Image Classification based on Color Space

Dr. Sharnabasappa[1]
Government Degree College (Autonomous) Kalaburagi.
smaisalgi7@gmail.com

Dr. Ambalagi Bheemashaknar[2]
Government Degree College (Autonomous) Kalaburagi.
bambalgi938@gmail.com

Abstract: **This paper presents an approach to classify the image based on the color information which is present in the image. The main objective of this paper is to identify and display the type of image along with color dominant present in that image. The proposed method comes under the computer vision, which provides the vision to identify the image and give the information about the image type.**

Keywords: Decision Tree, Image processing, Image classification, Color Image.

I. INTRODUCTION

Identifying the type of image is an easy task for a human being by seeing the image and one can easily say that the image belongs to a particular color/black and white. In the same way human may face the difficulty to identify which color may dominant in which image. Superficially humans can say that which color is dominated in given image. By using the proposed method that will statistically calculates the variance of the image and set the threshold based on the variance of an image. Then the decision tree worked on obtained results of threshold, it will check each image for variance and threshold and display color domination on the given image.

The flow of this paper is as follows; The section-I gives an Introduction part for the proposed method. Literature Survey provides information about previous works has been done in this area. Section-III describe the proposed method's working principle along with experimental results is covered in section-IV. Finally the section-V concludes the paper with the conclusion.

II. LITERATURE SURVEY

The literature survey reveals the various methods on color image classification. Dietrich Paulus et. Al[1] has provided the transformation of RGB space to RGB space color normalization. Alain Trémeau[2] has presented color images in digital representation, they have constructed the vectors based on the color intensity values. The figure-ground segmentation is proposed by F. Benedetto, G. Giunta and A. Neri[5], in which they have maximized the foreground/background color classes. The hybrid color space has been proposed in N. Vandenbroucke[6] . Hence, these literatures are motivated to propose this method.

III. PROPOSED METHOD

This method made an attempt to one of the classical problem of classifying the image based on the color. The proposed method works on basic technique that is, by using the decision tree to decide the images based on the dominance of the color. The main feature of this method is image variance among the different value with RGB (Red Green Blue) channels of each location of pixel in the image.

The main working principle of this method is to find the variance at each pixel location viz., Red channel = 30, Green Channel = 30 and Blue channel = 30 then variance is zero which gives a gray scale or else Black and White.

This method estimates the gray and dark pixels number. Like this, to count the total number of white or light pixels can be estimated. If the difference ratio between these is same then it will say that it's a black and white image. If gray pixels more as compared to white then it will make an estimation of the variance. By the variance values map, the decision will take place that the given image is black and white or color image dominant image. In this fashion, if the white pixels are in high numbers then gray pixels variance map will calculate based on the value of variance and the decision is made weather input image is color image or white dominant image.

A. *Algorithm:*

Step 1: Start
Step 2: Read the Input image
Step 3: Calculate the Size of Input image
     Size = Size(input image)
Step 4: Compute the Variance of input image
     Var = std(input image)
Step 5: Set the threshold
     Bt = sum(var <= 14)
Step 6: Count the number of pixels below threshold
     Btr = Bt/Size
Step 7: Apply the Decision tree to check color
     Dominance based on color space
Step 8: T1 = (Img(:,:,1) < 100&Img(:,:,2) <
     100&Img(:,:,3) < 100) (Black or Gray pixels)
Step 9: T2 = (Img(:,:,1) > 150&Img(:,:,2) > 150&Img(:,:,3) > 150) (White pixels)
Step 10: Compute T1
     T1 = (sum(T1(:)) / mn)*100
Step 11: Compute T2
     T2 = (sum(T2(:)) / mn)*100
Step 12: Apply condition for medium criteria for the
     color dominant
Step 13: if((T1/T2) > 0.8 & (T1/T2) < 1.6)
Step 14: Write Image Type:Black and White Image
Step 15: elseif(T1 > T2)
Step 16 : if(Prob_BT > 0.6)
Step 17 : Write Image Type:Black Dominant Image
     Else
Step 18: Write Image Type:Color Image
Step 19: elseif(T2 > T1) (Low Criteria for the color
     dominant)
Step 20: if(Prob_BT > 0.6)
Step 21: Write Image Type:White Dominant Image
     Else
Step 22: Write Image Type:Color Image
Step 23: Stop

IV. EXPERIMENTAL RESULTS

As per best knowledge, the bench mark dataset is not available to carry out the said experiment. Hence, we have developed our own dataset created by taking images from Internet. We have carefully chosen the images which are suitable for the proposed experiment to give proper decision on input images. The images are of different size and different shapes along with color variations.

