

Study of Various Segmentation Techniques and their Comparison

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Abstract— There are several segmentation algorithms that are applied in science and daily life. Practically, we cannot process the whole image for some applications such as compression and recognition. Firstly the image can be segmented. Image segmentation is method in which image is divided into several regions according to the pixels value or frequency.

I. INTRODUCTION

The segmentation is a process of subdivision of image into several regions and objects. Segmentation is based on two major aspects i.e. discontinuity and similarity. In the first case the image is divided on the basis of changes in intensity such as edges and in second the segmentation is carried out by dividing the image into similar regions according to some predefined criteria such as region growing, splitting and merging. Accuracy of the segmentation algorithm is carried out by the success and failure of the algorithm applied. This paper organized as follows: Section I represents the Introduction part, section II presents the various segmentation techniques. Section III explains the comparison of segmentation techniques and Section IV concludes the conclusion.

II. VARIOUS SEGMENTATION TECHNIQUES

(a) Histogram Normalization

This technique is very efficient technique because it requires only one pass through the pixels. To locate the clusters in the image the peaks and valleys are used and to compute the histogram from the image. Histogram normalization is adapted on different frames and in different fashion on each frame.

- Identify significant peaks and valleys in the image.
- Histogram-based approaches can also be quickly adapted to occur over multiple frames.

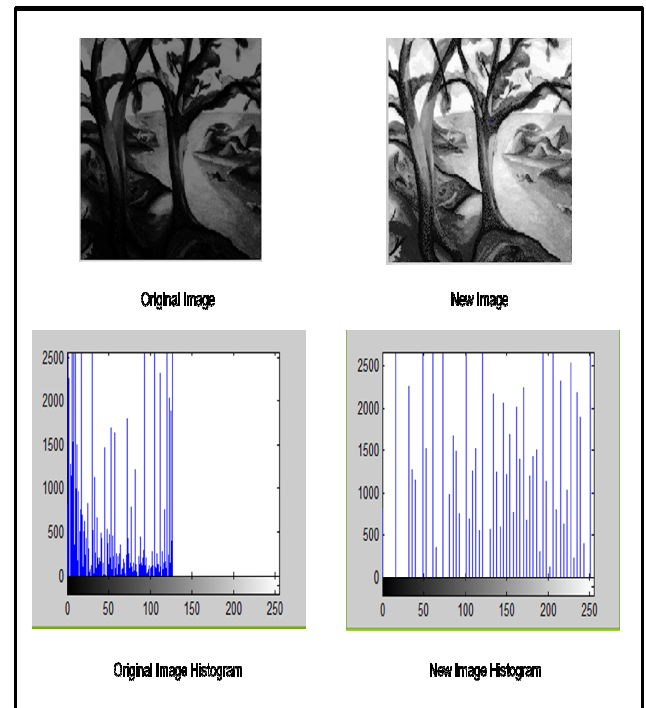


Fig.1 Comparison of Image after Histogram Normalization

(b) Edge Detection Method

Edge detection is a method to differentiate object and background of an image. An edge is the boundary between the background and the object. To find where the object can be located, firstly the edges of an image is identified accurately. The two terms, edge detection and edge enhancement are used which means Locating the edge pixels is called as edge detection and edge enhancement is the process of adjusting the contrast to differentiate the edge from the background of the image.

- There is often a sharp adjustment in intensity at the region boundary
- As an edge pixel is that which is near to the boundary between an object and the background, or between two objects.

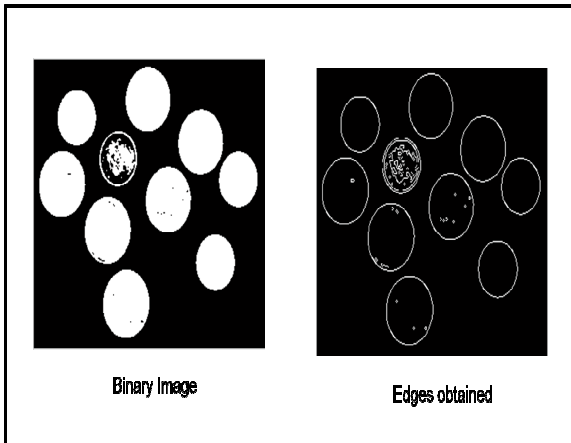


Fig.2. Results of edge detection.

