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PSEUDOCOLOR PROCESSING OF GRAPHICAL IMAGES USING MULTICOLOR PERCEPTIONS

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***Abstract*—In digital image processing, image enhancement is employed to give a better look to an image. Color is one of the best ways to visually enhance an image .Pseudo-color image processing assigns color to grayscale images. This is useful because the human eye can distinguish between millions of colures but relatively few shades of gray. Pseudo-coloring has many applications on images from devices capturing light outside the visible spectrum, for example, infrared and X-ray. The key observation in this work is Pseudocolor processing of graphical images and the images can be perceived by using different values in different layers of a color image using multicolor perception. This technique can be successfully applied to a variety of gray scale images and videos.**

Keywords— Pseudocolor, multicolor perception, reference grey images, image processing, computer graphics.

1. INTRODUCTION

This paper is based on the idea that the human visual system is more responsive to color than binary or monochrome images. We wanted to experiment the importance of pseudo-color. To create our images we use the multicolor perception for pseudo color method. The purpose of this paper is to image enhancement with color. We use ultrasound images, digital images, satellite images as gray scale images and used pseudo color technique to enhance them using multicolor perception. The main focus is to convert the grey image into color image by using multicolor perception. By using this multicolor perception the perception of the human eye is good and the quality of the image can be improved to give better enhancement of the image, The idea behind this method is that to convert the black and white image into color without losing its content because by conversion of an image some data night be lost.

Gray scale image contains pixels which are not a RGB color pixels. Many applications convert a gray scale image into RGB color space but fail to preserve the original contents of a Gray Scale image. This project provides an emphasis on noise removal, color conversion and blur removing techniques. Colorization is computerized processes that adds color to a black and white print, movie, images and In other fields such as archeology dealing with historical Gray scale data and security dealing with gray scale images by crime prevention camera, we can imagine easily that colorization techniques are useful.

Since different colors may have the same luminance values but vary in hue or saturation, the problem of colorizing grayscale images has no inherently “correct” solution. Due to these ambiguities, we use multicolor perception which plays a large role in the colorization process. Where the mapping of luminance values to color values is automatic, the choice of the color map is commonly determined by a reference image.

2. PRELIMINARIES

2.1 Image Enhancement

Image Enhancement techniques are employed to improve the quality of images for human viewing. Color is important for image enhancement because the human visual system has the ability perceive thousands of colors in a small spatial area compared to only about 100 gray levels. In addition, color contrast can be more dramatic than gray level contrast and various colors have different degrees of psychological impact on the observer. Taking these advantages of human visual perception to enhance an image a technique is applied which is called pseudo color. Image enhancement techniques can be divided into two broad categories:

2.1.1 Spatial Domain Techniques:

Spatial domain techniques directly deal with the image pixels. The pixel values are manipulated to achieve desired enhancement. Spatial domain techniques like the logarithmic transforms, power law transforms, histogram equalization, are based on the direct manipulation of the pixels in the image. Spatial techniques are particularly useful for directly altering the gray level values of individual pixels and hence the overall contrast of the entire image. But they usually enhance the whole image in a uniform manner which in many cases produces undesirable results. It is not possible to selectively enhance edges or other required information effectively. Techniques like histogram equalization are effective in many images.

(a)Point Operation: Point operations or image processing operations are applied to individual pixels only. The point operation is represented by g(m,n)= T[f(m,n)] Where f(m,n) is the input image, g(m,n) is the processed image, and T is the operator defining the modification process which operates on one pixel.

(b) Mask Operation: In mask operation, each pixel is modified according to values in a small neighborhood.

(c) Global Operation: In global operation, all pixel values in the image are taken into consideration for performing operation.

2.1.2 Frequency Domain Techniques

Frequency domain techniques are based on the manipulation of the orthogonal transform of the image rather than the image itself. Frequency domain techniques are suited for processing the image according to the frequency content . The principle behind the frequency domain methods of image enhancement consists of computing a 2-D discrete unitary transform of the image, for instance the 2-D DFT, manipulating the transform coefficients by an operator M, and then performing the inverse transform. The orthogonal transform of the image has two components magnitude and phase. The magnitude consists of the frequency content of the image. The phase is used to restore the image back to the spatial domain. The usual orthogonal transforms are discrete cosine transform, discrete Fourier transform, Hartley Transform etc. The transform domain enables operation on the frequency content of the image, and therefore high frequency content such as edges and other subtle information can easily be enhanced.

