A Survey on Filtered Watermarking Embedding & Extraction in Bit Planes

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Abstract— Now a days the image authentication through watermarking is going in many different techniques. One of the newest method is filtered watermarking. The filtered watermarking is a secured watermarking technique. Depending upon the type of filter used during the watermarking process, the overall watermarked images results will be changed. Actually the target information is present in the edges of the watermark image in filtered watermarking process. The watermark image is hidden into another cover image(original image). The extraction of target information by using various edge detecting filters produce various results. In this paper we discussed our survey results on watermark embedding and extraction in bit planes using different filters and also the embedding of the filtered watermark in various order bit planes.

Keyword---watermarking, Watermarking Embedding, authentication.

I. INTRODUCTION

Now a days for image security and authentication, watermarking is widely used process. There are many watermark embedding and extraction processes, one of the newest watermarking technique is filtered watermarking process. The watermark undergoes a filtering operation to detect the information which is mostly present in the edges of the watermark image. the detection of edges can be performed by using different filters. In this paper we discussed on four different edge detection filters for the watermarking process. The filters applied during the watermarking process are Sobel edge detector, Prewitt edge detector, Canny edge detector and Robert's edge detector. Before watermark embedding onto original image (cover image), the watermark is filtered for target information identification. The original image(cover image)goes under bit plane slicing operation before filtered watermark embedding into it. The original image (cover image) has a capacity has a capacity to hide a watermark into it. The final watermarked image is obtained by embedding the cover image and edge detected watermark image. The error metrices like Mean Square Error, Peak Signal to Noise Ratio are calculated and discussed in the following sections.

II. PROPOSED METHOD

The filtered watermark embedding and extraction in bit planes uses different filters for edge detection. The block diagram of the proposed method is shown in fig 2.1.
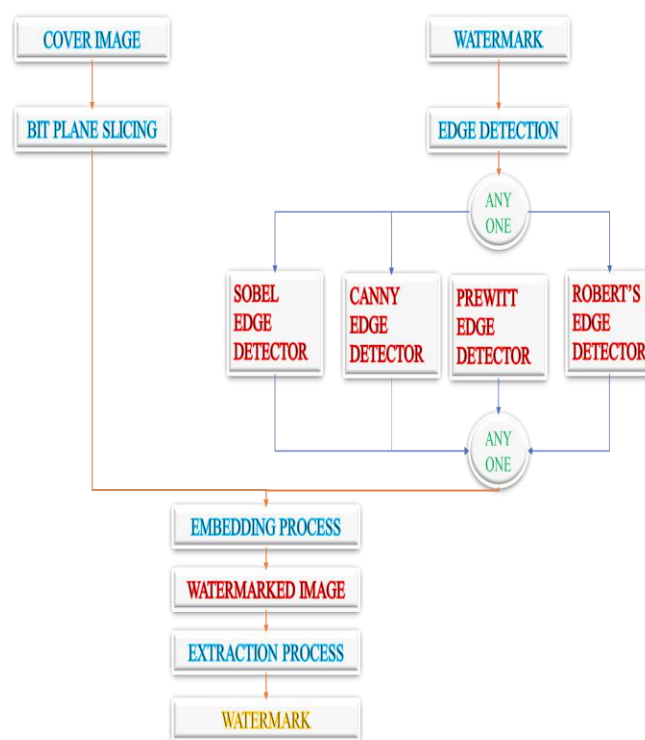

Fig.2.1. Block diagram of the proposed method.

Fig2.2. Cover Image.

Fig.2.3. Watermark Image Before Edge Detection.

Fig2.4. Sobel Filtered Watermark.

Fig2.5.Canny Filtered Watermark.

Fig.2.6.Prewitt Filtered Watermark.

Fig.2.7.Roberts Filtered Watermark.

The watermarking process has two images as input images. One of the image is cover image which is having a capacity to hide another image into it. This cover image goes under bit plane slicing process. The cover image is represented in pixels and each pixel is represented in bit format. According to the position of bits (in case of eight bit representation the total no. of bits are eight) different bit plane sliced images are formed. The image obtained by higher order bits i.e. MSB's has high visual appearance than the image obtained by lower order bits i.e. LSB's. the lower order bits has low amount of information. The watermark which is to embed into cover image goes under any one edge detection technique. In this proposed survey, we used four types of edge detection filters to extract the edges. The used filters are sobel edge detector, canny edge detector, prewitt edge detector & robert's edge detector. The edge detected watermark embedded in different bit planes produces different images as outputs. Each output image is differ from each other.
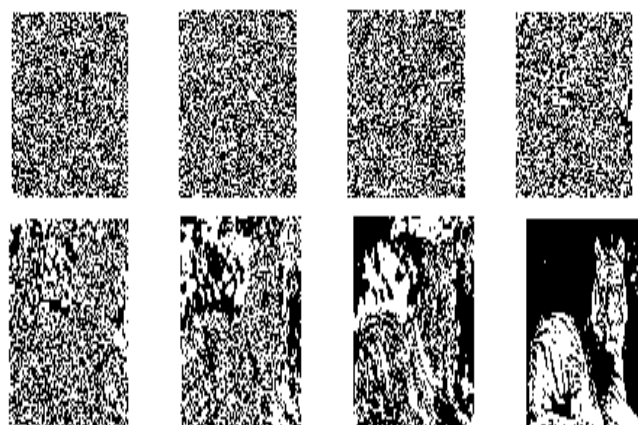

Fig2.8. Bit Plane Sliced Images of Cover Image.(order from LSB's to MSB's)

The extraction of the watermark works exactly opposite to the watermark embedding process. The Mean Square Error, Peak Signal to Noise Ratio are calculated to compare the cover image before adding the watermark and the final watermarked image. the results of our survey are discussed in the section-III.

III. RESULTS

The results of our survey are explained in this section in detail. We tabulated watermarking results in bit planes along with the PSNR and MSE values.

BIT PLANE NUMBER	WATERMARKED IMAGE (SOBEL FILTER)	MEAN SQUARE ERROR (dB)	PEAK SIGNAL TO NOISE RATIO (dB)
7		2116.19	14.91
8		6412.75	10.09

BIT PLANE NUMBER	WATERMARKED IMAGE (CANNY FILTER)	MEAN SQUARE ERROR (Db)	PEAK SIGNAL TO NOISE RATIO (Db)

		2092.06	14.96
7		2092.06	14.96
8		6495.25	10.04

BIT PLANE NUMBER	WATERMARKED IMAGE (PREWITT FILTER)	MEAN SQUARE ERROR (dB)	PEAK SIGNAL TO NOISE RATIO (dB)
7		2113.56	14.91

BIT PLANE NUMBER	WATERMARKED IMAGE (ROBERTS FILTER)	MEAN SQUARE ERROR (dB)	PEAK SIGNAL TO NOISE RATIO (dB)
8		6428.25	10.08
7		2089.50	14.96
8		6512.50	10.03

Table.3.1. Survey Results of Filtered Watermark Embedding and Extraction in Bit Planes.

IV. CONCLUSION

In this paper we discussed the survey results of filtered watermarking embedding and extraction in bit plane slicing.In our results we selected as the cover image goes under bit plane slicing and in this paper the bit planes seven and eight are taken for embedding the filtered watermark. In this paper the Roberts edge detection method gives a low Peak Signal to Noise Ratio value as 10.03dB and then next canny edge detection method gives a Peak Signal to Noise Ratio as 10.04dB.

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