

# CHAPTER 1 INTRODUCTION

## 1.1 Introduction

A computer has been widely used and implemented throughout the world. It provides an easy way to operate with digital data, e.g. storage, duplication, revision, etc. Also, with growth in communication technology, the Internet has been widely distributed throughout the world. It can be accessed by everyone. People can exchange digital data across the world. As above, it is possible that someone can distribute digital data without permission of its owner. It is obvious that copyright can be violated easily in digital technology currently.

Digital watermarking is one of methods to provide a proof of ownership and/or receipt of distributed copies of digital data, e.g. images that are distributed through the Internet. The digital watermarking can be used to authenticate and identify an owner of the data. Hence, the digital watermarking can be used against copyright violation. Technically, the digital watermarking can be achieved by two processes, i.e. embedding process and retrieval process. In addition, owners need to embed secret data into the digital data. Note that the secret data is called watermark. Then, this watermark will be retrieved and used as evidence of the original ownership of the digital data.

Presently, there have been quite a number of watermarking methods proposed and proved to be efficient. In this thesis, one [8] of them was considered and developed. The problem of the extreme pixel value can be found in the retrieval process of a digital watermarking scheme in [8]. A new watermark retrieval method based on the adaptive prediction techniques was proposed to solve the above problem. It was applied to the existing digital watermarking scheme in [8]. Our proposed method adaptively removes one or more surrounding pixel(s) around the predicted pixel, depending on a given

threshold in order to maximize the watermark retrieval performance. The efficiency of our method was demonstrated by the experimental results. That is, the improved performance in term of Normal Correlation (NC) was achieved by using our retrieval method, compared to the previous method in [8].

## **1.2 Objective and Possible Approach**

The objective of this thesis is to solve the problem that is appearance of extreme pixel value in the retrieval process, to maximize retrieval performance by removing all surrounding pixels having extreme value. To obtain maximum averaging performance in the retrieval process, all surrounding pixels having extreme value should be eliminated. Removal of the extreme value should be adaptive so that the prediction can be more precise. An adaptive algorithm was considered and developed to be used in the retrieval process.

## **1.3 Organization of this Thesis**

In the next section, the theory of digital watermarking based on the modifications of image pixels is given. In section 3, we describe our proposed watermark retrieval method. In section 4, the experimental setting is presented. In section 5, the experimental result is presented, and the results obtained are shown and compared to the previous retrieval method. The conclusion is finally drawn in section 6.