



جمهورية العراق

وزارة التعليم العالي والبحث العلمي

جامعة القادسية

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قسم الحاسوب / الدراسة الصباحية

Digital Watermarking For RGB Image

مشروع بحث تخرج

مقدم الى كلية علوم الحاسوب وتكنولوجيا المعلومات - جامعة القادسية وهو جزء

من متطلبات نيل درجة البكالوريوس في علوم الحاسوب

من قبل الطالبات

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اشراف

د.رنا جمعة سريح

٢٠١٦..... ٢٠١٧

الاهداء

-الى من جرع الكأس فارغا ليسقيني قطرة حب الى من كلت انامله ليقدّم لنا
لحظة سعادة الى من حصد الاشواك عن دربي ليمهد لي طريق العلم الى القلب
الكبير والدي العزيز.....

-الى من ارضعتني الحب والحنان الى رمز الحب وبلسم الشفاء الى القلب
الناصع بالبياض والدي الحبيبة.....

-الى القلوب الطاهرة الى رياحين حياتي اخوتي واخواتي...

-الى الروح التي سكنت روحي زوجي الغالي...

الشكر والامتنان

لأبد لنا ونحن نخطو خطواتنا الأخيرة في الحياة الجامعية من وقفة تعود الى انمواء قضيئناها
في رحاب حليتنا مع اساتذتنا الكرام الذين قدموا لنا الكثير باذلين بذلك جهود كبيرة
في بناء جيل الغد لتبوء الأمة من جديد

الى الذين مهدوا لنا طريق العلم

الى جميع اساتذتنا الأفاضل

كما نتوجه بالشكر الجزيل الى

د.منتصر جابر جواد

وأخص بالتقدير والشكر مشرفة البحث الدكتور رنا جمعة سريح

وأخيرا احب ان اشكر جميع زملائي وزميلاتي الذين قضيت معهم اجمل سنين

الحياة

Chapter One

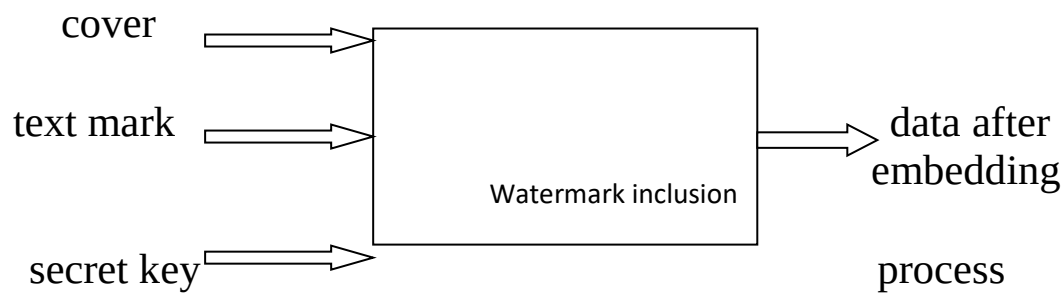
1. Introduction

Digital watermarking is the act of hiding a message related to digital single(i. e .an image, song, video)within the signal itself. it is a concept closely related steganography ,in that they both hide a message inside a digital signal .however ,what separates them is there goal. watermarking tries to hide a message related to the actual content of the digital signal, while in steganography the digital signal has no relation to the message , and it is merely used as a cover to hide its existence. The watermark before use commonly use to types of perceived (virtual) and non-aware (hidden) and the most commonly used what has been used by television from the mark in one of corners of the screen to represent the tag for that network or satellite channel. (1)

2.Basic Principles for the watermark:

In this project invisible watermark in RGB image are introduced watermark some embedding process and the some retrieval operations also called detection. And the shape (1-1) illustrates the watermark included a process where the introduction of this watermark cover and key together and that is several from either a number ,text, sound or image where the aim of using the key to making the watermark difficult penetration and resist deletion and replacement operation so that can not be read, or altered with out using the key it self and the cover is a picture or moving picture, text or

audio file either direction here is cover data after embed watermark.(2)