3. RELATED WORK

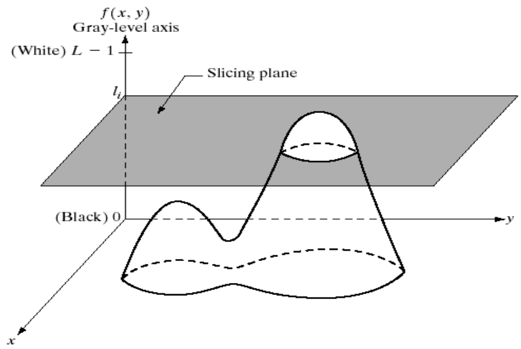
3.1. Pseudocolor: Pseudocolor (false color) image processing consists of assigning colors to gray values based on a specified criterion. The term "Pseudocolor" emphasizes that the colors were assigned artificially opposing to the true (real) colors. The principal use of Pseudocolor is for human visualization and interpretation of gray scale details on an image or their sequence. Intensity slicing and color coding is one of the simplest kinds of pseudocolor image processing.

A. Intensity slicing:

First we consider an image as a 3D function mapping spatial coordinates to intensities (that we can consider heights).Now consider placing planes at certain levels parallel to the coordinate plane. If a value is one side of such a plane it is rendered in one color, and a different color if on the other side.

In general intensity slicing can be summarized as:

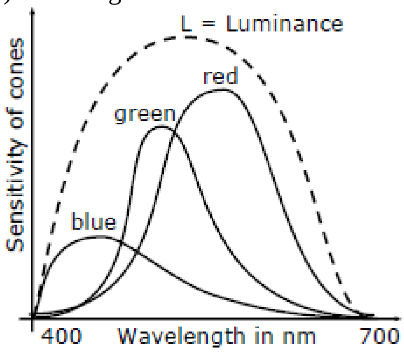
Let [0, L-1] represent the grey scale. l0 represent black [f (x, y)= 0] and let lL- 1represent white [f (x, y)= L-1]Suppose P planes perpendicular to the intensity axis are defined at levels l1,l2, …, lp. Assuming that 0 < P < L-1then the P planes partition the grey scale into P +1intervals V1, V2,…,VP+1.



Grey level color assignments can then be made according to the relation: where *ck* is the color associated with the *kth* intensity level *Vk* defined by the partitioning planes at *l* = *k* –1and*l* = *k*

3.2. Multi color perception model:

Three types of cone cells exist in our eye, with each being more sensitive to either short(S), medium (M),or long (L) wavelength light. The set of signals possible at all three cone cells describes the range of colors we can see with our eyes .the diagram below shows the the relative sensitivity of each type of cell for the entire visible spectrum. These curves are often referred to as "tristimulus functions"Different types of cones have different relative absorption characteristics. Long (red), medium (green) and short (blue) wavelength Cones



Human eye can distinguish between some millions of different colors. At one time (level of adaptation), only 300 colors and 100-150 levels of brightness can be distinguished. Contrast sensitivity describes the size of details that can be distinguished .It is also a function of wavelength.

The perception of a color with spectral energy distribution $C(\lambda)$is described by the responses of the three primaries to that color:

$$a_i(C) = \int_{\lambda_{\min}}^{\lambda_{\max}} S_i(\lambda)C(\lambda)d\lambda,\ i = 1,2,3$$

The human brain only sees the brain response. As a matter of fact, different spectra look the same.Metamerism is the fundamental principle of color reproduction.Instead of reproducing the spectrum, the visual response is simulated by mixing primary colors

4. APPLICATIONS

This pseudo coloring method is used for enhancing the quality of images. The applications of this method is widely used in Aerial imaging, Satellite imaging, Medical imaging, Digital camera application, Remote sensing etc

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5. PROPOSED WORK

5.1. Objective:

Adding colors to gray scale image directly is not possible. The process of colorizing a grayscale image does not seems to be a straight forward method which involves various methods to apply color onto the colorless image. This technique is entirely different it is an adaptive system which emphasis on a gray scale image and converting them into color using multicolor perception. Automatic selection of color in a particular gray scale image makes systems more impact and resultant image enhances the scale of colorization. In previous adapted method the mapping is done partially and the perception is done only by a particular perception. Here we propose a method that the mapping will be uniform and perception of the color in the image will be by using multicolor perception. So that the quality of the image can be improved and image can be viewed in a multi colored manner.

5.2. Algorithm:

Input: colorless image
Output: colored image by multi color perception
1. Select colorless gray scale image.
2. Split an Image into multiple segments.
3. Locate pattern for each segment.
4. If pattern located successfully, then goto step 5 else select default color reference image.
5. Insert reference image color to gray scale object.
6. Join all converted color objects.
7. Stop.

