COMPUTATIONAL APPROACH TO AUTHENTICATE THE ORIGINALITY OF AN IMAGE

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ABSTRACT

*The paper mainly deals with the segmentation of the color image; the algorithm used is nearest neighbor segmentation algorithm. The working principle of the algorithm is highly suitable for the L*A*B* color space. With the help of this method it's possible to distinguish the objects based on the color. The concept of the paper can may be applicable to some practical applications such as fake note detection, damaged cells detection in medical fields and defect detection in metal industry etc. Along with the color identification, the paper gives an idea how to calculate the amount of different colors present in an image.*

Keywords: *Image Segmentation, Separate Channels, Nearest Neighbor Segmentation.*

I. INTRODUCTION

In the area of the image processing, the segmentation is an important phase and it deals with the partitioning a digital image into multiple segments (sets of pixels, also known as super pixels). The main aim of the segmentation is to give information about the image features. From the image segmentation is possible to locate objects and boundaries (lines, curves, etc.) in images. More specifically, image segmentation is the process of assigning a label to every pixel in an image such that pixels with the same label share certain visual characteristics.

The image segmentation result shows a set of images that collectively cover the entire image, or a set of contours extracted from the image. The pixels in each region are similar with relevance to some characteristics, such as color, intensity, or texture.

For the image analysis purpose its possible to do the image segmentation by keeping track of some important properties of each method. The results of each method have their impact on the next method used for the image processing.

Usually the object detection process is performed after image segmentation; the proposed method is concentrated only on the image segmentation of an image by which it is possible to check the intensity of each color in an image. The three coordinates of L*A*B* indicate the nature of the color (for example if the value of L* = 0 gives black and L* = 100 gives diffuse white),the position of the color between red/magenta and green can be indicated by the value of A* (for example if A*is negative values or positive indicate green or magenta respectively) and if the position of the color is between yellow and blue (negative value and positive values of
B*indicates blue and yellow respectively) 0 to 100 is the range of coordinates [4].the possible range of A* and B* coordinates

2. LITERATURE SURVEY

Several methods exist for image segmentation out of these methods most of they uses the statistical information in the image for the segmentation. The iso data algorithm[3] is well known algorithm for segmentation. When noise level is high this method is not suitable.

In some other image segmentation methods it's based on minimization of certain functional values of an image are generally better than the isodata algorithm and its variants. The PDEs can be solved by minimization techniques. By the use of this minimization techniques helps to control the output of the model by introducing regularizes in the proposed systems. Along with this its possible to introduce constraints which must be fulfilled for the solution to hold.

Two-phase segmentation problem was introduced by chan an Vese,its an one level set function later this was extended by introducing more than one level set function by which it's possible to identify more phases. Hodneland studied this method for later improvement. Lie, Lysaker and Tai have been developed two new ways of handling the segmentation. The main limitation of the later method is that it's suitable only for two levels, set function rather than one level set function. By using set function it's possible to represent an arbitrary number of phases. The necessity of the second approach compare to the Chan/Vese approach is the use of regularizer to measure the lengths of edges in the images, by this method it's possible to get more accuracy. In image processing and pattern recognition image segmentation is very essential and critical phase.

3. METHODOLOGY

The example of an image taken here is assumed to containing different colors,identification of those colors in fabric image by using the L*A*B*[4] color space is explained in this section. Considering the input to the system is preprocessed image.

The procedure of the algorithm to differentiate different colors in an image is as follows

1. The color full image fabri.png image was acquired. It's also possible to acquire an image by using the imread and imshow functions in the Image Acquisition Toolbox.

2. Let us assume there are different colors are there in an acquired image. By using L*A*B* color space (also known as CIELAB or CIE L*A*B*) it's possible to quantify the visual differences between these colors.

3. By using nearest neighbor rule its possible to classify each pixel, the principle used in this method to classify each pixel is by calculating the Euclidean distance between the pixels and each color marker. If the distance is small it will tell that the pixel most closely matches that color marker. Let us take an example; if the distance between the red color marker and pixel is smallest, then the color of the pixel is red.

