Digital Watermarking

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Introduction

With the onset of the World Wide Web, authors of digital media can easily distribute their works by making them available on Web pages or other public forums. Anyone having access to those forums can copy the author's media. By the nature of digital media, a copy is an exact, perfect duplicate of the original. This brings to front a potential problem about how do authors claim ownership rights of such digital media when multiple persons have exact copies

Copyright Protection Issues

It is easy to ensure the ownership of "analog documents" and protect the author from having her/his work stolen or copied, for example the artist signs a painting, books and albums have copyright labels imprinted inside these works.

Encryption methods

Traditional data protection methods such as encryption methods – the use of a public and private keys to encode the data so that it can only be decoded with the required key – can protect contents during the transmission of the data from the sender to receiver. But it cannot be used in copyright enforcement issue, since the content must be played back in the original form, at which point it can always be re-recorded and then freely distributed

Information Hiding

Information hiding represents a class of process used to embed data into various forms of media such as image, audio, video, or text. Information hiding can be classified into two categories: steganography and watermarking.

Watermarking

Watermarking aims to hide secret information in digital multimedia contents. The secret information is embedded in the contents itself by actively modifying contents, but in such a way that it causes only slight and imperceptible modification. It is a technique which embeds the less amount of data, but requires the greatest robustness. The embedded information, which is known as a watermark, can provide, for example, information about the media, the author, copyright, or license information.

Steganography

Steganography serves to hide secret messages in other messages, such that the secret's very existence is concealed. Generally the sender writes an innocuous message and then conceals a secret message on the same piece of data.

Watermarking applications

- Broadcast monitoring

- Owner identification

- Transaction tracking

Broadcast monitoring

It is often crucially important that we are able to track when a specific video is being broadcast by a TV station. This is important to advertising agencies that want to ensure that their commercials are getting the air time they paid for. Watermarking can be used for this purpose.

Owner identification

Being able to identify the owner of a specific digital work of art, such as a video or image can be quite difficult. Nevertheless, it is a very important task, especially in cases related to copyright infringement. So, instead of including copyright notices with every image or song, we could use watermarking to embed the copyright in the image or the song itself.

Transaction tracking

In this case the watermark embedded in a digital work can be used to record one or more transactions taking place in the history of a copy of this work. For example, watermarking could be used to record the recipient of every legal copy of a movie by embedding a different watermark in each copy. If the movie is then leaked to the Internet, the movie producers could identify which recipient of the movie was the source of the leak.

Types of Digital Watermarking

- Visible Watermarking

- Invisible Watermarking

Visible Watermarking

☐ In visible watermarking, the information is visible in the picture or video. Typically, the information is text or a logo which identifies the owner of the media.

☐ When a television broadcaster adds its logo to the corner of transmitted video, this is also a visible watermark.

Fencepost 2007

Art Wade 2007

The Relentless Power of Creation

Website Copyright

If you are starting an online business and you are working to build and promote it, it is important to have website copyright for online business.

A watermark is usually a small icon that is printed on web pages. The icon can be the company's logo or the owner's name.