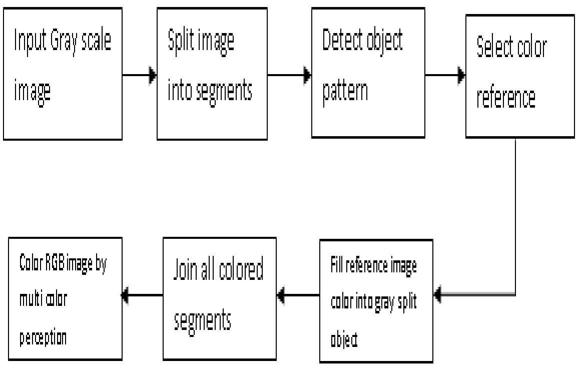

Figure: Proposed System Architecture

6. EXPERIMENTS

The proposed approach was implemented and tested in a set of color images. The pseudo coloring processing of graphical images has been implemented by using MATLAB and the images that we referred (gray scale) and convert into color are taken from x-rays, digital images and satellite images.

7. CONCLUSION

In the proposed system the pseudocolor processing of graphical images has been implemented using multicolor perception and the results were analysed. The input graphs considered are random graphs. Colorization improves the perceptibility of grayscale image to great extent. The method of grayscale image colorization is proposed here with help of multicolor perception. The technique helps to overcome the assumption of having source color image size bigger than the target grayscale for colorization algorithms given in earlier approaches.

Resultant image:

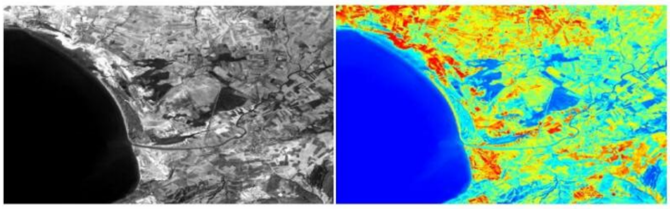

Figure: a) SPOT Pan in grey scale b) SPOT Pan in pseudo color.

Figure: Digital image (a) Grey scale b) Pseudo color

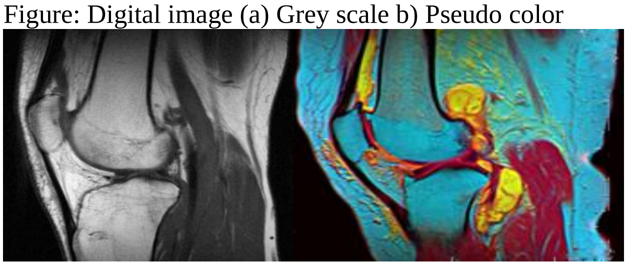

Figure: X-Ray image (a) Grey scale b) Pseudo color

REFERENCES

1. J. Preiss, I. Lissner, P. Urban, M. Scheller Lichtenauer, and P. Zolliker, “The impact of image-difference features on perceived image differences”, in Proc. 6th Eur. Conf. Color Graph, Image. Vis., Amsterdam. The Netherlands, 2012.

2. Ingmar Lissner, Jens Preiss, Philipp Urban, Matthias Scheller Lichtenauer, and Peter Zolliker,” Image Difference Prediction: From Gray scale to Color,”IEEE transactions on image processing, vol. 22, no. 2, February 2013.

3. Mahmoud K. Quweider,” Adaptive Pseudocoloring of Medical Images Using Dynamic Optimal Partitioning and Space-Filling Curves”, IEEE 2009.

4. Mohammad Zare, Mahdi Jampour, Issa Rashid Farrokhi," "A Heuristic Method for Gray Images Pseudo Coloring with Histogram and RGB Layers", Proceedings of the Seventh International Conference on Machine Learning and Cybernetics, Kunming, 12-15 July 2008.

5. Ye ji, Yan Chen," Rendering Greyscale image using color feature", Proceedings of the Seventh International Conference on Machine Learning and Cybernetics, Kunming, 12-15 July 2008.

6. J. Preiss, I. Lissner, P. Urban, M. Scheller Lichtenauer, and P. Zolliker, "The impact of image-difference features on perceived image differences," in Proc. 6th Eur. Conf. Color Graph, Image, Vis., Amsterdam, the Netherlands, 2012.

7. Hitoshi Yamauchi, Jorg Haber, and Hans-Peter Seidel "Image Restoration using Multiresolution Texture Synthesis and Image Inpainting", IEEE, 2011.

8. Marcelo Bertalmio, Guillermo Sapiro, Vicent Caselles and Coloma Balleste,"Image Inpainting", ACM journal 2007.

9. M.Y. Sanavullah, R. Samson Ravindran, "Pseudocolour Image Processing in Digital Mammography", Proceedings of the International Conference on Cognition and Recognition, 2010.

10. J. H. Jang and J. B. Ra,"Pseudo-Color Image Fusion Based on Intensity-Hue-Saturation color space", Proceedings of IEEE International Conference on Multisensor Fusion and Integration for Intelligent Systems Seoul, Korea, August 20 - 22, 2008.