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An Approach of Colour Based Image Segmentation Technique for Differentiate Objects using MATLAB Simulation

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Abstract: Digital Processing techniques help in manipulation of the digital images by using computers. As raw data from imaging sensors from satellite platform contains deficiencies. To get over such flaws and to get originality of information, it has to undergo various phases of processing. The three general phases that all types of data have to undergo while using digital technique are Pre- processing, enhancement and display, information extraction. The proposed work has been explained the concept of the Image Segmentation means to analysis of Images based on the colour Features. The analysis of the different objects and differentiate it can be implement using image segmentation process. The proposed work has been implemented in the MATLAB Simulation Tool and results has been generated on the different image datasets and correspondingly PSNR performance parameters has been calculated shows the accuracy.

Keywords: Image Processing, Segmentation, Computer Vision.

I. INTRODUCTION

Image processing is a method to perform some operations on an image, in order to get an enhanced image or to extract some useful information from it. It is a type of signal processing in which input is an image and output may be image or characteristics/features associated with that image. Nowadays, image processing is among rapidly growing technologies. It forms core research area within engineering and computer science disciplines too. Image processing basically includes the following three steps:

a. Importing the image via image acquisition tools
b. Analysing and manipulating the image;
c. Output in which result can be altered image or report that is based on image analysis.

There are two types of methods used for image processing namely, analogue and digital image processing. Analogue image processing can be used for the hard copies like printouts and photographs. Image analysts use various fundamentals of interpretation while using these visual techniques. Digital image processing techniques help in manipulation of the digital images by using computers.

The three general phases that all types of data have to undergo while using digital technique are pre-processing, enhancement, and display, information extraction. Computer vision deals with developing a system in which the input is an image and the output is some information. For example: Developing a system that scans human face and opens any kind of lock. This system would look something like this.

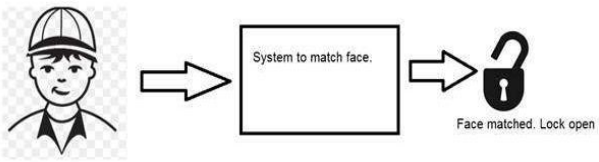

Figure 1: Example of Image Processing

Segmentation partitions an image into distinct regions containing each pixels with similar attributes. The latter take no account of spatial relationships between features in an image and group pixels together on the basis of some global attribute, e.g. grey level or color. Contextual techniques additionally exploit these relationships, e.g. group together pixels with similar grey levels and close spatial locations.

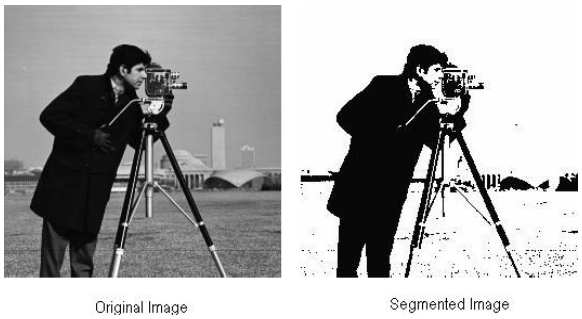

Figure 2: Image Segmentation

Color segmentation may be more accurate because of more information at the pixel level comparing to grayscale images. The standard Red-Green-Blue (RGB) color

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representation has strongly interrelated color components, and a number of other color systems have been designed in order to exclude redundancy, determine actual object / background colors irrespectively of illumination, and obtain more stable segmentation.

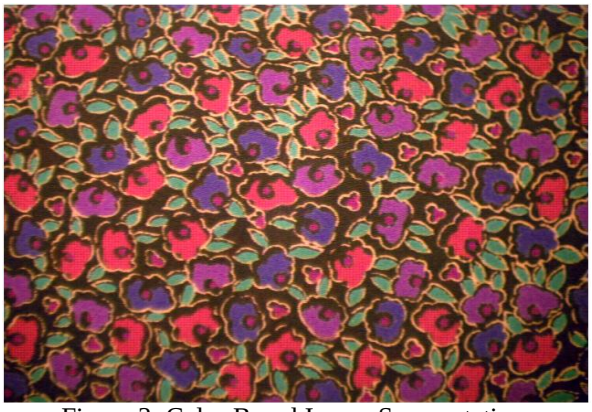

Figure 3: Color Based Image Segmentation

An example shows that color thresholding can focus on an object of interest much better than its grayscale analogue. The RGB Color space distance thresholds are specified for the R, G, and B components.

Applications

1. Intelligent Transportation Systems – This technique can be used in Automatic number plate recognition and Traffic sign recognition.
2. Remote Sensing – For this application, sensors capture the pictures of the earth's surface in remote sensing satellites or multi – spectral scanner which is mounted on an aircraft. These pictures are processed by transmitting it to the Earth station. Techniques used to interpret the objects and regions are used in flood control, city planning, resource mobilization, agricultural production monitoring, etc.
3. Moving object tracking – This application enables to measure motion parameters and acquire visual record of the moving object. The different types of approach to track an object are Motion based tracking and Recognition based tracking.