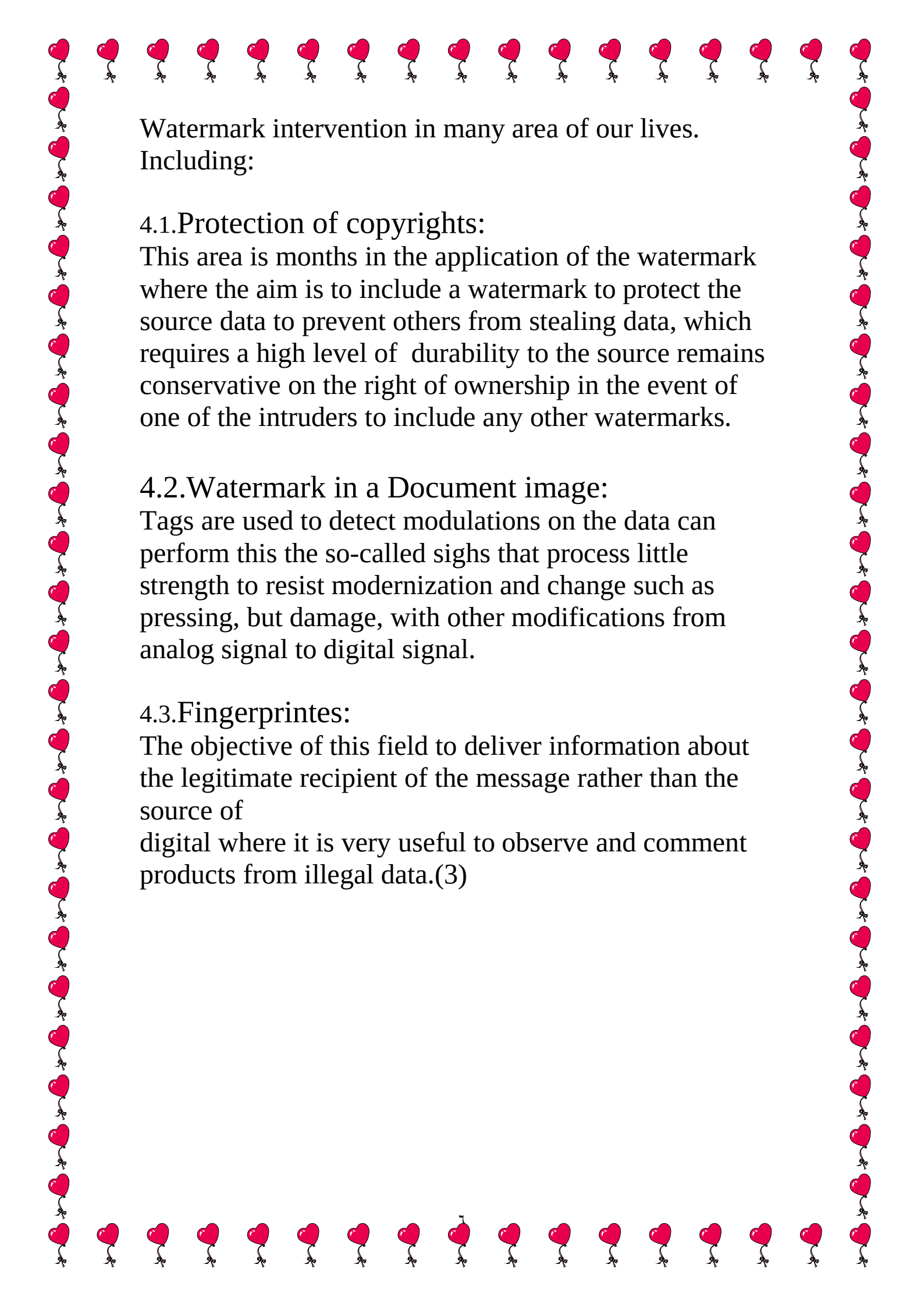


the figure(1-1) is included for the watermark process (1)

3. Watermarking Properties:

Every watermarking system has some very important desirable properties. Some of these properties are often conflicting and we are often forced to accept some trade-offs between these properties depending on the application of the watermarking system. The first and perhaps most important property is effectiveness. this is the probability that the message in a watermarking image will be correctly detected. we ideally need this probability to be 1. Another important property is the image fidelity. Watermarking is a process that alters an original image to add a message to it, therefore it inevitably affects the image's quality. we want to keep this degradation of the image's quality to a minimum , so on obvious difference in the image's fidelity can be noticed. The third property is the payload size. Every watermarking work is used to carry a message. The size of this message is often important as many systems required a relatively big payload to be embedded in a cover work. There are of course applications that only need a single bit to be embedded.(2)

4. watermark applications:



Watermark intervention in many area of our lives.
Including:

4.1. Protection of copyrights:

This area is months in the application of the watermark where the aim is to include a watermark to protect the source data to prevent others from stealing data, which requires a high level of durability to the source remains conservative on the right of ownership in the event of one of the intruders to include any other watermarks.

4.2. Watermark in a Document image:

Tags are used to detect modulations on the data can perform this the so-called sighs that process little strength to resist modernization and change such as pressing, but damage, with other modifications from analog signal to digital signal.

4.3. Fingerprints:

The objective of this field to deliver information about the legitimate recipient of the message rather than the source of digital where it is very useful to observe and comment products from illegal data.(3)

Chapter Two

1. Watermark Requirements:

It is necessary to contain to watermark on some important characteristics in its application

1.1. Durability: the watermark has high durability if they do not come out signal processing of transfers from the digital signal to analog and vice versa as well as the operations of pressing the loss of data if the marks against pressing it be against converting the digital signal to analog as well as it should is not affected operations zooming in and out, cutting recycling and this is not necessary to be a watermark resistant to all properties and in short dependent resistance watermark on the nature of the application.

