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A Brief Review of Image Segmentation Based on Thresholding Technique

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Abstract: Image processing plays an important role in computer vision. The process of image segmentation provides the partition of image into different segments per their feature attribute. Image segmentation divided into two types based on similarity and based on discontinuity. Region based segmentation is a type similarity based segmentation. Another type of segmentation is called thresholding based segmentation. In thresholding based segmentation method some thresholding techniques are used. Moreover, technologies required for one field of image may not suitable for other types of image. Many image applications can be found on binary or gray image but almost none for color image segmentation. In this paper, we present the study of various image segmentation techniques.

Keywords: - segmentation, thresholding, image, pixel.

I. INTRODUCTION

In computer science, image processing is any kind of signal processing for which the input is an image, such as photographs or frames of video; the output of image processing can be an image. It can also be a set of characteristics or a set of image related parameters [1]. Image-processing techniques mostly involves treating the image as a two-dimensional signal and it constitutes applying various signal-processing techniques to the image. Image processing includes different forms of information processing where the input is an image. Image processing techniques are mostly derived from the signal processing techniques application in the domain of images, such as pictures or videos [2].

An image is considered as a two dimensional function, $f(x, y)$ where x and y are spatial (plane) coordinates, and the magnitude f at any pair (x, y) is called the gray level of the image or intensity at that point. When (x, y) coordinates and intensity values of f are finite terms and discrete quantities the the image is a Digital Image [3].

Gray scale image have 0-255 range of color. Histogram is a gray scale image. Histogram is a graphical [4] representation of an image which show the number of times each gray level occurs.

The name image processing is suitable when images are outputs and inputs. When arbitrary information is extracted from images, it is considered as the domain of image processing, which includes pattern recognizing in techniques [6] and patterns to be identified are in images. In Computer science we want to extract more abstract information, such as the 3D properties of a picture from the video clip . The techniques of image processing are also vital to image synthesis from more abstract information, which are studied in computer graphics.

For processing of an image, we use more method like image segmentation, image enhancement, image de-noising, morphologic operation [7]. Segmentation refers to the mechanism of partitioning a an image(digital) into multiple segments (set of pixels as known as super pixels), the target of image segmentation is to generalize and or change the presentation of a digital image into meaningful information.

Image processing area is developing faster theoretically rather than actual point of view. The devices are available at a very bigger scale and the chip technology also increasing so it creates the requirement to improve the color image segmentation to make its execution faster. Segmentation scheme now a day's lacks in some fields i.e. no sensitivity to grey level difference, color image information in darken image is unreliable, no common method for processing. It has a large number of criteria to fulfill in color processing that include image segmentation, fusion, compression, recognition and many other. We will introduce image segmentation scheme for images that deals with automatic thresholding and color model based segmentation. Thresholding is the first-stage processing for image segmentation.

The rest of paper discuss as in section 2 discuss the Related Work. In section 3 discuss the Prediction model. In section 4 discuss problem statement. finally discuss conclusion & future work in section 5.

International Journal for Research in Applied Science & Engineering Technology (IJRASET)

II. RELATED WORK

In this section we describe the literature survey titled with their author name and given references number respectively.

V. Sivakumar, V.Murugesh Et. Al. [1] In this paper an effort to review Image Segmentation using Thresholding Technique on a picture corrupted by Gaussian Noise as well as Salt and Pepper Noise is conducted. It is enforced using MATLAB software and the results obtained are studied and thereby mentioned, highlighting the techniques performance. The algorithm is demonstrated through the segmentation of color images. The classification accuracy of the proposed method is evaluated and a comparative study versus existing techniques is presented. The experiments were conducted on an extensive set of color images. Satisfactory segmentation results have been obtained showing the effectiveness and superiority of the proposed method.

Ashish Issac, M. Parthasarathi, Malay Kishore DuttaEt. Al. [2] ,In this paper presents an image processing technique for segmentation of optic disc and cup based on adaptive thresholding using features from the image. The proposed algorithm uses the features obtained from the image, such as mean and standard deviation, to remove information from the red and green channel of a fundus image and obtain an image which contains only the optic nerve head region in both the channels. The optic disc is segmented from the red channel and optic cup from the green channel respectively. The threshold is determined from the smoothed histogram of the preprocessed image.

Sanjay Agrawal, Rutuparna Panda and Lingraj Dora Et.Al. [3] In this research presents a novel technique of intracranial segmentation of magnetic resonance (MR) brain image pertaining to pixel intensity values by optimum boundary point detection by values (OBPD) method. The recently proposed (OBPD) method comprises of three steps. Firstly, the brain only part is retrieved from the full MRbrain image. The brain single portion primarily contains three regions–gray matter (GM), white matter (WM) and cerebrospinal fluid (CSF). They need two boundary points to classify the brain pixels in the three regions based on their intensity values. Secondly, the finally optimum boundary points are obtained using the newly proposed hybrid GA–BFO algorithm to get final cluster centers of FCM technique.

Pedram Ghamisi, Micael S. Couceiro, Mathieu Fauvel and Jon Atli Benediktsson Et.Al. [4] this paper a new spectral–spatial algorithm for classification of hyperspectral images is defined. The proposed approach is based on two segmentation methods, fractional-order Darwinian particle swarm optimization and mean shift segmentation. The output of these two methods is classified by support vector machines. Experimental results indicate that the integration of the two segmentation methods can overcome the drawbacks of each other and increase the overall accuracy in classification.

