Information Hiding: User Point of View

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Abstract—Information hiding techniques have recently become important in a number of application areas. The information hiding scheme can be classified into two main application fields: steganography and watermarking. There is a considerable amount of published work in this field. However, little work addresses information hiding from the user's point of view. Potential problems, user requirements, evaluation and protection are introduced. The results illustrate that normal users prefer watermarking rather than steganography.

Keywords—Information Hiding, steganography, watermarking, invisible watermarking, visual watermarking and stego-image.

I. INTRODUCTION

The growth of high speed computer networks and the Internet, in particular, have explored the means for new business, science, entertainment, and social opportunities. Digital media offer several distinct advantages over analogue media, such as high quality, easy editing and high fidelity copying. The ease with which digital information can be duplicated and distributed has led to the need for effective copyright protection tools. Various software products have recently been introduced in an attempt to address these growing concerns [1-3]. Protection is given by hiding data (information) within digital audio, images and video files. One such method is a digital watermark. Digital watermarking is the process that embeds data called a watermark into a multimedia object such that the watermark can be detected or extracted later to make an assertion about the object.

Watermarking is either “visible” or “invisible”. Although visible and invisible are visual terms watermarking is not limited to images, it can also be used to protect other types of multimedia objects [4-6].

Steganography is derived from the Greek for covered writing and essentially means “to hide in plain sight”. Steganography is the art and science of communicating in such a way that the presence of a message cannot be detected. Simple steganographic techniques have been in use for hundreds of years, but, with the increasing use of files in an electronic format, new techniques for information hiding have become possible [7,8].

An information hiding system has two main stages: the embedding phase with the sender and the extraction phase with the receiver [9-11].

II. EMBEDDING PHASE

The original data is first compressed and encrypted to form the unrecognized data (secret message). The secret message is considered to be a bit stream that is usually divided into blocks of equal size and embedded into an innocuous image (called the cover image) block by block. The image embedded with the secret is referred to as the stego-image or watermarked image and is then transmitted to the receiver via public channels (Figure 1).

III. EXTRACTION PHASE

At the receiver, the extraction process is started. The secret is first extracted from the stego-image (watermarked image) and then decrypted and decompressed. The original data can be recovered if the correct decryption key is used (Figure 2).
IV. SURVEY QUESTIONNAIRE

Information hiding has recently gained much attention and consideration. Many papers were published discussing technical issues, but none of them attempted to investigate the user point of view. This paper introduces a survey of user expectations regarding information hiding applications. A questionnaire comprising 23 questions was distributed via the Internet using the Survey Console service. In order to cover different aspects, the survey was divided into three main areas: first, evaluating and understanding the problems to which information hiding applications can be a solution; second, determining the user requirements and their importance; finally, reviewing illegal usage of this technology and possible protection methods.

V. RESULTS AND DISCUSSION

A. What is the problem?

This survey aimed to study and measure the Internet users’ need for this technology and to evaluate the difficulties and obstacles in dealing with digital content on the Internet. The results show that users have great concerns about copyright protection.

Many users prefer not to publish their work on the web because there is no such method to protect their rights (Figure 3).

![Figure 3: Many users prefer not to publish their work on the web because there is no such method to protect their rights.](image)

On the other hand, the results give evidence that users are looking for a new mechanism (information hiding) which offers a secure communication channel to exchange confidential content (Figure 4).

![Figure 4: Secure communication will help Internet users share their confidential content without any problem.](image)

This part shows user-wide understanding of the current problems and their possible solution using information hiding techniques.

B. User requirements?

This part assesses and decides on the most significant characteristics which should be offered in an information hiding application. The key factors in information hiding, arranged according to their importance from the users’ point of view, are shown in Figure 5.
The most important factor is that the perceptual quality of the image after the embedding process should be the same. Users showed greater consideration for digital watermarking applications rather than steganographic applications, which indicates that the carrier (image) is more important than the message (Figure 6).

C. Protection?

Information hiding technology provides an ideal solution for many problems. However, it can be used for illegal purposes. Many solutions have been presented and exposed to participants. The results show considerable user awareness of such a problem proving that panning the usage of this technology will not be the solution (Figure 7).

Users believe that illegal usage could be prevented by developing and updating information hiding detection software (Figure 8).

VI. CONCLUSION

This paper introduced information hiding technology from the user point of view. Users value this technology and how it protects their digital content while surfing the Internet. Digital watermarking applications are the users’ main focus because they match the users’ requirements rather than steganography applications. This result is consistent with the number of papers published in the digital watermarking field as compared with steganography. Panning information hiding software will not resolve the problem of illegal usage. The results indicate that developing and updating countermeasure software would be an ideal practice.
REFERENCES