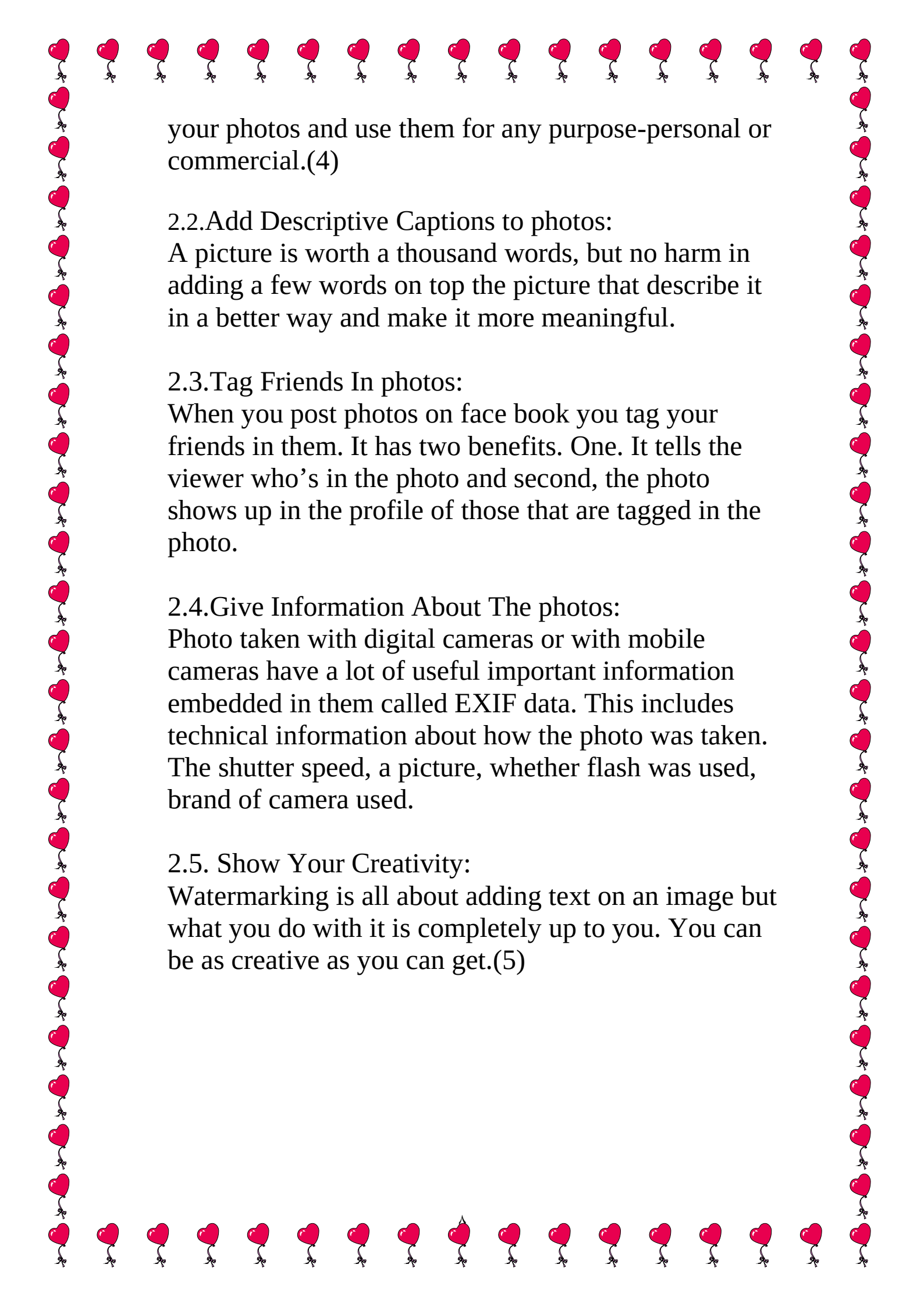
1.2. Resistance Threat: this feature means resistance to external attacks and there are several.

1.3. The Quality: the watermark has high quality if it is difficult to detect the modification or change caused included.

2. Five Uses Of Watermark:

2.1. Protecting the photo:

Coping photos off the internet is just a matter of right clicking on a photo and saving it on the computer people can just search for images on Google and save



your photos and use them for any purpose-personal or commercial.(4)

2.2.Add Descriptive Captions to photos:

A picture is worth a thousand words, but no harm in adding a few words on top the picture that describe it in a better way and make it more meaningful.

2.3.Tag Friends In photos:

When you post photos on face book you tag your friends in them. It has two benefits. One. It tells the viewer who's in the photo and second, the photo shows up in the profile of those that are tagged in the photo.

2.4.Give Information About The photos:

Photo taken with digital cameras or with mobile cameras have a lot of useful important information embedded in them called EXIF data. This includes technical information about how the photo was taken. The shutter speed, a picture, whether flash was used, brand of camera used.

2.5. Show Your Creativity:

Watermarking is all about adding text on an image but what you do with it is completely up to you. You can be as creative as you can get.(5)

3. Fidelity Criteria:

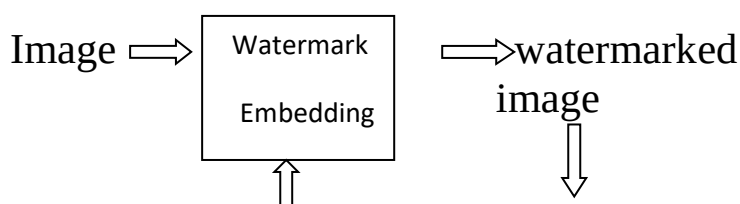
to evaluate the performance of our new algorithm, two metrics can be used. First one is mean square error (MSE) second is peak signal to noise ratio (PSNR). These metrics are to measure the quality of reconstructed image as compared to the original one. MSE is used to calculate differences between watermarked image and original one.

PSNR is most commonly used to measure the quality of reconstruction of lossy compression codec (e.g., for image compression). The signal in this case is the original data, and the noise is the error introduced by compression. When comparing compression codec, PSNR is an approximation to human perception of reconstruction quality. Although a higher PSNR generally indicates that the reconstruction is of higher quality, in some case it may not.(6)

5.Traditional Least Significant Bit:

Introduction :

4.1.Digital watermarking is a technique of embedding or hiding information called watermark (also known as tag or label or digital signature) within the digital file (known host) without noticeably altering the file itself .digital watermarking provides intellectual property right and tamper detection of data .