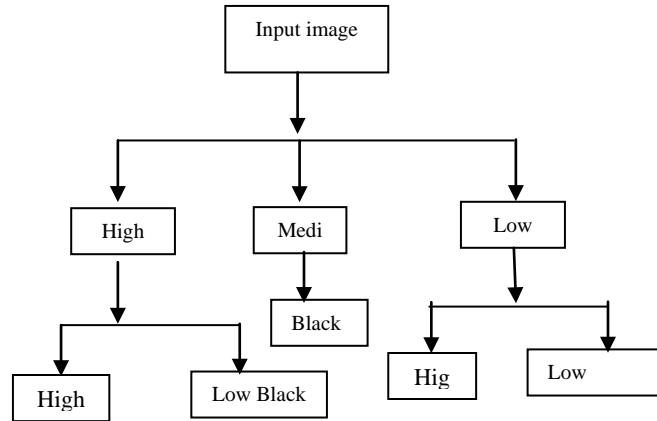Following figure shows the decision tree based on the color space.

Fig 1: Decision Tree for the input image.

Following output images are shown with the decision of domination of the colors in the images.

Image Type: Color Image

Fig 1: Color image

Image Type: Black and

White

Fig 2: Black and White image (Misclassified).

Image Type: Black Dominant

Image

Fig 3: Black Dominant Image

Image Type: White Dominant Image

Fig 4: White Dominant Image

V. CONCLUSION

This paper gives the information about the image belonging to which color based on the color space. This method utilized decision tree and calculating variance of the image. The proposed method worked good for various colors and black and white images. In the future work this experiment can be applied to some more different kinds of image.

References

[1]   Dietrich Paulus, László Csink, Heinrich   Niemann: Color Cluster Rotation, in Proceedings of International Conference on Image Processing, 1998, pp. 161-165.

[2]   Alain Trémeau: Lecture on 'Color Spaces and Digital Color', in Intensive Programme on Computer Vision 2006, Budapest, Hungary, August 21- September 1, 2006.

[3]   M. Swain and D. Ballard, "Indexing via color histograms," International Journal of Computer Vision, Vol. 7, pp. 11–32, 1991.

[4]   J. C. Platt, N. Cristianini, and J. Shawe-Taylor, "Largemargin DAG's for multiclass classification", Advances in Neural Information   Processing Systems, Cambridge, MA: MIT Press, vol.12, pp. 547-553, 2000.

[5]   F. Benedetto, G. Giunta and A. Neri, "A new color space domain for digital watermarking in multimedia applications". Proceedings of IEEE, International Conference on Image Processing, Vol. 1, pp. 249-252, 2005

[6]   N. Vandenbroucke, L. Macaire and J.G. Postaire, "Color image segmentation by pixel classification in an adapted hybrid color space: application to soccer image analysis", Computer Vision and Image Understanding, Vol.90, Issue 2, pp 190- 216, 2003.

[7]   D-Y. Tzeng and R. S. Berns, "A review of principal component analysis and its applications to color technology", Color Research and Applications,Vol. 30, pp 84-98, 2005.

[8]   M. Vrhel, E. Saber, and H.J. Trussell, "Color image generation and display technologies,'' IEEE Signal Processing Mag., vol. 22, no. 1,   pp. 23–33, Jan. 2005.

[9]   F.A. Baqai, J.-H. Lee, A.U. Agar, and J.P.   Allebach, "Digital color halftoning,'' IEEE Signal Processing Mag., vol. 22, no. 1, pp. 87– 96, Jan.2005.

[10]   A. Koschan and M. Abidi, "Detection and classification of edges in color images,'' IEEE Signal Processing Mag., vol. 22, no. 1, pp. 64–73, Jan. 2005.