II. LITERATURE REVIEW

Color image segmentation algorithms are proposed based on granular computing clustering (GrCC). Firstly, the atomic hyperspherical granule is represented as the vector including the RGB value of pixel of color image and radii 0. Secondly, the union operator of two hyperspherical granules is designed to obtain the larger hyperspherical granule compared with these two hyperspherical granules. Thirdly, the granular computing clustering is developed by the union operator and the user-defined granularity threshold. Global Consistency Error (GCE), Variation of Information (VI), Rand Index (RI), and Loss Entropy (ΔEn) are used to evaluate the segmentations. Segmentations of the color images selected from internet and BSD300 show that segmentations by GrCC speed up the segmentation process and achieve the better segmentation performance compared with Kmeans and FCM segmentations [1]. Color image segmentation is a very emerging topic for image processing research. Since it has the ability to present the result in a way that is much more close to the human eyes perceive, so today's more research is going on this area. Choosing a proper color space is a very important issue for color image segmentation process. Generally L*A*B* and HSV are the two frequently chosen color spaces. In this paper a comparative analysis is performed between these two color spaces with respect to color image segmentation. For measuring their performance, we consider the parameters: mse and psnr. It is found that HSV color space is performing better than L*A*B* [2]

In computer vision, image segmentation is always selected as a major research topic by researchers. Due to its vital rule in image processing, there always arises the need of a better image segmentation method. Clustering is an unsupervised study with its application in almost every field of science and engineering. Many researchers used clustering in image segmentation process. But still there requires improvement of such approaches. In this paper, a novel approach for clustering based image segmentation is proposed. Here, we give importance on color space and choose l*a*b* for this task. The famous hard clustering algorithm K-means is used, but as its performance is dependent on choosing a proper distance measure, so, we go for "cosine" distance measure. Then the segmented image is filtered with sobel filter. The filtered image is analyzed with marker watershed algorithm to have the final segmented result of our original image. The MSE and PSNR values are evaluated to observe the performance [3]

Color image segmentation is a very emerging topic in current image processing research. An optimal technique for the same is always sought by the researchers of this field. In this paper, an efficient approach for color image segmentation is proposed. Here, the input color image is first converted from RGB to HSV color space. The V channel of the HSV converted image is extracted and normalized between 0 and 1. Then this normalized V channel is sent as input to Fuzzy C Means (FCM) algorithm. The fuzzy segmented image is then thresholded with Otsu's method. The thresholded image is then filtered by sobel filter and sent as input to the Meyer's watershed algorithm. This produces the final segmented image of the original color image. The proposed approach is found very efficient after analyzing and comparing the results with previously existed watershed algorithm in terms of the MSE and PSNR values [4] Finding an efficient approach for color image segmentation is always sought by the researchers in the color image processing research. We have different clustering based and region based methods for the same. But still there arises the requirement of an optimal method. In this paper, a new approach for color image segmentation is proposed. Here the segmentation is carried out on the L channel of LAB color space. The input color image is first converted from RGB to LAB. Then L channel is extracted from the LAB converted

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image and sent as input to FCM algorithm. After this initial segmentation, the segmented image is filtered by sobel filter. The filtered image is then segmented by Meyer's Watershed algorithm to produce the final segmented image of the original image. The results of the proposed approach are found efficient when the same are analyzed in terms of MSE and PSNR. Also the segmented images are found free from over segmentation [5].

III. OBJECTIVES

The aim of this thesis is to develop segmentation methods for Colored imaging applications. The problem of segmentation is difficult because of image texture. If an image contains only homogeneous color regions, clustering methods in color space5 are sufficient to handle the problem. In reality, natural scenes are rich in color and texture. It is difficult to identify image regions containing color-texture patterns. Each region in the image contains a uniformly distributed color-texture pattern. The color information in each image region can be represented by a few quantized colors, which is true for most color images of natural scenes. The colors between two neighboring regions are distinguishable. To fulfil the problem and maintain the accuracy, we need to follow the following objectives:

1. To analyse and differentiate image using Color Based Image Segmentation Techniques.
2. To Implement the Improved Algorithm in Simulation Tool.
3. To improve accuracy by choose right type of filters in algorithm.
4. To Implement designed algorithm.
5. To generate the outputs using performance parameters such as PSNR.
6 To Generate Graphs.

IV. PROPOSED METHODOLOGY

1. To understand general problem of detecting linear structure.
2. To analyze techniques of image segmentation
3. Study the Techniques for Improving segmentation and Color Based Image Grouping.
4. Identify the problems in existing techniques and Methods.
5. Design an efficient technique to improve Color and Pixels Based Image Segmentation.
6. Develop the Algorithm in any programming language to demonstrate the real scenario.
7. Analyze the Results.

A flowchart is a type of diagram that represents an algorithm, workflow or process, showing the steps as boxes of various kinds, and their order by connecting them with arrows. This diagrammatic representation illustrates a solution model to a given problem. Flowcharts are used in analyzing, designing, documenting or managing a process or program in various fields.