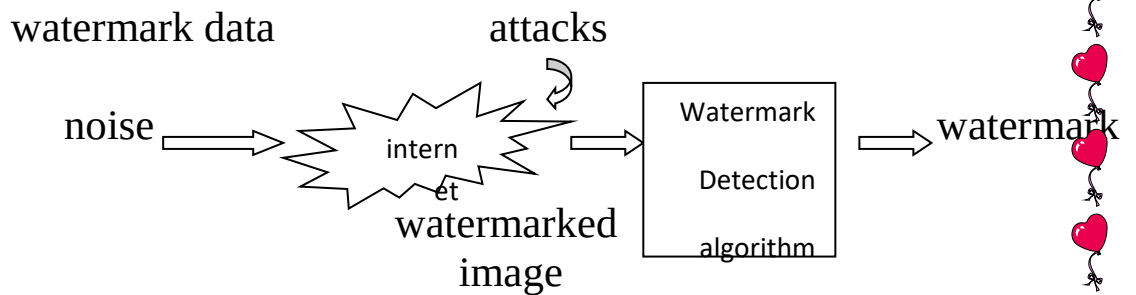


Fig.1 procedure of digital watermarking [4]

There are two types of watermarks one is visible watermark and other is invisible watermark . visible watermark is an opaque or semitransparent sup image placed on the top of host image (original image).

Example of visible watermark

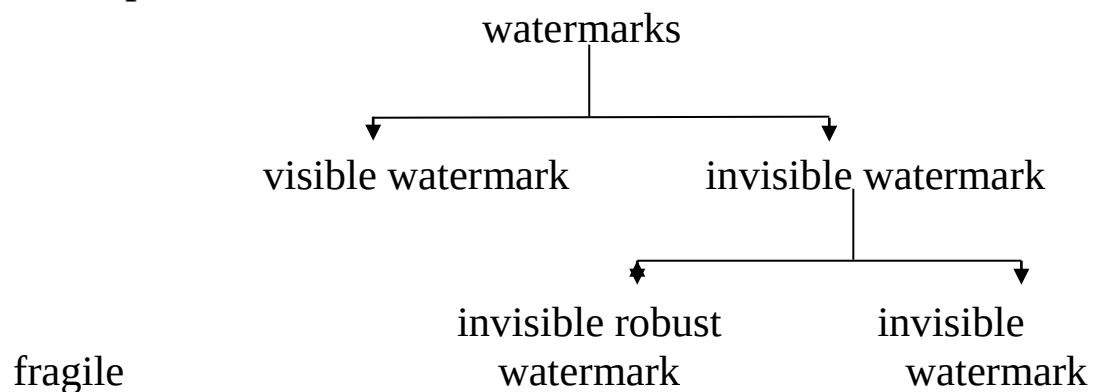


fig.2 types of digital watermark

Invisible watermark cannot be perceived by human sensory system [1] . invisible watermark can be categorized as invisible robust watermark and invisible fragile watermark .

invisible robust watermark are not sensitive to attacks (that is watermark can not be removed or destroyed by any attack) like removal attack, modification attack and is generally used for copy right protection. Invisible fragile watermark are sensitive to the attacks, any small change in image can destroy the watermark. It is used for

tamper detection [3] . the various techniques of digital watermarking are categorized into two domains :

- spatial domain
- frequency domain .

4.2. Traditional least Significant Bit digital watermarking :

In the basic least significant bit digital watermarking technique the image pixel's decimal values are first converted into corresponding binary values and then the least significant bit value of eight bit pixel of an image (host image) is overwritten with the watermark bit value [5] . for example ,if a pixel value 24 is represented by 00011000 in binary and a watermark value is 100 .