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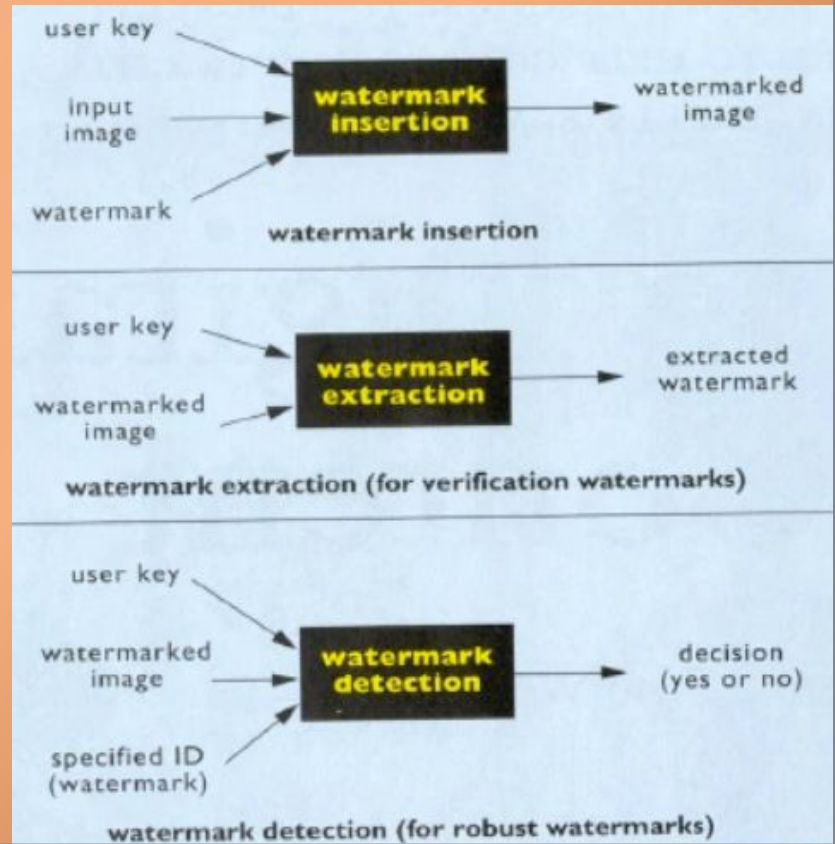HOME   ABOUT US ⌄   ACADEMICS ⌄   ADMISSION ⌄   RESEARCH ⌄   QUALITY ASSURANCE   CENTERS ⌄   CONTACT

Invisible Watermarking

☐ In invisible watermarking, information is added as digital data to audio, picture or video, but it cannot be perceived as such (although it may be possible to detect that some amount of information is hidden).

☐ It is also possible to use hidden embedded information as a means of covert communication between individuals.

Watermarking Process

watermark insertion

watermark extraction (for verification watermarks)

watermark detection (for robust watermarks)

Techniques for Texts

☐ Text Line Coding: Change the spacing between lines.

☐ Word-shift Coding: Change the spacing between words.

☐ Character Encoding: Alter the shapes of characters.

Text Line Coding

Some years ago never mind how long ago precisely
having little or no money in my purse and nothing
particular to interest me on shore I thought I
would sail about a little and see the watery part
of the world. It is a way I have of drivin' off the
spleen and regulating the circulation. Whenever It
find myself growing grim about the mouth I account
it high time to get to sea as soon as I can.

Some years ago never mind how long ago precisely
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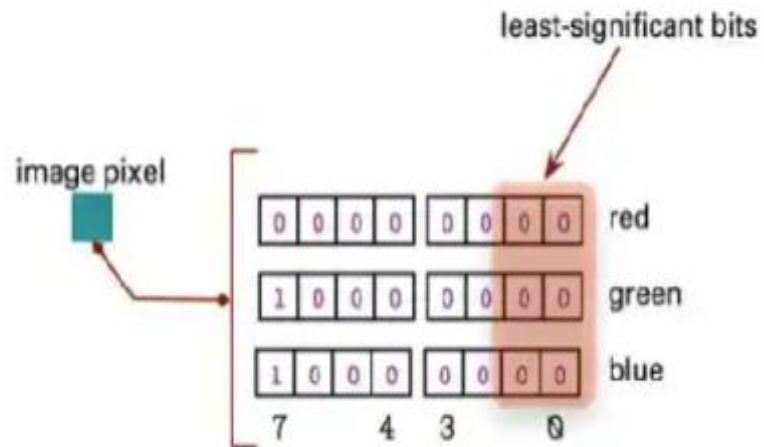it high time to get to sea as soon as I can.