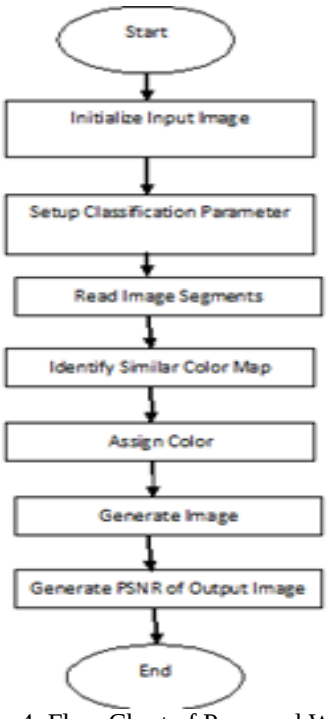

Figure 4: Flow Chart of Proposed Work

V. RESULTS AND DISCUSSION

The image has been collected for generate the color maps and cluster the similar regions. The flow chart explains the steps which have been followed up for generate the results. The above given steps have been implemented sequentially so that we can understand the concepts already implemented, the tools which are used, the inbuilt functions of MATLAB which are available and we have used them in our algorithm for implementation. The color segmentation process is been implemented by using the steps: 1. The first step is image capturing and taken as Input. 2. Read the Color from an Image. 3. Calculate the different values which include the Pixel Colors, Color Clusters and generate the results.


Figure 5: Input 1

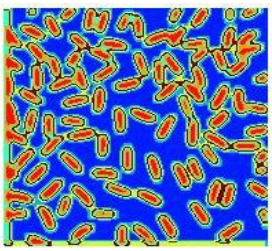
Figure6: Output 1

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Figure 7: Input 2

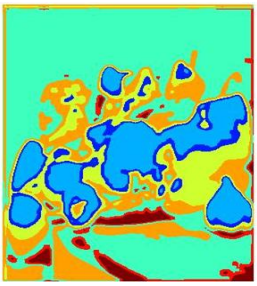

Figure 3: Output 2

The Profile of Input and output Images are explained as:

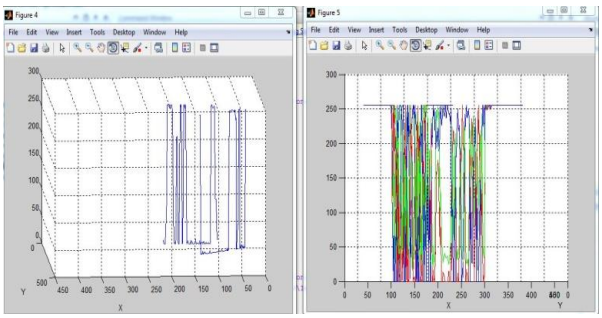

Figure 4: Pixel Color of Input-Output 1

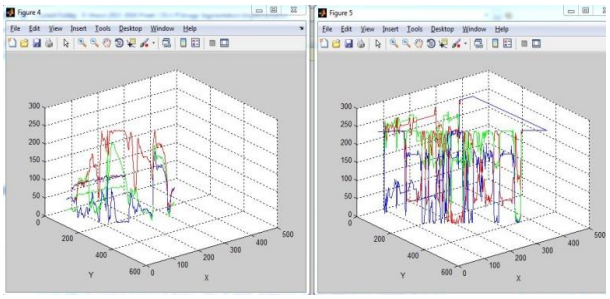

Figure 5: Pixel Color of Input-Output 2

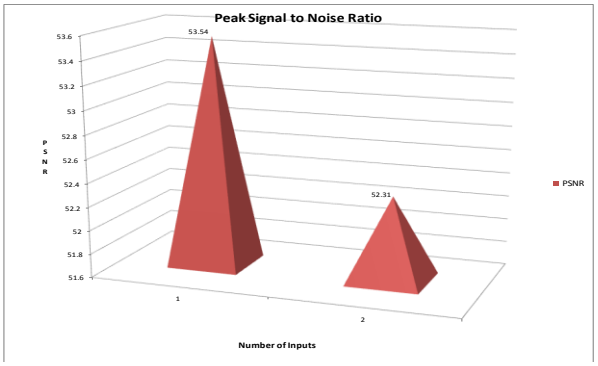

Figure 11: PSNR Values

VI. CONCLUSION AND FUTURE WORK

In this paper, the Color based Image Segmentation methodology has been used for partition the colors in the segments. Segmentation partitions an image into distinct regions containing each pixels with similar attributes. To be meaningful and useful for image analysis and interpretation, the regions should strongly relate to depicted objects or features of interest. Meaningful segmentation is the first step from low-level image processing transforming a greyscale or color image into one or more other images to high-level image description in terms of features, objects, and scenes. The research work has been implemented the color based segmentation technique which classify the input image into different segments and assign the different colors to identify the different regions. The images pixel values has also been generated to view the image profile and multi color which explains the segments and segmented portions shows differently. The PSNR values have been calculated of the images and generated output and accurate in terms of segments.

In Future, the Noise Filtration techniques can be embed with the Segmentation techniques to improve the results and segments.

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