ABSTRACT

Digital watermarking is the process of embedding information into digital multimedia content such that the information can later be extracted or detected for a variety of purposes including copy prevention and authentication proof. Embedding watermark in the wavelet becomes more attractive to most researchers as it could provide better performance. Even though there are many technique have been developed in this regards, but the problem of robustness and transparency from any attack is still becomes the main research issue in the watermarking technique. Thus, the challenge is still wide open . In this research; we describe a transparency and a robust DWT digital image watermarking algorithm. In the proposed algorithm, a multiple watermark images are embedded into segmented blue part of the RGB host image using a Discrete Wavelet Transform (DWT). Performance in terms of robustness and transparency of the watermarking scheme is obtained by embedding the maximum strength watermark while maintaining the perceptually lossless quality of the watermarked color image. Simulation results show that the proposed method is transparent and robust under common attacks such as JPEG compression, high pass filtering, median filtering, cropping, ,Gaussian , spackle noise , salt and peppers, motion effects and scaling attacks. In addition, the recovery method is non-blind since it requires the original host image for extracting the watermark.

ABSTRAK

Peneraan air digital (digital watermarking) ialah proses membenam maklumat ke dalam kandungan multimedia digital yang mana maklumat tersebut kemudiannya dapat dikeluarkan atau dikesan untuk pelbagai tujuan termasuk pencegahan salinan dan bukti pengesahan. Membenam tera air dalam wavelet menjadi lebih menarik untuk kebanyakan penyelidik kerana ia boleh menghasilkan prestasi yang lebih baik. Walaupun terdapat banyak teknik telah dibangunkan dalam bidang ini, masalah keteguhan (robustness) dan ketelusan (transparency) dari sebarang serangan masih menjadi isu penyelidikan utama dalam teknik peneraan air. Oleh sebab itu, cabaran ini masih terbuka luas. Dalam penyelidikan ini; kami menghuraikan sebuah algoritma peneraan air bagi imej transparensi dan imej teguh digital DWT. Dalam algoritma yang telah dicadangkan, beberapa imej tera air ditanam di dalam bahagian teruas biru hos imej RGB menggunakan Discrete Wavelet Transform (DWT). Prestasi dari segi keteguhan (robustness) dan ketelusan (transparency) skim peneraan air telah diperolehi melalui pembenaman tera air kekuatan maksimum sambil memelihara secara tanggapan kualiti imej berwarna yang ditera air tidak hilang. Keputusan simulasi menunjukkan bahawa cadangan yang disarankan adalah telus dan teguh daripada serangan-serangan biasa seperti mampatan JPEG, penapisan hantaran tinggi, penapisan tengah, memotong (cropping), Gaussian, ‘spackle noise’, ‘salt and peppers’, kesan-kesan pergerakan dan serangan penskalaan. Sebagai tambahan, kaedah pemulihan adalah non-blind kerana ia memerlukan imej hos yang asal untuk mengeluarkan tera air.

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CHAPTER 1

INTRODUCTION

1.1 Introduction

An increased care has been paid recently on the multimedia services leading to fast and noticeable growth in this vital sort of computerized services. This growth is moving along with special techniques prepared to support the security fields like copyright protection, fingerprinting and authentication.

Multimedia services have recently witnessed a remarkable growth. This growth has found a need for techniques that can be used to support some security issues such as copyright protection, fingerprinting and authentication. The fast evolution in the internet has bred new generation of security concerns. One of the most concerns to be taken into the consideration is impeding the unauthorized copying of digital production from distribution. To solve the problems associated with intellectual protection, the principles of digital watermarking have been created.

The purpose behind digital watermarking is to embed the information and data in the host digital media (image, video and audio) with the purpose of copyright protection, access control, broadcast monitoring etc. Embedding the information in images is made possible through making slight changes unrecognized by naked eye [1].The changes imposed in the images are controlled by computer program to be recoverable.

According to [35] there are three significant differences between digital watermarking and other technology:

i. Unlike encryption, watermark is imperceptible so that the image will not be detracting from the aesthetic sense.
ii. The watermarks and the works they embedded in are inseparable. Even if the works were displayed or converted into other file formats
iii. The watermarks will have exactly the same transformation experience as the works that means you can get the information of transformation by looking at the watermarks.

Watermarking system is regarded as a reliable way in which many efforts have been exerted in order to get the researches fully acquainted with it. However, the requirements of this system are significant issue to discuss [2]:

i. Readability*:* The mobility of the information in the watermark system ought to be pretty rapid, statistically organized, with a sufficient amount of data to define the ownership and sound copyright.
ii. Security*:* watermark data are allowable just for the permitted users.
iii. Imperceptibility: The embedding process should not introduce any perceptible artifacts into original image and not degrade the perceive quality of image
iv. Robustness: The powerful watermark is that it is not able to be detected by the unauthorized users.

The watermarking system is provided with at least one key, or a number of keys to meet the requirement of the security. In another hand, the function of the key is to support the security for preventing the unauthorized users to modify on or fooling around with the secured image [3]. The General Framework for watermarking is shown in Figure 1.1 and 1.2. Any watermarking scheme consists of three parts. The watermark, embedding (insertion algorithm), and detection with comparator (extraction). Embedding as a process contains watermark as inputs, cover object and the secret or the public key. Numbers, text and images are the main types used as watermark. The outcome of the process is watermarked data Figure 1.1.

