A SURVEY ON DIFFERENT IMAGE SEGMENTATION TECHNIQUES

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ABSTRACT

The Image processing is a procedure of converting an image into digital form and carry out some operation on it, in order to get an improved image and take out several helpful information from it. Due to the advent of computer technology image-processing techniques have become increasingly important in a wide variety of applications. Digital image processing has a wide range of applications such as remote sensing, image and data storage for transmission in business Applications, Medical Imaging, Acoustic Imaging, Jurisprudence and industrial automation. Images purchased from satellites are useful in tracking ground resources, geographic mapping and prediction of arable crops, urban populations, weather prediction, flood and fire protection. Image segmentation is an important step of image processing and also is a hotspot and used in image processing techniques. Several algorithms for image segmentation have been developed, but no general solution is available for the image segmentation problem, therefore some techniques often have to be combined in order to effectively solve an image segmentation problem for a problem domain. This paper presents a comparative study of different image segmentation techniques.

1 INTRODUCTION:

Image segmentation is the essential step in image processing and pattern recognition. It is one of the important components of image analysis system. Being one of the most difficult tasks in image processing, and determines the quality of the final result of analysis. In image processing, image segmentation is a phase which separates the background from foreground, so that ROI(Region of interest) can be separate from its background. Image segmentation methods can be categorized as follows:

• Histogram thresholding: In this method it is assumed that images are composed of regions with different gray (or color) scales, and separates it into a number of peaks, each corresponding to one region.

• Edge-based approaches: In this methods edge detection operators such as Sobel, Laplacian for example. Resulting regions

may not be connected, hence edges need to be joined.

• Region-based approaches: This method is based on similarity of region based image data.

Some popular and widely used approaches are: Thresholding, Clustering, Region growing, Splitting and merging.

• Hybrid: consider both edges and regions

2 BROAD LITERATURE SURVEY:

One of the important techniques for image segmentation is the thresholding technique. This technique deals with the pixel value of an image, such as grey level, color level, texture, to name a few. In this technique, Bhattacharyya et. al has presumed that the adjacent pixel values lying within a certain range belong to the same class . The main objective of this technique is to determine the threshold value of an image. The pixels whose intensity values exceed the threshold value are assigned in one segment and the remaining to the other.

Raju et. al designed and implemented an image segmentation method based on region-growing techniques. The algorithm has been implemented in C, and the program is run through a Mat lab interface. Authors supposed that an image f(x,y) is associated with the gray-level histogram an image, composed of dark objects in a light background, in such a way that object and background pixels have gray levels grouped into two dominant modes. One obvious way to extract the objects from the background is to select a threshold 'T' that separates these modes. If f(x,y)>T for any point(x,y),then it is called an object point, otherwise, the point is called a background point.

Example:

Bimodal – Histogram

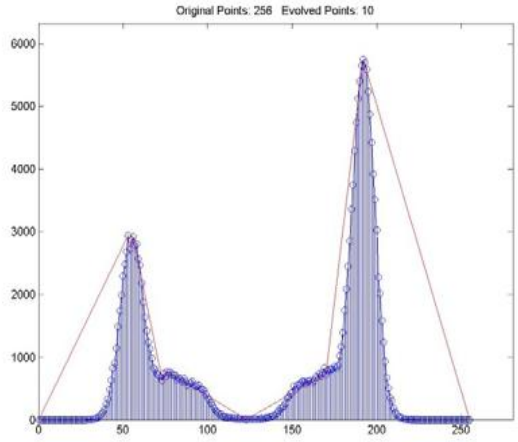

Fig1 : Image histogram of rice

If two dominant modes characterize the image histogram, it is called a bimodal histogram (fig1). Only one threshold is enough for partitioning the image. Using image histogram we can characterize three

or more dominant modes if the image is of light color in dark background.

Gray Scale Image

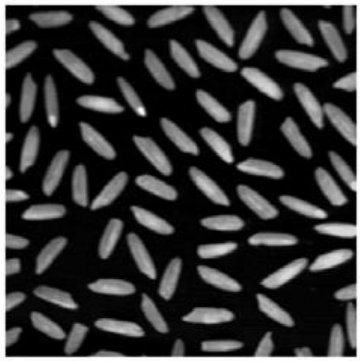

Fig2: Image of rice with black background

Segmented Image

Fig3: Image after segmentation

A modified segmentation method has been described by the Lalaouni et.al. They applied it to images and developed an EM algorithm to estimate parameters of the Gaussian mixtures. There are various useful applications such as multimedia, image processing in which researchers are focusing the use of expectation of maximization (EM), pattern recognition and bioinformatics. The visual system of human mostly interpret images correctly that are of high quality as well as those images that contains insufficient information to do so.. Due to variable brain structures, the difficulty is mainly with various MRI artifacts and restrictive body scanning methods. For comparing and evaluating the proposed methods, the IBSR image segmentation data set is used. In this paper

A modified expectation of maximization (MEM) based on the properties of likelihood method has been proposed, which can be used for reducing number of iteration for fast convergence to the center of cluster and application to image segmentation. The experiments on real images show that:

(1) The proposed approach can reduce the number of iterations, which leads to a significant reduction in the computational cost while attaining similar levels of accuracy.

(2)The approach also works well when applied to image segmentation.

Authors have proposed a methodology for calculate is presented for making use the error between the ground truth, human-segmented image data sets to compare, develop and optimize image segmentation algorithms. The error calculated depends on how a segmented image and a ground-truth (reference) image is compared object by object. Experimental results for segmented images demonstrate

the good segmentation performance of the proposed approach.

In this paper, authors have proposed a new region-based modified MEM algorithm for region image segmentation. This method utilizes an astute to minimize the number of iteration to converge quickly a center a low time for segmented the image. The results of this paper prove that we can have good segmentation results by applying the MEM clustering method to real and synthetic images. The major contribution of the new approach is based on minimization the number of iteration and the execution time. The results from the segmentation algorithms are compared to the ground truth. Experimental results demonstrate desirable performance of our method for brain real MR and synthetic images with intensity in homogeneity. Additionally, it is robust to initialization, allowing fully automated applications. The results show that, MS and MEM methods are better than the others in segmentation image, which imply the best criteria are SSIM and Martin with lower degree of two others criterion. In future, we propose to test this method on color images in RGB and YUV spaces as well as on videos.

Soft Computing is an emerging technique to computing which tries to achieve the remarkable ability of human mind to reason and learn in an environment of uncertainty and imprecision. Soft computing techniques have found wide applications. One of the most important applications is edge detection for image segmentation. Image segmentation is basically a process of partitioning an image into multiple regions or set of pixels. A boundary between two homogeneous regions is called the edge. With the help of Edge detection techniques one can identify and locate the sharp discontinuities in an image. In Different soft computing approach based on artificial neural network, genetic algorithm and fuzzy logic of edge detection for image segmentation have been surveyed by Senthilkumaran & Rajesh. Authors have found three most frequently used edge detection methods are used for comparison. These are

(1) Roberts Edge Detection,

(2) Sobel Edge Detection and

(3) Prewitt edge detection

3 CONCLUSIONS:

In this survey paper, in-depth reviews on recent efforts dedicated to image segmentation and how it can be used in image identification has been done. Some of them are soft computing approaches and some of them are classical approaches that can be is applied on a real life example image of nature scene and the results show the efficiency of image segmentation. The process of segmenting an image is found be very useful in identification of objects.

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