SURVEY ON: IMAGE SEGMENTATION USING REGION BASED ALGORITHMS

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ABSTRACT

The goal of image segmentation is to partition an image into certain number of pieces that have coherent features and to group the meaningful pieces together. Human interactions involved in segmentation should be as less as possible hence to overcome with the disadvantages of image segmentation some techniques were developed which will provide better result of image segmentation. We compared some papers out of which fast interactive image segmentation to locate multiple similar colored objects is found better than other methods.
Key Words: L0 Smoothening Filter

I. INTRODUCTION

Images are considered as one of the most important medium of conveying information, in the field of computer vision by understanding images the information extracted from them can be used for other task for example navigation of robots, finding injurious tissues from body scans, detection of cancerous cells, and identification of an airport from remote sensing data. Hence their is strong need of methods which will provide to extract information from the images. Image segmentation is the process of separating or grouping an image into different parts. These parts normally correspond to something that humans can easily separate and view as individual objects. Computers have no means of intelligently recognizing objects, and so many different methods have been developed in order to segment the image. The segmentation method process is based on various features found in image. This might be Color information that is used to create histogram, or information about the pixels that indicate edges or boundaries or texture information thus image segmentation is first step in image analysis. there are different types of image segmentation such as compression based, histogram based, region based and cluster based methods. In compression based here The segmentation tries to find the pattern in an image and any regularity in the image can be used to compress the values in order to get well defined image. Histogram based methods are very efficient compared to other image segmentation methods because in this techniques histogram is computed from all the pixels in an image and the peaks and Valley in the histogram are used to locate the cluster in an image. . Edge detection is a well-developed field on its own within image processing. Relation between Region boundaries and edges are close, since there is often a sharp adjustment in intensity at the boundary region. Therefore Edge detection techniques been used as the base for another segmentation approach for sharp segmentation. The edges traced by edge detection are often discontinuous. For segmenting an object from an image with high complexity however, one needs closed connected region boundaries. The desired edges are the boundaries of such objects. Segmentation approaches can also be applied to already traced edges using edge detectors for more sharp edges. . In region-based methods, a lot of literature has investigated the use of primitive regions as a preprocessing step for image

segmentation. The advantages are twofold. First, regions carry on more information in describing the nature of objects. Second, the number of primitive regions is much fewer than that of the pixels in an image and thus largely speeds up the region-merging process. . Region based methods are based continuity. These techniques divide the entire image into sub regions depending on some rules like all the pixels in one region must have the same gray level. Region-based techniques rely on common patterns in intensity values within a cluster of neighboring pixels. The cluster is referred to as the region, and the goal of the segmentation algorithm is to group the regions according to their anatomical or function roles.

II. LITERATURE REVIEW

2.1 Automatic image segmentation by dynamic region merging

In this paper it addresses the problems with region merging. Where it start with an over segmented region in which many super pixels with homogenous color are detected hence image segmentation is performed iteratively merging the region according to the statistical way. There are two issues in region merging style one is stopping criteria and other is order of merging. Stopping criteria means exactly we can't conclude that where we need to stop the loop an order of merging is the state that where we need to merge region in order to form a large region. Problem in this paper is solved by sequential probability ratio test (SPRT) Algorithm that are used where dynamic region merging minimal spanning tree, region based algorithm and region adjacency graph. Advantage of the paper is that the neighboring regions with coherent colors are merged into one, boundaries are well located on the reasonable places and algorithm can tolerate variations for grouping meaningful regions in an image. Hence with the final results and discussion came limitations were found such as they may miss some long but weak boundaries, it may also merge region with short but high contrast boundary random nature of sequential probability ratio test might lead to non unique partitions to an image. Hence the future work of the paper was to deal with regions which are suppressed by other dominant region.

2.2 Improving fuzzy algorithm for automatic image segmentation.

In this paper it deals with the questions of fuzzy algorithm i.e. can the fuzzy k-means (FKM), kernel zed FCM (KFCM) and spatial constrained (SKFCM) work automatically without pre-define clusters. Hence they had present automatic fuzzy algorithms with considering some spatial constraints on objective function. Hence the existing work of the paper deals with fuzzy algorithms which are used for MRI segmentation and algorithms by considering some spatial constraints on the objective function. Segmentation is used for the brain web merging. Their proposed work deals with the same algorithm which is modified to produce the effective results hence their output was calculated and compared with the existing algorithms. The algorithms which are used are fuzzy k-means (FKM), fuzzy c-means (FCM), and kernalized FCM (KFCM) spatial constraints (SKFCM). The advantages of these algorithms where it estimates the correct tissues and more accurately, noise was reduced the modified algorithms where much faster, it viewed the high robustness in discrimination of the region because of low level of signal/noise ratio. But yet it has found certain limitations such as it consume much time for obtaining the true number of segments, accuracy was not improved and computational speed of segmentation was reduced. Hence the future work was to overcome with the limitations.

2.3 A fast interactive image segmentation to locate multiple similar-colored objects.

Many conventional image to some extent suffer from the problem of inaccurate segmentation. In this paper they had proposed the fast and simple technique for interactive image segmentation. The existing work was done on images with different color background. And the proposed work was carried out in three steps first it deals with the pre-segmentation by some low level segmentation method second was with the region marking where the region with similar features was marked under one region and third was region labeling the regions where labeled. The algorithm used in this paper where mean shift analysis watershed algorithm which is based on region merging than the interactive image segmentation method (MSRM). By proposed algorithm it deals with many problems such as it has capability to identify the multiple similar objects, the regions which are closed to the background were retained and the foreground regions are maintained efficiently. But yet it has some limitations such as unwanted regions were merged and secondly the proposed methods were based on threshold not on adaptive method. Hence to deal with this problem the proposed work was to extend the method to adaptive.

