo from the current frame of video. Figure (8) illustrates the extraction operation.
- Extracting the features from the intelligent extracted stego logo.
- Checking whether the extracted features are equal or not to the features of the watermarked cover. Figure (9) illustrates the extraction and checking features operation.

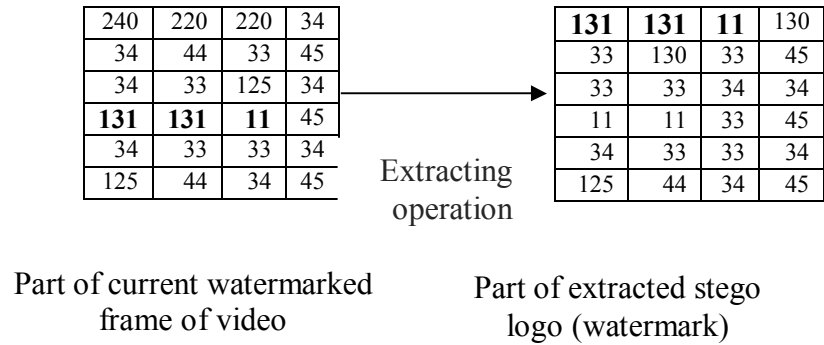


Figure (8) Extracting the intelligent logo

In Figure (9), two cases are illustrated. The first case (a), illustrates the watermarked video with true logo while the second case (b), illustrates the watermarked video with fake logo. So, in the case (a), when we make reflecting to features of the watermarked video nothing will be happen and the watermarked video will be (don't changed) don't distorted , while in the case (b) the watermarked video will be (changed) distorted.

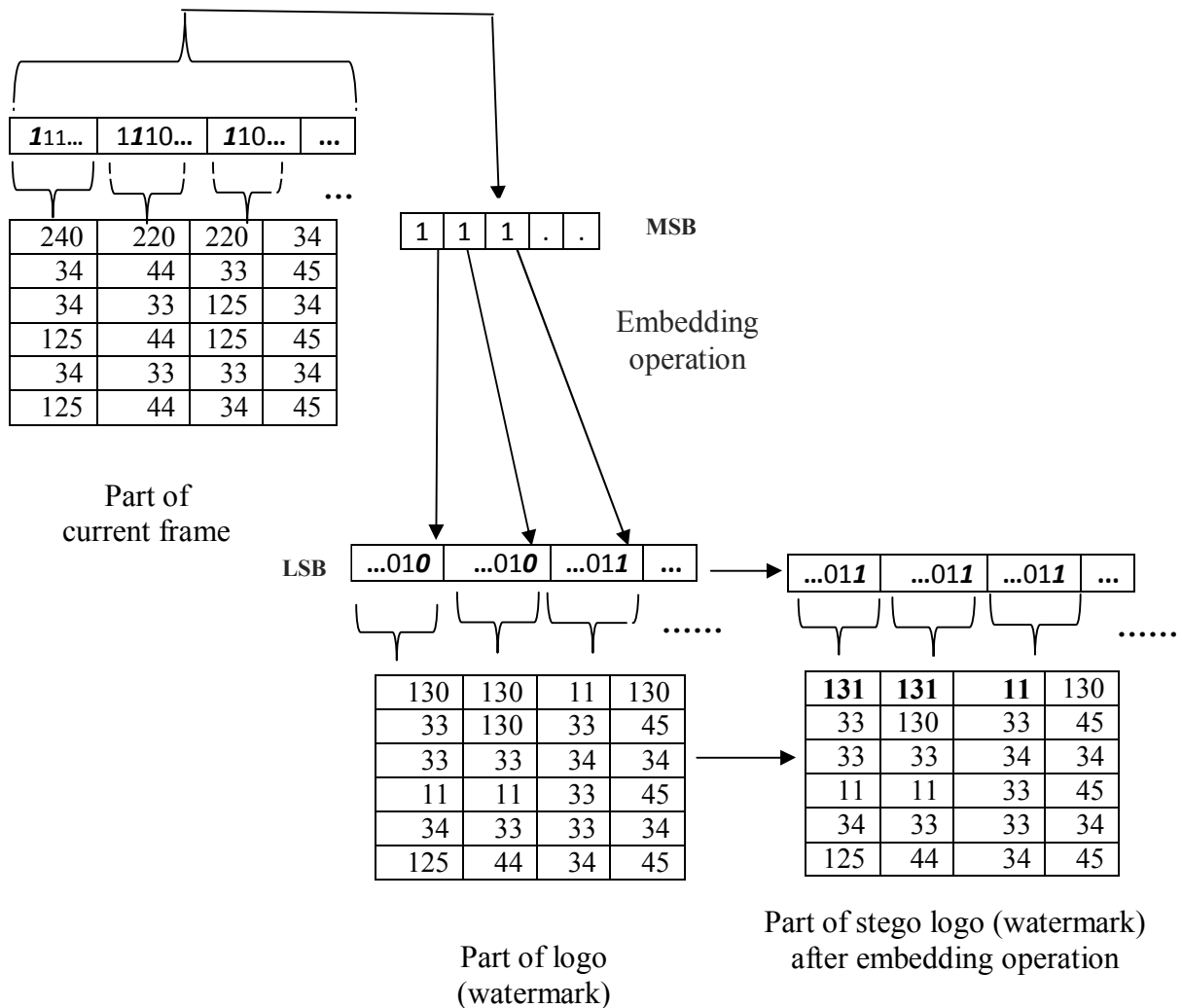
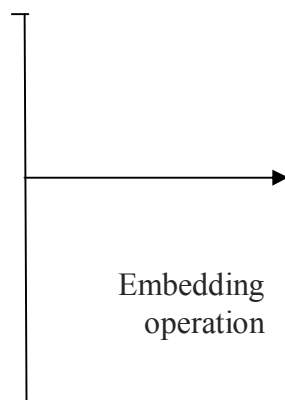