4. Array of colors can be created by taking color labels i.e., 0 = background, 1 = red, 2 = green, 3 = purple, 4 = magenta, and 5 = yellow.

5. In this step use the label matrix to separate objects in the original image.

6. The values of the 'A*' and 'B*' were displayed.

The flow chart for the proposed methodology is depicted in the Figure1.Here it's assumed that the image used for the method is preprocessed fabric image so no need of any preprocessing techniques like noise filtering or smoothening etc.

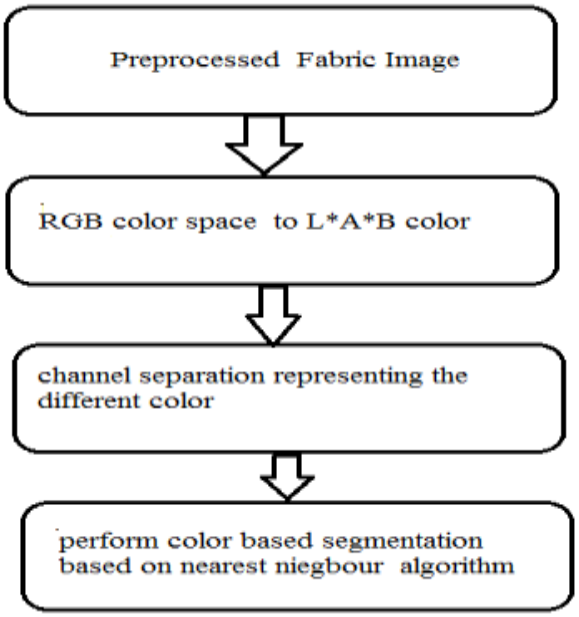

Figure1.Flow chart of the proposed method

The preprocessed colored image is changed to the L*A*B* color image followed by identifying the area of the different colors in an image, at last the colors can be separated by using nearest neighbor algorithm by which it's possible to have image segmentation.

Basically the concept of this paper can also be used in the medical field to identify the TIBIA fracture, identification of cancer cells in a patients X-ray or in MRI images[3]. Where the defected part color different with respect to the normal parts, by which doctor will diagnose the patient properly. The method not only interested about the color segmentation but also gives an information about the amount of color present in each region so that it specify the amount of damage occurred in a particular region.

4. RESULTS

The graphical result of the proposed method is as shown in Figure 2 in which the input image is just a fabric image after applying the proposed algorithm it will give the separate image for different colors, the identified images are labeled as red objects, green objects, etc.,

