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Performance Analysis of Convert a Gray Image to Color Image

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Abstract **-** A simple and efficient method for coloring the gray-scale images into the color images with the existing color map or with creating a new one. The conversion of grayscale images into the color images using different algorithm methods. This color matching technique helps in adding chromatic values to a colorless image and measure for color transfer. Moderately than choosing the entire color from the source to the target image transfer RGB colors from a palette to color gray scale components, by matching difference information between the images. The target image achieved high quality with higher PSNR and lower MSE metrics. It shows that this simple method can be successfully applied to a variety of gray scale images and it can be applicable in different applications.

Keywords **-** Gray scale image, RGB image, color map, lockup table, color matching.

I. INTRODUCTION

A gray scale image is a scale of shades from black to white used in digital image technology, such as facsimile machines. Gray scale is a variation on the theme of black and white. Gray scale measures the intensity of the light reflected from an area (dot) of a plane surface and defines each pixel as a byte, generally of eight bits, which yields 2 8, or 256, shades of gray. Gray scale images are stored as an m-by-n data array that defines the intensity for each individual pixel.

An RGB image, referred to as a true color image, is stored as an m-by-n-by-3 data array that defines red, green, and blue color components for each individual pixel. RGB images do not use a palette. The color of each pixel is determined by the combination of the red, green, and blue intensities stored in each color plane at the pixel's location [2], [3].

Color mapping is a function that maps the colors of image to the colors of another image. A color mapping may be referred to as the algorithm that results in the mapping function or the algorithm that transforms the image colors. A lookup table specifying the colors to be used in reproduction a palletized image.

A color map is an m-by-3 matrix of real numbers between 0.0 and 1.0. Each row is an RGB vector that defines one color. The i th row of the colormap defines the i th color, where map(i,:) =[r(i) g(i) b(i)]) specifies the intensity of red, green, and blue.

II. LITERATURE REVIEW

It was exposed that the algorithm works well in a number of image domains, and it was shown that the running time of the algorithm for one image can range from 15 seconds to 4 minutes, this technique as mentioned in [4] was not a technique that will work on most images. Studies on converting gray scale images to color ones showed not too much progress comparing with image processing, as in Mahmud used Pseudo Coloring technique to color medical images and completely restricted, which the same topic can be found at and See also[5] [6] [7] . In another report Haldankar and contemporaries had provided the benefit of a color image as a sample image, created a mapping of color image to black and white image and they use the appropriate mapping to color gray levels of black and white image, the results of this technique had Further improvement than had[8]. In another technique that Cheng and colleagues had expressed the operation of image histogram and definition of an overlap to select different power of light in different levels of color image, is basic idea, although this technique is not entitled of good quality in images details and in some situations of image color contrast is developed but is still acceptable and desirable in images with not a lot of details, in Xiang and colleagues for coloring industrial images are acting, of course that the images are divided into smaller pieces thus the obtained results[9] [10]. In another technique that Rujuta R Mahambare, introduce a general technique for “coloring” grayscale images by transferring color from the colored position image to the black and white grayscale image.. They transfer the entire color “humour” of

the source to the target image by matching luminance and surface information between their image[11].

Technique suggested by Ingmar Lissner, Jens Preiss emphasis on placed on using color information to improve the assessment of gamut-mapped images. Our best image-difference measure shows appreciably higher prediction accuracy on a gamut-mapping dataset than all other evaluated measures.

III. GRAYSCALE IMAGE TO COLOR IMAGE

A gray scale image is a scale of shades from black to white used in digital image technology, such as facsimile machines. Grayscale is a variation on the theme of black and white.

Grayscale measures the intensity of the light reflected from an area (dot) of a plane surface and defines each pixel (picture element) as a byte, generally of eight bits, which yields 2 8, or 256, shades of gray. Gray scale images are stored as an m-by-n data array that defines the intensity for each individual pixel. An RGB image, sometimes referred to as a true color image, is stored as an m-by-n-by-3 data array that defines red, green, and blue color components for each individual pixel. RGB images do not use a palette. The color of each pixel is determined by the combination of the red, green, and blue intensities stored in each color plane at the pixel's location

Color matching is a function that maps (transforms) the colors of one (source) image to the colors of another (target) image. A color mapping may be referred to as the algorithm that results in the mapping function or the algorithm that transforms the image colors. A lookup table specifying the colors to be used in rendering a palletized image. A color map is an m-by-3 matrix of real numbers between 0.0 and 1.0. Each row is an RGB vector that defines one color. The kith row of the color map defines the kith color, where map(k,:) =[r(k) g(k) b(k)] specifies the intensity of red, green, and blue. in this paper discuss some methods for converting grayscale image to color image.