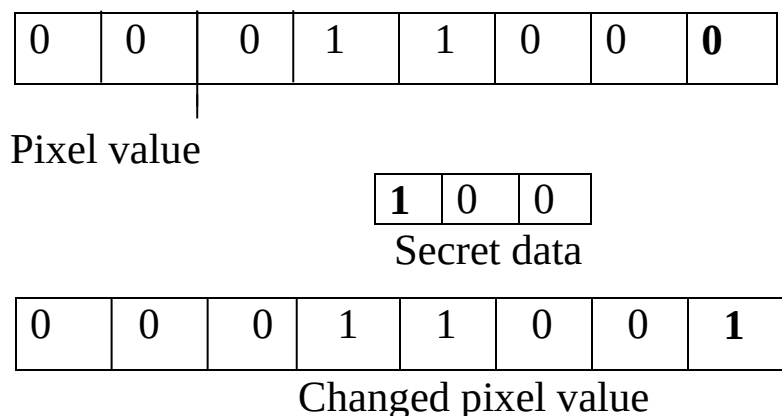


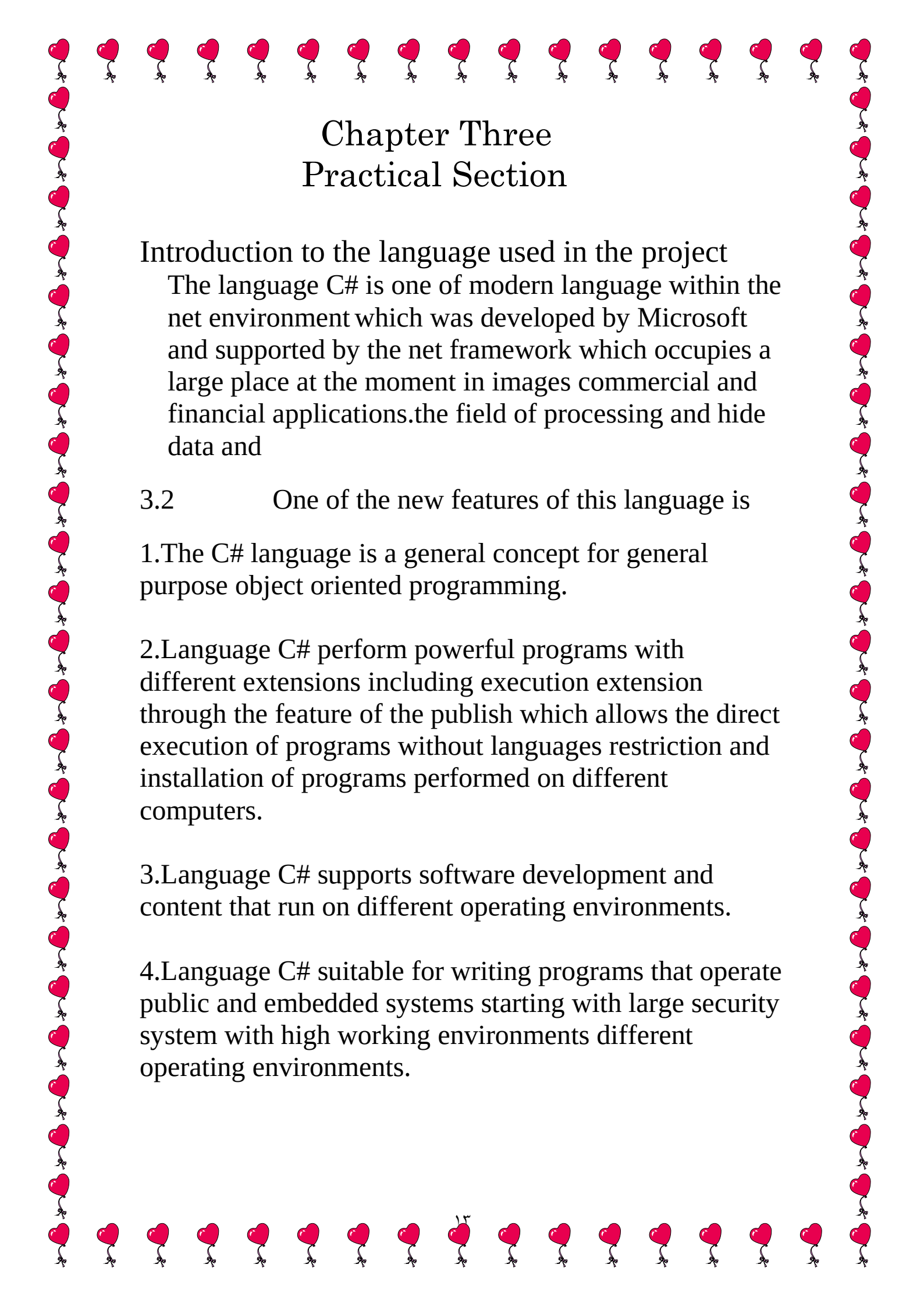
Fig.3 example of traditional LSB watermarking

After applying least significant bit technique the LSB of pixel value changed to 1 from 0 thus changing value 24 into 25. this difference of value 1 is so negligible that human eyes are not able to identify.

Advantage of LSB technique is that it is simple, requires less computations and also changes occur in host image



after watermarking are negligible. But disadvantage of this technique is that watermark can be easily destroyed by changing bits. And also watermark can be destroyed by noise introduced during transmission of image.(5)



