CHAPTER I

INTRODUCTION

1.1 Background

The existence of internet and the rapid development of information and communication technology have increased data exchange between users worldwide where people can easily interact and share their files. However, once a file is published or uploaded to the internet, it is hard to control or to monitor whoever has accessed that file. It can be downloaded, copied, edited and/or re-uploaded with different tag of ownership without the concern of the original owner.

In the case of digital video, file sharing on internet via certain websites like You Tube, Facebook.com and 4shared.com happen almost in every minute. Not long after uploaded, the video will be reposted on other websites. Unfortunately, those websites mostly have not provided any protection to the file. Ownership of that file can easily be claimed. Furthermore, someone who has business interest to that file can download the video, burn them on compact disks and sell them without paying any property to the real owner.

To avoid the illegal action to digital video, a mark of ownership should be planted. It should be able to protect the video from various possible manipulations. However, the main thing is the mark should not decrease the video quality. The video should be visibly smooth like no mark has been added to the video.

Digital watermarking is a method to embed a watermark into digital data. The watermark can be text, binary code, image or video, which works as the copyright label of that file. As part of Steganography, digital watermarking will make the file robust to data manipulation, appear smoothly, and has the same size even after inserted with the mark. To achieve those criteria, various watermarking methods are developed and research on watermarking is still on its way.

Video watermarking means inserting the watermark to video. Seeing every frame as a digital image, methods used in image watermarking are automatically possible for video watermarking. Inserting watermark to video also give different challenges to explore.

In general, there are two types of domain to embed watermark; spatial and transform. In spatial domain, watermark is embedded through manipulating the pixels. In transform domain, the pixels first are grouped based on their frequency level; high, medium, or low, and then further manipulation on those components can be done. Some possible transformations to use are Fourier Transform, Cosine Transform and Wavelet Transform.

Independent Component Analysis is an algorithm which has been used in cocktail party problem. ICA is proven capable of separating the mixed sounds in cocktail party to their independent components. Consider video and watermark as two independent components, a scenario to extract watermark from the video using Fast-ICA algorithm is proposed as a Blind Source Separation method. Blind Source Separation means the extraction only depends on the mixed file without the help of original video or watermark.

1.2 Statements of Problem

This research should consider about:

1. What watermark insertion method which should be formed to produce robust watermarked video without degrading its visual quality
2. What watermark extraction method which should be formed to produce good quality extracted watermark and video after removal

1.3 Goals of Research

Answering the problems, this research is composed with goals to create:

1. A watermark insertion method in effort to produce robust watermarked video with good fidelity and data payload
2. A watermark extraction method in effort to produce good quality extracted watermark and video after removal

1.4 Benefits of Research

Form this research, the benefits which are expected from the results are:

1. A watermark insertion method which can produce robust watermarked video with good fidelity
2. A watermark extraction method which can produce good quality extracted watermark and video after removal

1.5 Scope of Research

To be more specific and focus, this research will concentrate in:

1. Using .AVI format video, with 320 x 240 frame size
2. Using .BMP format, RGB image as watermark
3. Disregarding audio part of video
4. Embedding watermark in transform domain by uniting Discrete Wavelet Transform and Discrete Cosine Transform; taking the ll band of watermark to the hh band of frame with weight value of alpha (0.01, 0.03, 0.05, 0.08, 0.1, 0.03, 0.5 and 0.8) on every color layer Red, Green and Blue
5. Extracting watermark based on Independent Component Analysis
6. Evaluating robustness of watermarked video from additive white Gaussian noise attack
7. Measuring fidelity of watermarked video, extracted watermark and extracted video using MSE and PSNR