Watermarking Techniques

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1. Introduction

- Over the past few years, watermarking has emerged as the leading candidate to solve problems of ownership and content authentications for digital multimedia documents.

1. Introduction

- Ratio between the information contained in the watermark and in the host signal.
- Image degradation due to watermarking.
- Robustness.

2. The Choice of Host Locations in the Cover

- In many implementations, a pseudorandom number generator initialized from a secret key determines these locations. This secret key is only known by the owner of the document and correspondingly, he is the only one who can access the watermark in both the insertion and the recovery processes.

2. The Choice of Host Locations in the Cover

- Besides security aspects, a good choice of watermark locations is crucial with respect to the visual distortion of the original image. The accuracy of the human visual system varies according to the texture nature of the images.

2. The Choice of Host Locations in the Cover

- **The Patchwork Algorithm**: proposed in 1995 by Bender et al.
- This algorithm does not as such allow a message to be hidden in a cover, but it simply allows the following binary question to be answered: "Does this person know the key which was used to embed and build a watermark?"

2. The Choice of Host Locations in the Cover

- In the insertion process, the owner selects n-pixel pairs pseudorandomly according to a secret key K_S. He then modifies the luminance values $(a_i, b_i)$of the n pairs of pixels by using the following formula:

$$\widetilde{a_i} = a_i + 1$$
$$\widetilde{b_i} = b_i - 1$$

2. The Choice of Host Locations in the Cover

- In the extraction process, the n-pixel pairs which were used in the encoding step to host the watermark are retrieved, again using the secret key Ks. Then, the sum:

$$S = \sum_{i=1}^{n} a_i - b_i$$

2. The Choice of Host Locations in the Cover

- Watermarking algorithms based on a secret key present a major drawback: they do not allow a public recovery of the watermark.
- In order to overcome this limitation, public key watermarking algorithms have been proposed.

3. The Choice of Workspace

- Discrete Fourier Transform
- Discrete Cosine Transform
- Mellin-Fourier Transform