Word-shift Coding
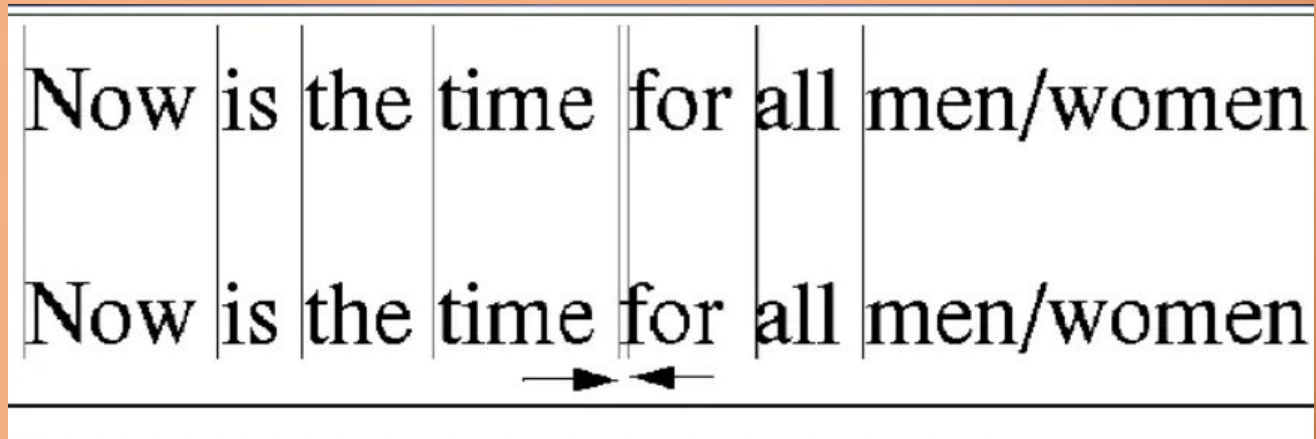
Techniques for Images

☐ Spatial Watermarking: Just change some of the values of the pixels in the lower bit plane; e.g., Change some of the bits from 1 to 0 or 0 to 1.

☐ Frequency Domain Watermarking: First convert the image to the frequency domain and then apply the watermark in the low frequency regions.

Small changes in brightness, contrast, etc.

(sail.jpg): Original image.
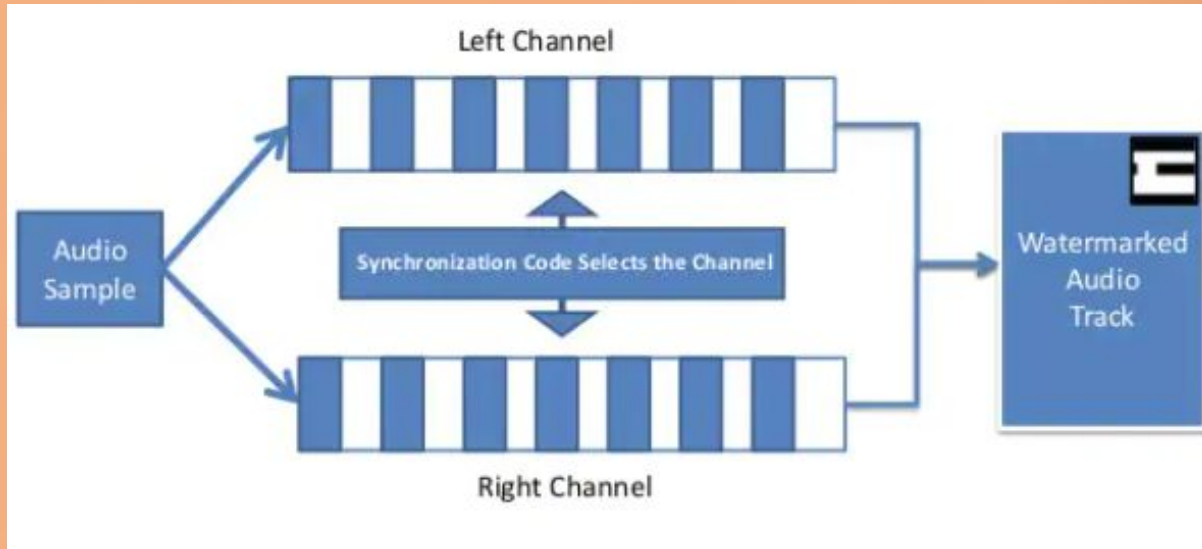
(sail_e.jpg): Signed image. Verify with secret key 100001.

Techniques for Audio