Chapter Three

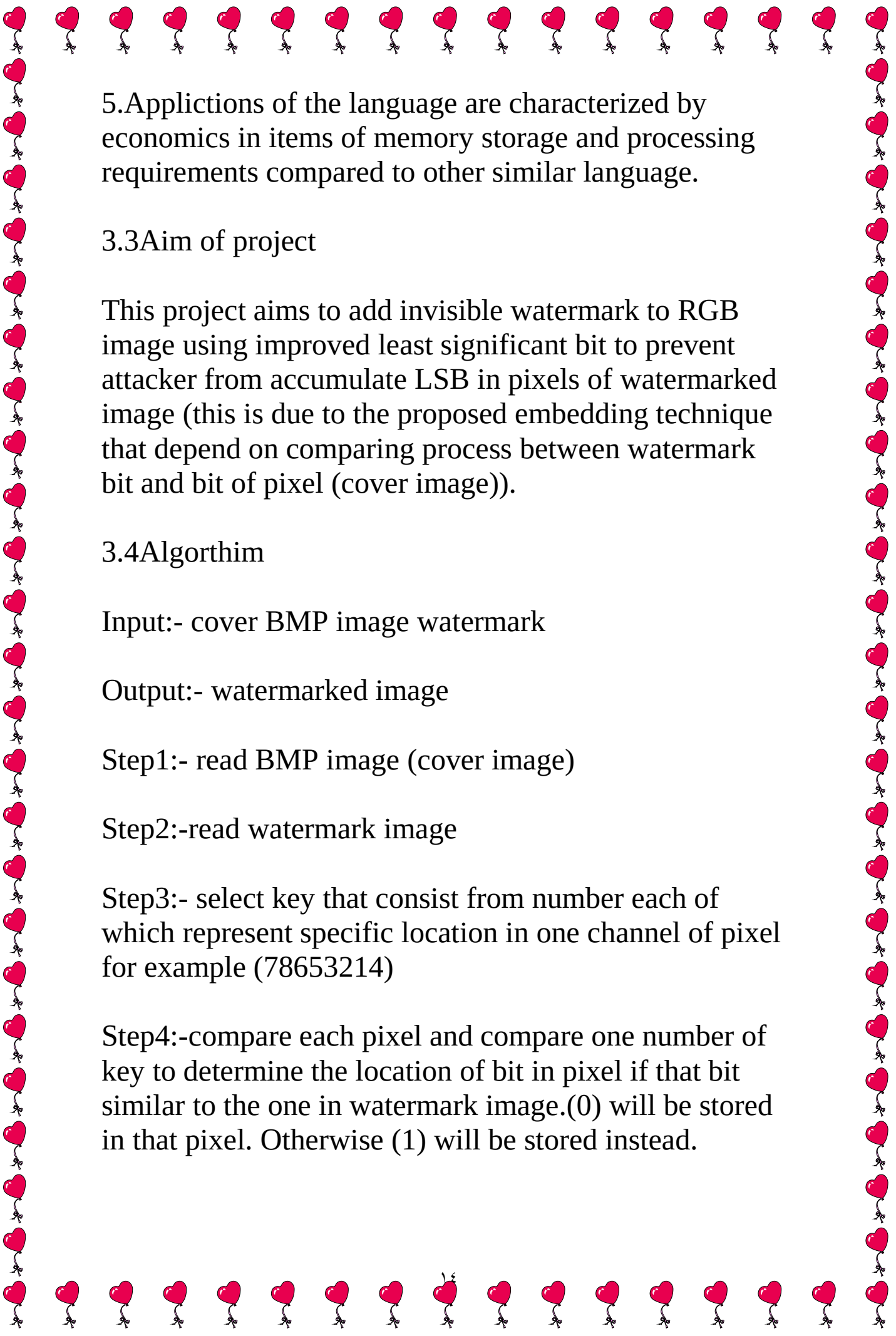
Practical Section

Introduction to the language used in the project

The language C# is one of modern language within the net environment which was developed by Microsoft and supported by the net framework which occupies a large place at the moment in images commercial and financial applications.the field of processing and hide data and

3.2 One of the new features of this language is

- 1.The C# language is a general concept for general purpose object oriented programming.
- 2.Language C# perform powerful programs with different extensions including execution extension through the feature of the publish which allows the direct execution of programs without languages restriction and installation of programs performed on different computers.
- 3.Language C# supports software development and content that run on different operating environments.
- 4.Language C# suitable for writing programs that operate public and embedded systems starting with large security system with high working environments different operating environments.



5.Applications of the language are characterized by economics in items of memory storage and processing requirements compared to other similar language.

3.3Aim of project

This project aims to add invisible watermark to RGB image using improved least significant bit to prevent attacker from accumulate LSB in pixels of watermarked image (this is due to the proposed embedding technique that depend on comparing process between watermark bit and bit of pixel (cover image)).