IV. PROPOSED METHOD

A.Color Matching Algorithm

This gives us enhancement of the luminance and clarity of image. For the first initial work consider a particular selection of a colorless image then to add color into it is not that easy, first we have to work on the selection of splitter segment of image in colorless image and need to set a reference for it. For example, if there is a image of lena then the color of hair of it should be either violet or similar shade to it. This application of color need to be adaptive and for that first we need to select references and the by deploying certain methodologies regarding to object detection program can achieve its adoptions. For converting a gray scale image into color image refer following steps:

Step 1: In this step select the source grayscale image and depending upon the image quality we will filter it using some technique to remove noise in image.
Step 2: After image selection need to split grays cale image. Image splitting is needed for selecting proper area to be converted in suitable color. Splitting can be done in different ways similar to horizontal splitting, vertical splitting. Image splitting will add more effective addition of color.
Step 3: For applying color to any fragment of image first require to recognize pattern of that part.
Step 4: After decide color the different segmented parts of image are converted to color by the selected location image and this process should be adaptive, it means program must decide which color shall be given to which part of image.
Step 5: **A**t present the newly obtain color image will be in different segments so require to join all parts properly to get complete colorful image.
Step 6: Analysis of work can be recommended to be done by image disparity method. Trying to find out actual dissimilarity is happened in resultant image and the source image.

Grayscale and color images have a color maps, and if do have it is easy to convert the gray image to color image is shown in Fig. 1 and 2.

Figure 1.Grayscale Image

Figure 2.Color Image

V. PERFORMANCE ANALYSIS

Our proposed technique is implemented using MATLAB (version 14a). During Comparative analysis, the performance of our proposed Colour Matching algorithm is compared by means of the coloring algorithm in terms of

PSNR(Peak Signal Noise Ratio), MSE(Mean Square Error) performance metrics.

Table 1. Performance analysis of the proposed color matching algorithm with existing coloring algorithm in terms of PSNR and MSE

Test images	Existing coloring algorithm		Proposed color matching algorithm	
	MSE	PSNR	MSE	PSNR
Lena	29.77	33.39	27.45	35.76
Baboon	31.23	34.52	30.11	36.89
Butterfly	41.56	43.25	39.87	45.12
Apple	38.52	40.69	36.43	42.53

Table I illustrate that the performance of our color matching algorithm is equated with traditional coloring algorithm based on the parameters like PSNR and MSE. It reveals that our proposed shown higher values for the parameters like PSNR and MSE. Therefore it clearly shows that our proposed color matching technique yields higher coloring quality results than the traditional techniques. Figure 3 illustrates the comparison graph of our proposed color matching with traditional coloring technique.

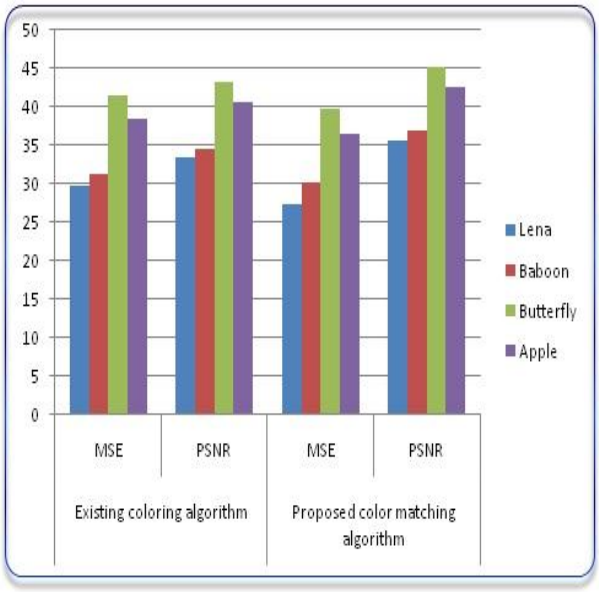

Figure 3. Comparison graph of our proposed color matching algorithm with traditional coloring Algorithm.

VI. CONCLUSION

whilst standard method complete this task by assigning pixel colors via a color palette,color look up table and our technique empowers the user to first select a suitable color image and next transfer the color of this image to the gray scale image at hand. In the method of getting the color image equivalent to a given source gray image was proposed, tested and implemented. Image enhancement can be seen in resultant image. Resultant image will be rich in color, quality and feature in terms of greater value of PSNR and lesser value of MSE. It was shown that the proposed method is very effective.

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