(c) Split And Merge Method

The split and merge algorithm is based on the partition of an image. There are two phases of this technique are split and merge phases. In first phase we can split an image in four regions and so on. In the second phase, it can check the two neighbor regions if they are same pixel value then merge both the regions. This merging process is done until there is no more changes are required. Split and merge algorithm may generate the bloky segments so the computational time will be increased.

- Method start from the root of the image
- Split into four and so on regions
- Merge the same regions



Fig. 3 Representation showing splitting and then merging

(d) Region Growing Method

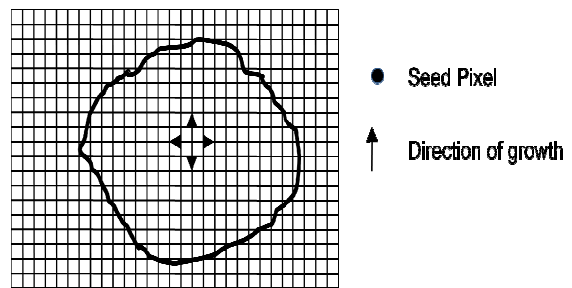
Region growing method used a common procedure to compare neighbors pixels. A pixel is classified from the image and the gray value of that object pixel is compared with the neighboring pixels. This method assume that the

neighboring pixels contains the same value within one region. After comparing, the pixels which satisfied the same criteria they are set close to eachother. The result of this technique is more affected from the noise.

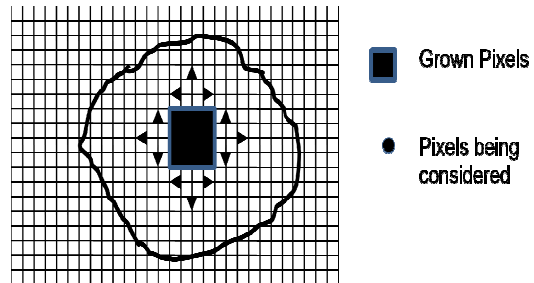
- This method takes a set of seeds as input along with the image
- The seeds mark each of the objects to be segmented

The region growing method is divided into various techniques but two of them are:-

- Seeded Region Growing Method
- Unseeded Region Growing Method



(a) Start of Growing A Region



(b) Growing Process after a few iterations

Fig. 4 Pixels traversal during region growing.

(e) SEEDED REGION GROWING METHOD Seeded region growing method is based on the the segmentation of an image while examining the neighboring pixels as a set of points, known as seed points and then deciding whether the pixels can be classified to cluster of seed point or not. In this method the pixels with the similar property make a region. The steps are as follows:

- For segmentation finding a seed point as a starting point
- Merging of same or similar property of pixel with the seed pixel

- Now the new pixels will act as a new seed pixel to make above process continue until no more pixels that satisfy the condition.

(f) UNSEEDED REGION GROWING METHOD

This algorithm is same as seeded region growing method i.e. in each iteration it consider the neighboring pixels but it is a modified algorithm because it does not required an explicit seeds.

III. COMPERISSION OF SEGMENTATION TECHNIQUES

The histogram normalization technique is very efficient technique. It can be adapted on different frames in different manners. But the histogram normalization has a disadvantage to identify the significant peaks and valleys in the image

The edge detection method is used as the base of other segmentation techniques. Regions and edge boundaries are closely related to each other and there is a sharp adjustment in intensity at the boundary of region. Edge detection method has also a disadvantage i.e. the edges identified in this are disconnected. For segmentation of an image one needs closed region boundaries.

The split and merge algorithm is based on the partition of an image. There are two phases of this technique are split and merge phases. This merging process is done until there is no more changes are required. The disadvantage of Split and merge algorithm, it may generate the bloky segments so the computational time will be increased.

The region growing method is assumption of the neighboring pixels with the same value with in a region. One pixel is compared with their neighboring pixel and set closed to the similar value pixel. It has also a disadvantage i.e. noise which is disturb in all instances. But this problem is also remove by using mask to filter the holes. Then the problem of noise is actually removed. So we can say that it perform well with respect to the noise. The region growing method is very easy and simple method to implement. It works well in different lightning and camera hardware conditions for skin detection and give good response. We can choose the multiple criteria at same time. It provides the original image with clear edges with good segmentation result. This method separates the correct region with the same property we define.

IV. CONCLUSION

In the present world, the computer application is spread in each field i.e. remote sensing, medical, electronic and so on. It is very important to find out a appropriate segmentation technique based on your application and an appropriate

inputted image. So Image segmentation is very important task in this. It depend upon gray scale, color model and text of inputted image. To find an appropriate segmentation technique it depend upon the accuracy of the technique and good result.

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