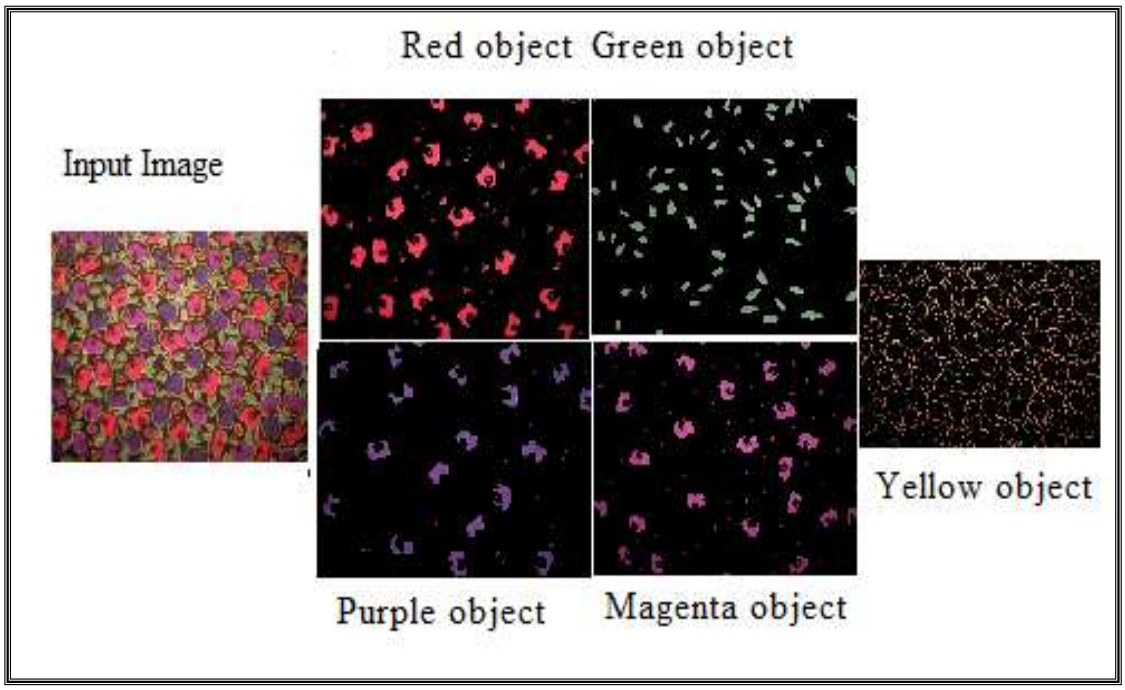

Figure 2: Different colors identified in an image

The percentage of color in an image can be found out by considering the total amount of pixels of each color first for example the number of red pixels in an image is 31919; number of green pixels is 216622 etc. Once the pixels evaluation is over find the percentage of each color in an image by dividing each color pixel by background image pixel value i.e 172181.

For an image size of 480X640 the total number of pixels are 307200, out of which 31919 identified as a red pixel, 21622 identified as a green pixel etc. The overall result of color percentage calculation is as shown in Table 1

Table 1: Percentage of the colour in an Image

Colour	No. of pixels	Percentage of Colour
Red	31919	10.39
Green	21622	7.03
Purple	19046	6.19
Magenta	20930	6.81
Yellow	41487	13.50
Background	172196	56.05

Note: Image size 480x640=307200 pixels

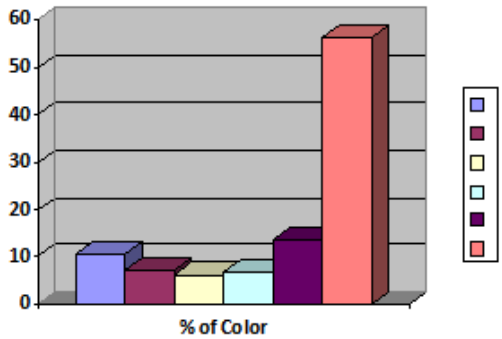

Figure 3: Percentage of color in an image

The percentage of different colors in an image as well as the number of pixels of each number with respect to the background of the image is as shown in Figure 3 and Figure 4.In Figure 3 Y axis represents the amount of different colors where as X axis represent percentage of the colors but in Figure 4 the Y axis represents the total amount of pixels in an image and the X axis represents the number of pixels of each color.

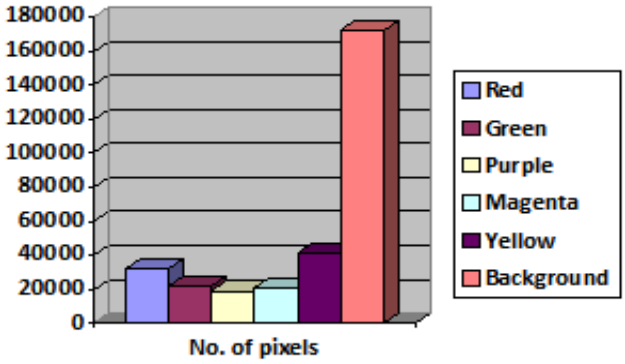

Figure 4: Number of pixels of different colors in an image

5. CONCLUSION

The proposed method summarizes the concept of image segmentation of color image by using nearest neighbor algorithm which is based on the Euclidean distance between the pixels in an image.

The theme of this paper can be used for various practical applications such as fake note detection, where it's possible to define the different color pixel values so that by applying this algorithm it's possible to identify originality of the document or any currency by considering the difference in pixel values between the original document and fake documents.

Further its important to note down the applications of the proposed method can be adopt to geographical area identification in a geographical picture received from the satellite.

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