3.4Algorithim

Input:- cover BMP image watermark

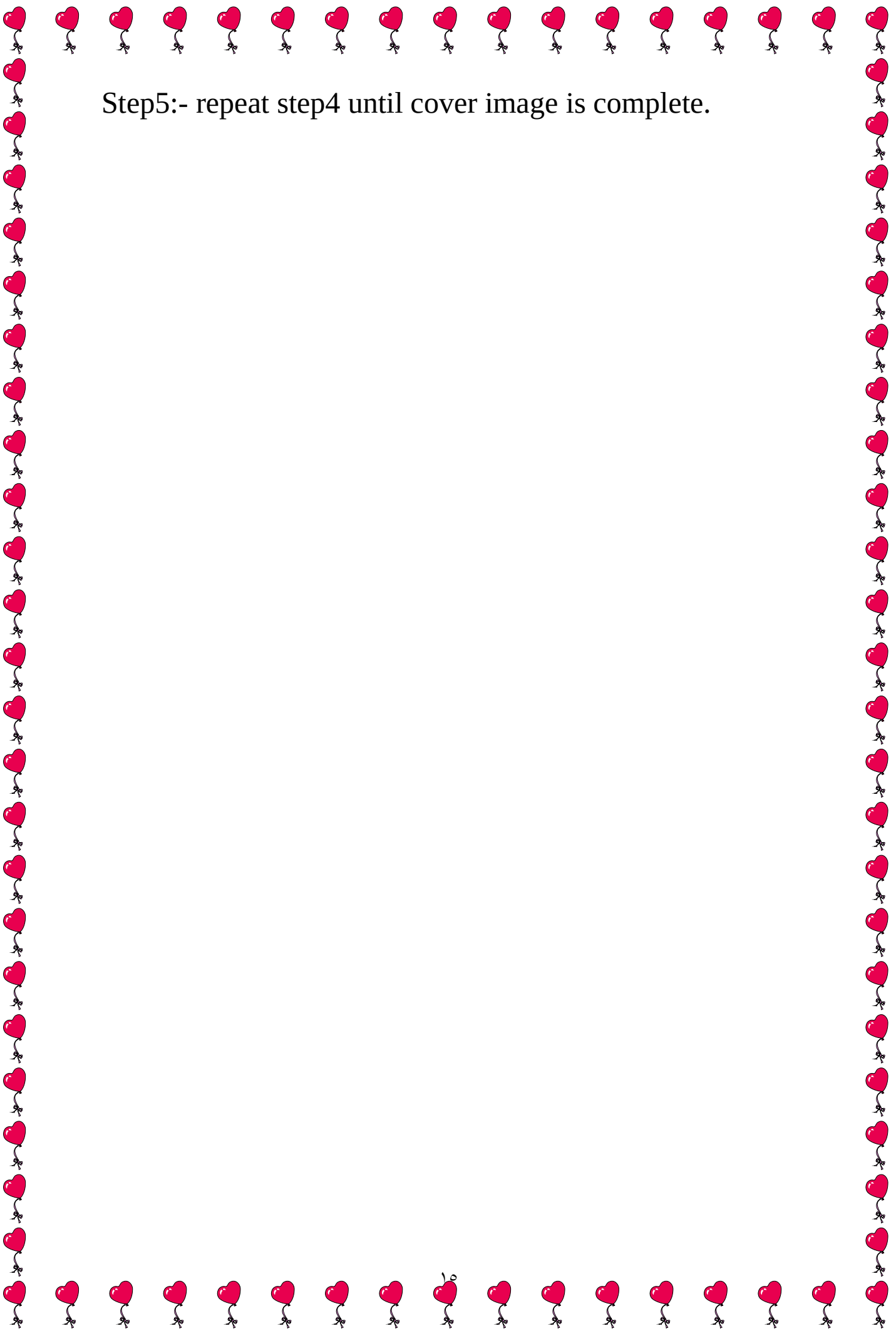
Output:- watermarked image

Step1:- read BMP image (cover image)

Step2:-read watermark image

Step3:- select key that consist from number each of which represent specific location in one channel of pixel for example (78653214)

Step4:-compare each pixel and compare one number of key to determine the location of bit in pixel if that bit similar to the one in watermark image.(0) will be stored in that pixel. Otherwise (1) will be stored instead.



Step5:- repeat step4 until cover image is complete.

الخاتمة

وبحمد الباري ونعمة منة وفضل ورحمة

نضع قطراتنا الاخيرة بعد رحلة عبر ثلاثة مواعيد بين تفكير وتعقل في

Digital watermarking for rgb image

وقد كانت رحلة جاهدة للارتقاء بدرجات العقل ومعراج الافكار فما هذا الا

جهد مقل ولاندي في المكان ولكن عذرنا انا بذلنا فية قصارى جهدنا فان

اصبنا فذلك مرادنا وان اخطئنا فلنا شرف المحاولة والتعلم في موضوع بحثنا

الذي يتناول في الفصل الاول من المشروع على مفهوم العلامة المائية وخصائصها

باستخدام خوارزمية

وتطبيقاتها

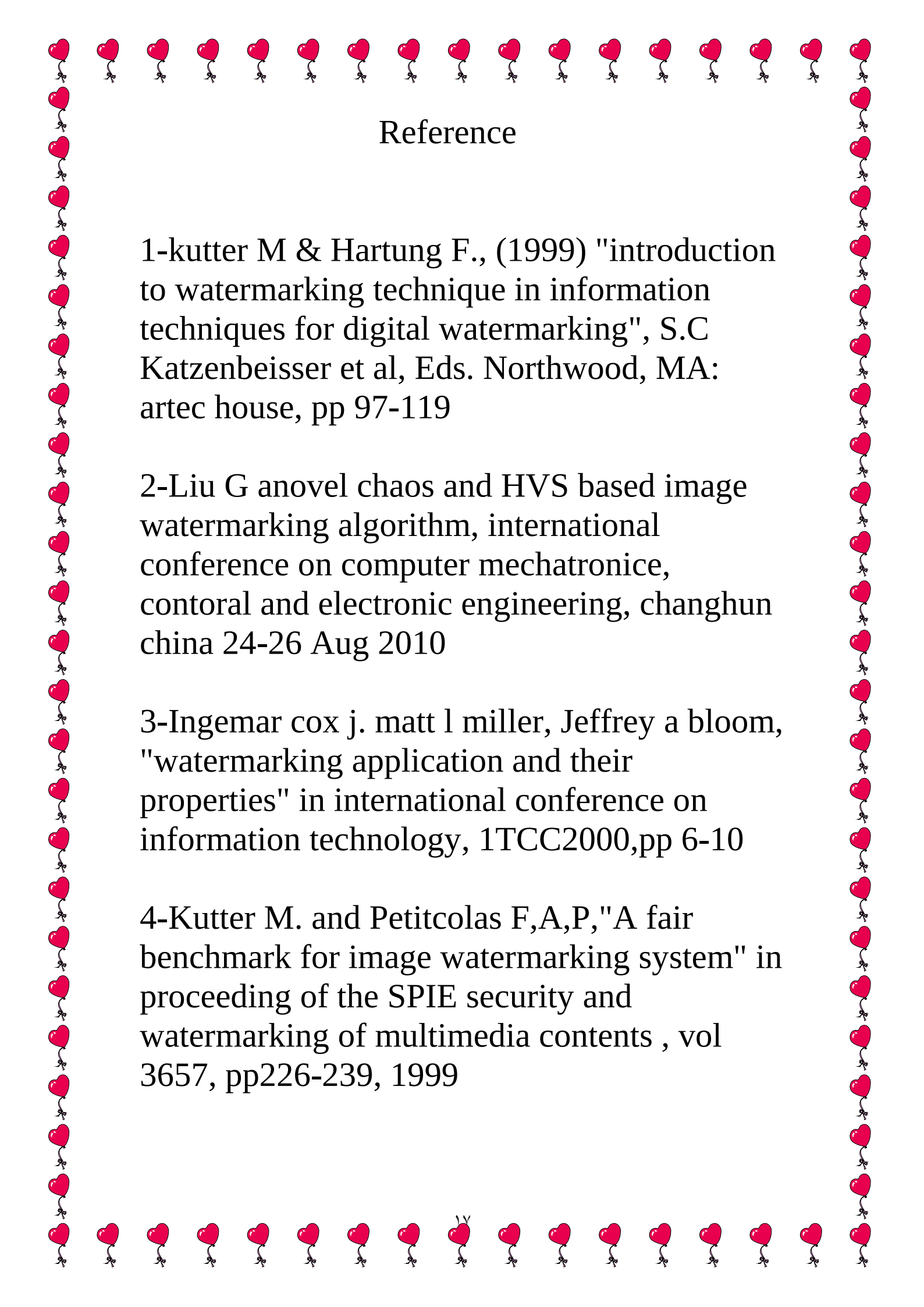
اما الفصل الثاني من المشروع يتضمن اخفاء العلامة المائية داخل صورة من نوع