Figure (6) The extracting and embedding features

Part of current frame of
video

240	220	220	34
34	44	33	45
34	33	125	34
125	44	125	45
34	33	33	34
125	44	34	45

131	131	11	130
33	130	33	45
33	33	34	34
11	11	33	45
34	33	33	34
125	44	34	45



240	220	220	34
34	44	33	45
34	33	125	34
131	131	11	45
34	33	33	34
125	44	34	45

Part of current
watermarked frame
of video

Part of stego logo (watermark)

Figure (7) Embedding the intelligent logo

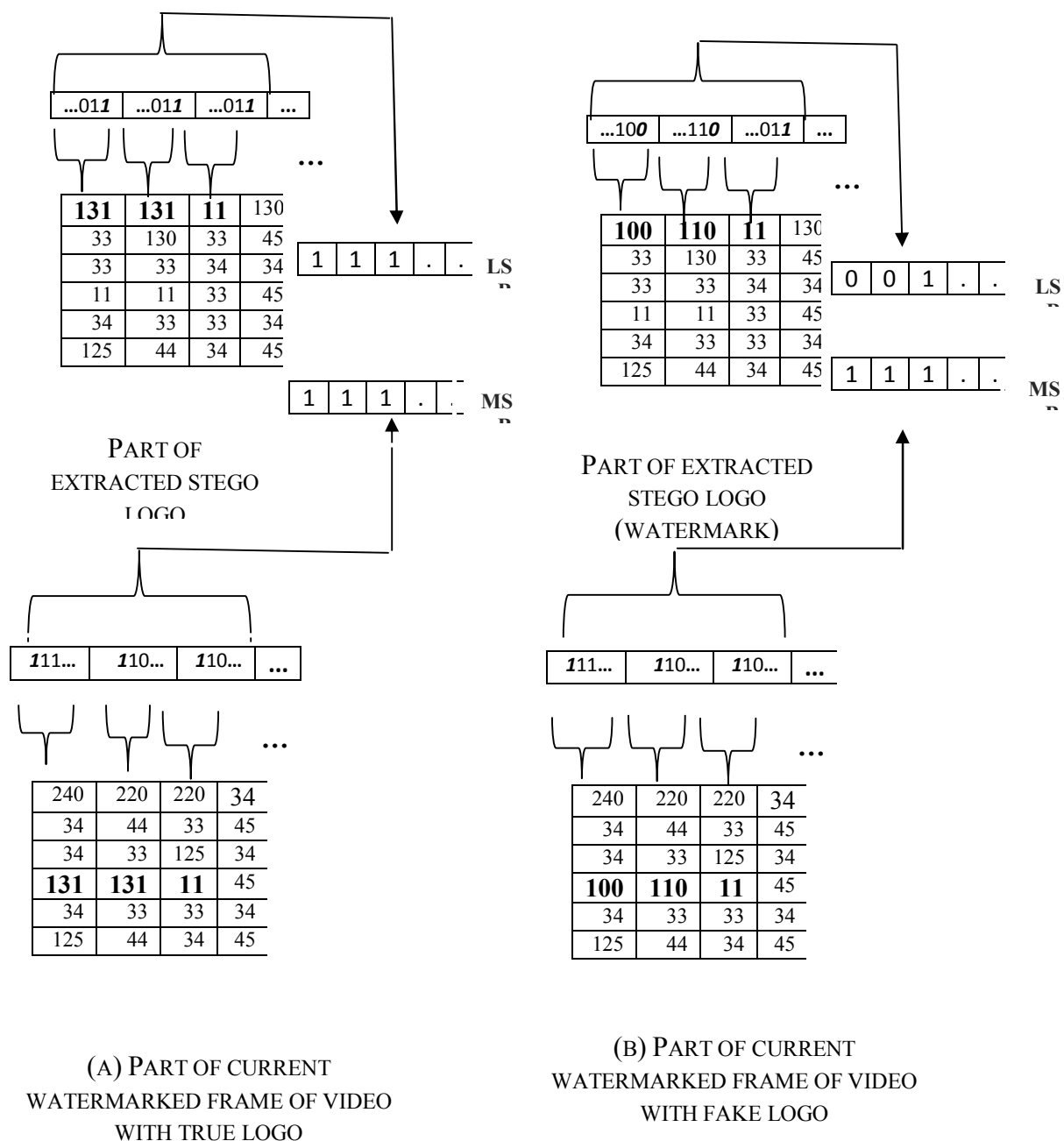


Figure (9) The extraction and checking features operation.

4. Conclusions and Suggestions for Future Works

In this paper, a new watermarking algorithm is proposed. This algorithm is used to discover the fake logo. The discovering of fake logo is done by using an intelligent visible logo. This intelligent logo distorts the video if the fake logo added to the video. The intelligent logo is created by external watermark and some features of the cover (video). The experimental results showed that the proposed method is very efficient. It is good idea to study the ability of applying the suggested method in the other media such as image, text, email, etc.

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