Xiaofang Wang, Yuxing Tang, Simon Masnou, and Liming Chen Et.Al. [5] In this paper author described construction of a reliable graph capturing perceptual grouping cues of an image is fundamental for graphcut based image segmentation methods. In this paper, they propose a novel sparse global/local affinity graph over superpixels of an input image to capture both short- and long-range grouping cues, and thereby enabling perceptual grouping laws, including proximity, similarity, continuity, and to enter in action through a suitable graph-cut algorithm. Moreover, they also evaluate three major visual features, namely, color, texture, and shape, for their effectiveness in perceptual segmentation and propose a simple graph fusion scheme to implement some recent findings from psychophysics, which suggest combining these visual features with different emphases for perceptual grouping.

Deepak Gambhir and Meenu Manchanda Et.Al. [6] In this paper an automatic segmentation and color feature based video object tracking algorithm has been proposed. The proposed algorithm automatically segments the moving object in video by creating a multiplicative mask, which contains reduced number of shadowed pixels, noisy pixels and false pixels. The segmented object can be tracked by extracting its features such as color. Once the object to be tracked is segmented and its feature extracted, the position of the moving object is predicted using Kalman filter which is an optimal recursive estimator.

Dibya Jyoti Bora, Dr. Anil Kumar Gupta Et.Al. [7] In this research Image processing is an vital most interesting research area in computer vision. Image segmentation executes the vital rule in image processing research. There exist thousands methods for image segmentation. Clustering is an unsupervised field of computer science. Clustering can also be required for image segmentation. In this research, an in-depth field research is done on different clustering. In this paper, study is done to observe the utilization of clustering algorithms in image segmentation task.

International Journal for Research in Applied Science & Engineering Technology (IJRASET)

Dibya yoti Bora, Anil Kumar Gupta and Fayaz Ahmad Khan Et.Al. [8] In this research technique the authors discussed color image segmentation is a very promising topic for image segmentation research. Since it has the ability to give the result in a technique that is much close to the what a human being eye can perceive, so today's more research is going through this area. Choosing a proper color space is a very vital for color image segmentation technique.

K. Bhargavi and S. Jyothi Et.Al. [9] In this paper describes the study of the threshold techniques in image segmentation. Image segmentation is one of the important approaches of the digital image processing. Image segmentation is used widely in many applications. Several general purpose algorithms and techniques have been developed for image segmentation. Segmentation applications are involving detection, recognition and measurement of features. The purpose of image segmentation is to partition an image into meaningful regions with respect to a particular application.

Kamal A. ElDahshan, Mohammed I. Youssef, Emad H. Masameer and Mohammed A. Mustafa Et.Al.[10] In these paper the color segmentation for acute lymphoblastic leukemia image is apply to segment each leukemia image into two clearly defined regions: blasts and background. The ALL segmentation process is based on hue channel (H) of HSV color space as a method in segmentation of WBC from its complicated background. This work presents an efficient framework for segmentation of ALL images on a reconfigurable logic platform using Simulink, MATLAB and Xilinx System Generator (XSG).

Jay Patel and Kaushal Doshi Et.Al. [11] In this paper described the Segmentation is a vital role in medical image processing, where clustering technique widely used in medical application particularly for brain tumor detection in magnetic resonance imaging (MRI). They use MRI because of it is provide accurate visualize of anatomical structure of tissues. In this paper, various clustering methods that have been used for segmentation in MRI are reviewed. Image processing plays vital role in today's world. Now a day the applications of image processing can be found in areas like electronics, remote sensing, bio-medical and so on.

III. GENETIC ALGORITHM APPROACH

Basically, a genetic algorithm comprises of three important operations: selection, crossover, and mutation. The selection evaluates every individual and keeps only the fittest of them in the population. In addition to those best individuals, some less fit which could be selected for to a small probability [8]. The others are removed from the population we have. The crossover merges two individuals to have new ones which could be better. The mutation operator induces differences in a small number of chromosomes units [9]. Its actual motive is to maintain the population diversified much during the optimization technique. Image segmentation targets at partitioning an image into homogeneous sub parts. High number of segmentation method are all we have in the literature to segment images pertaining to various criteria such as for example grey level, colour, or texture. This job is not easy and almost important, since the output of an image segmentation algorithm can be considered as input to higher-level processing jobs, such as model-focussed object recognition systems. Many general pattern recognition applications of this respective paradigm can also be found in. A rest reason (among others) for using this variety of approach is mainly related with the GA ability to deal with large, complex search spaces in situations where only minimum knowledge is available about the objective function [10]. For instance, these led Bhanu et al. to adopt a GA to determine the parameter set that optimise the output of an available segmentation algorithm under various situations of image acquisition and is namely Phoenix segmentation algorithm [1].

IV. PROBLEM STATEMENT

Image segmentation is an important process of computer vision and pattern recognition. The applicability of computer vision and pattern recognition is increase day to day in the field of medical science and remote sensing. Now the requirement of image segmentation process is increases. Initially the segmentation process performs by clustering technique such as k-means but afterwards, various authors proposed various techniques for image segmentation. The process of image segmentation compromised the dissertations of data and noise impact. For the reduction of noise and distorted area various soft computing and neural network approaches were used. The segmentation techniques are differentiated as edge based, region based and graph based segmentation technique. Some problem mention below related to image segmentation. Segmentation is performed using thresholding and result is compared for global thresholding and local thresholding.

V. CONCLUSION AND FUTURE WORK

Image segmentation is the fundamental approach for digital image processing. In image processing segmentation is the first step to

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preprocess the images to extract the objects and make it easier to analyze. It is used to separate the foreground from the background to change the representation of an image into meaningful one. The main aim of segmenting an image is to enhance the quality and suitability for presenting the image. The process of image segmentation provides the partition of image into different segment according to their feature attribute. Thresholding is the simplest method of image segmentation. The local thresholding technique used region based segmentation process and used multiple thresholds for the process of segmentation. In this paper we focus on the different image segmentation techniques.

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