(bmp)

باستخدام خوارزمية البت الاقل اهمية والحفاظ على هذه العلامة (LSB)

عن طريق استخدام كلمة سر لصاحب العلامة لتضمين العائدية الملكية لهذه

البيانات للمالك



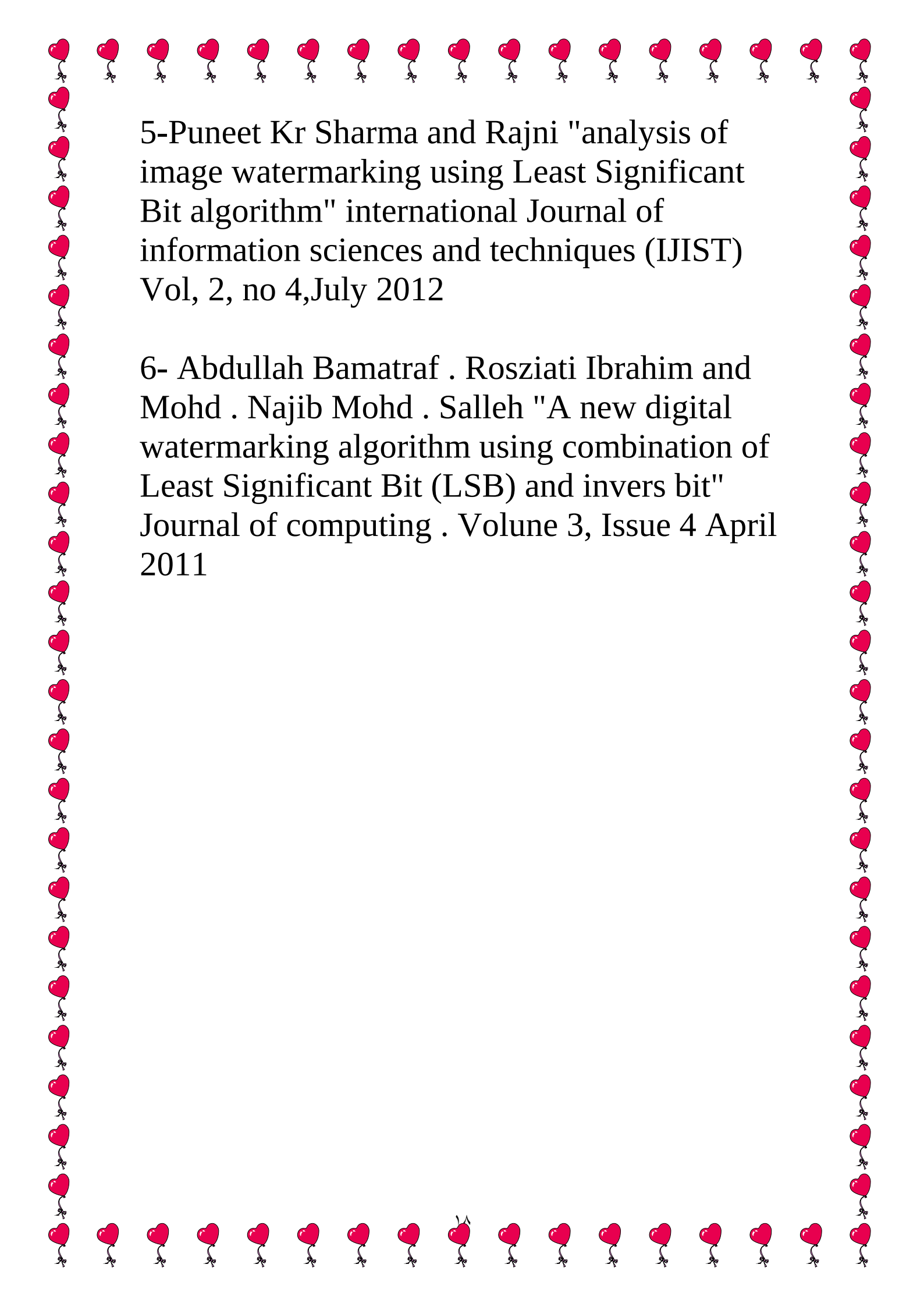
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