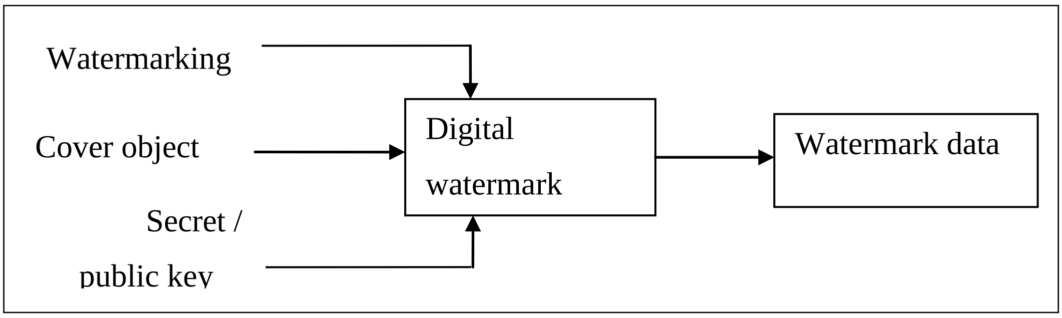

Figure 1.1: Digital watermarking Embedding

The inputs used for extracting are watermarked data, original data and secret or public key. The recovers watermark is the outcome of the process.

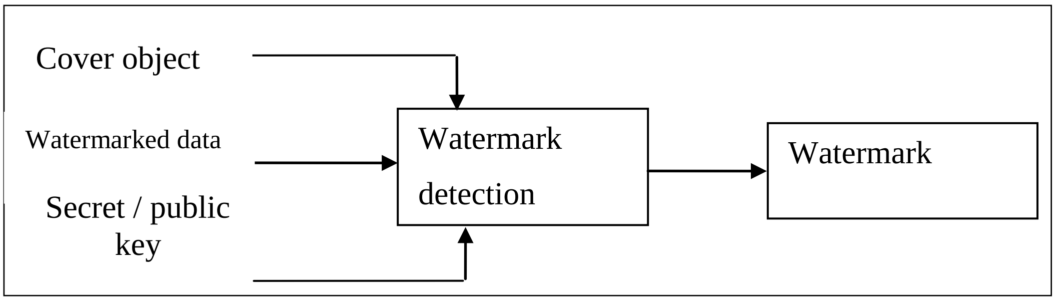

Figure 1.2: Digital watermarking extracting

Robustness and transparency are the parameters in which the watermarking tries to adjust. The technique of watermarking insists to find a location for watermark to insert and to get the robustness of the watermark improved [4].

There are many issues contributes to make the algorithm robustness significant. The Algorithm robustness must play a role of a robust watermark to withstand all the attacking attempts including common signal processing distortions which an image encounters during transmission and malicious removing attacks [5].

1.2 Problem Background

There is remarkable number of unprotected images in internet at the time being; consequently this makes these images vulnerable to illegal use and informal downloading. The negativity of the illegal use to these data is usually associated with economic losses to original owner [6]. The problem in digital watermarking is that there are two requirements of transparency and robustness which must be satisfied but they almost always conflict with each other.

Transparency means watermark image must be embedded in the host image without causing any effect or any kind of degradations, and a digital watermark must be completely invisible. Digital watermark should be perceptually invisible so that it will not alter the qualitative of original contents. However, when the original data is compared directly with the watermarked data. [7]. Therefore, it may be sufficient that the modifications in the watermarked data go unnoticed as long as the data are not compared with the original data [8]

Robustness is another important issue in watermarking, the embedding process should not introduce any perceptible artifacts into original image and not degrade the perceive quality of image. Robustness refers to ability to recover the watermark after performing various signals processing attacks on watermarked image. The degree of watermarking robustness differs from one signal processing to another [9]. The attack implement by applying for example, filters, adding noise, geometric distortions and removal. in addition to evaluating similarity between original and recovered watermark after applying attacks.

1.3 Problem Statement

Internet and network topologies are being utilized extensively nowadays. As a result for these affect digital contents become widely available and every one can access it then use it for personal or commercials purposes. Many users abused these contents by piracy and forgery, these problems generated the need to authenticity of digital contents.

The digital watermarking technology proposed as a solution to deal with this kind of problems.The problem is how to embed a watermark in an image to how to improve the robustness of the watermark.

The digital watermarking technology proposed methods still under development because there are a lot of techniques need implementation, in addition to variety of applications. There are a lot of researches proposed digital image watermarking using Discrete Wavelet Transform (DWT) in the literature, but the work of each one distinct in terms of scopes and applications from the others.

1.4 Research Aim

The aim of this work is to construct a digital image watermarking using wavelet transform. The proposed watermark technique offers a property of robustness whereby it is strong enough to confront the malicious attacks. The other point behind using watermark technique is to create no evidence on watermarking the image, in another words; the watermarked image is unable to be differentiated by naked eye.

1.5 Objectives

This project intends to achieve the following objectives:

i. To develop a digital watermarking by using wavelet method
ii. To achieve a transparency image watermarking
iii. To achieve the robustness of image watermarking by applying filters, adding noise, geometric, removal, Contrast enhancement, Brightness and motion attacks.

1.6 Project Scope

The research areas cover the following aspects:

i. The project focus on 1024*1024 RGB images of the host image and gray scale UTM logo image size (256*256) BMP format as a watermark. The format of the host image is (JPG), also (BMP).

ii. The program is built on windows environment using MATLAB language 2008a.

1.7 Thesis Organization

The report is divided into 5 chapters:

i. Chapter 1 describes the introduction and background of the study, the project objectives, scope.

ii. Chapter 2 gives literature reviews on the existing watermarking technique, and brief description of wavelet transform.

iii. Chapter 3 describes the project methodology.

iv. Chapter 4 discusses the result of the project methodology

v. Chapter 5 gives the overall discussion of the project and conclusion of the