A Simple Approach to Watermarking of Multiple Grayscale Images using Alpha Blending

Anirban Patra[1], Dr. Arijit Saha[2], Dr Ajay Kumar Chakraborty[3]

[1]*Assistant Professor , Dept. of ECE, JIS College of Engineering, Kalyani, West Bengal, India*

[2]*Associate Professor , Dept. of ECE, B P Poddar Institute of Engineering and Management, West Bengal, India*

[3]*Professor , Dept. of ECE, Institute of Engineering and Management, West Bengal, India*

Abstract : *Watermarking is a technique very often used in image processing for copyright purpose, where a special image is superimposed on another image. Watermarking of images and then retrieve the original image from the watermarked image is an application in image processing. Various methods can be utilized for watermarking of images. In this paper, a new technique for Watermarking of images has been proposed. Images are first watermarked with different values of alpha blending. The resulting image contains the watermarked information of all images. Theoretically a multiple images can be watermarked by this system, however to get a reasonably good output, we have worked with only three images. Using proper value of alpha, original image can be retrieved from the watermarked image. This scheme is suitable for both visible as well as invisible watermarking. This technique can be used for image steganography also.*

Keywords : Image transform, alpha blending, digital watermarking, image security

1. **INTRODUCTION** *:* There are many techniques used for Watermarking of images. P Sharma and S Swami used three level discrete wavelet transform for watermarking. In their method, they have used a technique where a multi-bit watermark is embedded into the low frequency sub-band of a cover image by using alpha blending technique. During embedding, watermark image is dispersed within the original image depending upon the scaling factor of alpha blending technique. [1] A P Singh et al proposed an idea where they have also used discrete wavelet transform but in a simplified manner using various values of PSNR's and MSE's. [2] R V Totla and K S Bapat used both discrete cosine transform and discrete wavelet transform for watermarking . They have described imperceptibility & robustness of the both algorithms and make a comparative study on both of them. [3] G Kaur et al have discussed least significant bit for image watermarking in their technique. They have applied this technique in spatial domain only. Their technique is simple but is not applicable in frequency domain. [4] Asha N and Bhagya P described a new technique of watermarking using alpha blending and three level discrete wavelet transform for watermarking. According to their theory, a multibit watermarking technique is used into low frequency sub band of cover image by

using alpha blending technique by varying the scaling factor. The extraction of the watermark is also done by the scaling factor. [5] L Rajab et. al. launched a scheme applying two-level DWT to the video scene followed by Schur decomposition in which the binary watermark bits are embedded in the resultant block upper triangular matrix. In their scheme, the imperceptibility of the scheme is very high due to the use of discrete wavelet transform transform; therefore, no visual distortion is noticed in the watermarked video after embedding. [6] Dr. S K Sood and his associated proposed a scheme an algorithm for digital image watermarking technique based on singular value decomposition an algorithm for digital image watermarking technique based on singular value decomposition using both of the L and U components for watermarking algorithm.[7]

In our proposed technique, we have selected two images for experiment. One image is treated as main image; however other image is selected as cover image or watermark image. We have also selected a value of alpha for blending purpose. Each pixel of the first image is multiplied directly by alpha. However each pixel of the second image is again multiplied by different form of alpha. In our experiment, we have multiplied by $(1 - \alpha)$ with each pixel of the column of the image. By selecting different values of alpha, we can watermark the main image. For different values of alpha, sometimes main image is to be dominated whereas sometimes cover image be dominated. Selected values of alpha is between 0 to 1 for our experiment.

2.THEORY

Let us assume that selected images are $\mathbf{f_1(x,y)}$ and $\mathbf{f_2(x,y)}$. First we have multiplied each pixel of first image $\mathbf{f_1(x,y)}$ by alpha $\mathbf{(\alpha)}$. The resultant image is represented by $\mathbf{d_1}$. Similarly, each pixel of second image $\mathbf{f_2(x,y)}$ is multiplied by alpha $\mathbf{(1-\alpha)}$. The resultant image is represented by $\mathbf{d_2}$. The sum total two multiplied images formed the blended image. It is represented by **g**. Mathematically we can write as,

$$\mathbf{d_1 = f_1(x,y) * \alpha} \quad (1)$$

$$\mathbf{d_2 = f_2(x,y) * (1- \alpha)} \quad (2)$$

Adding both equation (1) and (2), we get

$$\mathbf{g = d_1 + d_2 = f_1(x,y) * \alpha + f_2(x,y) * (1- \alpha)} \quad (3)$$

3. RESULT

The selected images are shown in fig 1(a) and 1(b).

Fig 1(a)

Fig 1(b)

The resultant blended images with different values of alpha are shown in Fig 2(a-f). Both images are multiplied by α and $(1- \alpha)$. Selected values of α is between 0 to 1.

Different α value selection for our experiment is 0.25, 0.4, 0.5, 0.6, 0.8 and 0.95 respectively.

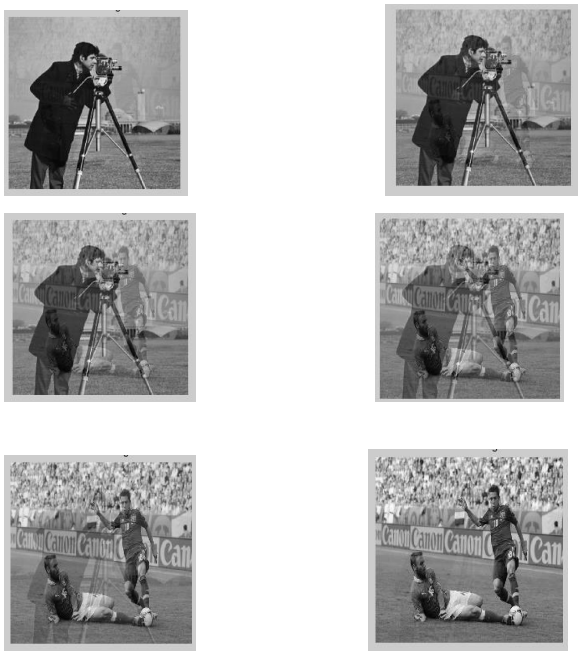

Fig 2 (a-f)

α = 0.25, 0.4, 0.5, 0.6, 0.8 and 0.95 respectively

From the above images, it can be proved that when value of α is tends to 0 then first image is dominating. Similarly when value of α is tends to 1, second image is dominating.

4. CONCLUSIONS

From the above images , it is clear that by using this simple process we can watermark two or more than two images in a simplified manner. In our experiment, we have selected value of alpha from 0 to 1. By varying the value of it, we can highlight a particular image from multiple images. However , this scheme can be used for watermarking of color images too. In this case, different values of alpha is appied in each planes of the RGB image.

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