2.4 Dynamic ISAR imaging of maneuvering targets based on sequential SL0.

ISAR imaging is widely used in many military and civilian applications including target recognition, aircraft control and air/space surveillance. Hence in this paper they had represented the dynamic algorithm for ISAR imaging based on the sequential processing of smoothed L0 (SL0) which is one of the most effective SR algorithms in the complex domain. Hence the existing work deals with the SAR images i.e. locating the SAR images an working on them the proposed work deals with the L0 filter and working them on SAR images the algorithms which were used such as sparse recovery algorithm, L0 filter, Fast Fourier transform hence the advantages of this algorithms were that when SAR is used with the L0 there is no blurring and high resolution is obtained, and hence the processing time is decreased. But yet it has found some disadvantages such as L0 is more complex to implement. The processing time was increased when the ISAR images are used with the FFT. Hence from the results and discussion it was stated that the modeling cross range compression in the matrix form, the SSL0 algorithm in the complex-valued domain is proposed for the fast recovering the ISAR image sequentially. The similarity between two adjacent ISAR images are defined as the stopping rule and the minimum pulse number required in each CPI can be determined. Simulation results show that the proposed algorithm is promising from practical considerations.

2.5 Tree-pruning A new algorithm and its comparative analysis with the watershed transform for automatic image segmentation.

Tree pruning and watershed (WS) has been presented in the framework of the image forest transform (IFT). Hence in the proposed work tree pruning was introduced and then it was compared with the water shed. Algorithm which was used were watershed, tree pruning and image forest transform(IFT). Advantages of this paper was the tree pruning was more robust and provides image segmentation with higher accuracy secondly problem related to image segmentation such as boundaries are weak, image is noisy and blur were reduced. To obtain the accurate results future work can be improved by combining tree pruning with statistical approaches.

2.6 Improved techniques of automatic image segmentation

Several techniques have been developed for image segmentation the watershed algorithm which is important morphological tool for image segmentation has been widely used. This technique is a region growing algorithm

that analyzes an image as a topographic surface. Object oriented processing has recently been introduced to image and video processing hence object based coding provides more functionality to video like object manipulation and the combination of natural and synthetic video. Thus image or video segmentation is an important field of research in video processing. Hence in this paper it mainly deal with image but techniques are applicable to video signals. Hence the existing work is carried out in three steps simplification, marker extraction and boundary decision simplification which make use of area morphology and hence removes unnecessary information from the image to make it easy to segment. Marker extraction identifies the presence of homogenous region and a new marker extraction design is proposed in both forms that is luminance and color information and watershed algorithm was modified and boundary decision was based on region growing algorithm. Algorithms which was used where region growing algorithm watershed algorithm and morphological filter are used. The main advantage of this method was that their edges were maintained but great loss of information was noticed.

2.7 Automatic image segmentation by integrating color-edge extraction an seeded region growing.

In this paper they state the new automatic image segmentation method in which the color edges are first obtained automatically by combining an improved isotropic edge detector and a fast entropic thresholding technique. The initial seed for this region is captured by obtaining color edges which have provided the major geometric structures in an image and the centriods between these adjacent edge regions. These seeds are than replaced by the centroids of the generated homogenous regions. The algorithm which was used are the color edge extraction and facial extraction in which the color edge extraction detects the different color from the images and seprate them by labeling the different regions and facial extraction was done to state the facial characters the advantages of this technique was they could detect the homogenous region with accurate boundaries but limitations was that they may leave discontinuity in an image hence their future work was to deal with an image to form continuous image.

2.8 A robust automatic clustering scheme for image segmentation using wavelets.

The objective of this paper is to divide an image into homogenous region which is made up of complex textures. Hence the approach which has been suggested is spatial frequency techniques. Proposed methodology deals with automatically selecting the optimal features for each pixel using wavelet analysis. The algorithm used were robust segmentation algorithm and optimal region for segmentation . The advantage of this technique Were it requires no threshold and is completely automatic. Its limitation was to determine the optimal no of regions.

III. COMPARISSON OF PAPERS AND THEIR TECHNIQUES

	Image is noisy	Background is retained	Boundaries are well defined	Pixel are peculiar	Blur image	Resolution of image	Well defined image	Loss of information
Paper (a)	NO	NO	NO	YES	NO	HIGH	YES	Chances are low
Paper (b)	NO	YES	YES	YES	NO	HIGH	YES	NO
Paper (c)	NO	YES	YES	YES	NO	MEDIUM	YES	CHANCES ARE LOW
Paper (d)	NO	YES	YES	YES	NO	HIGH	YES	NO
Paper (e)	YES	YES	NO	YES	YES	HIGH	YES	YES
Paper(f)	YES	YES	YES	NO	YES	LOW	NO	YES
Paper (g)	YES	YES	YES	NO	YES	HIGH	NO	YES
Paper (h)	NO	YES	YES	YES	NO	HIGH	YES	YES

Table 1 : COMPARISION OF TECHNIQUES

IV. LIST OF CHALLENGES

Hence above papers are related to image segmentation and their region merging process comparing these papers we had came across various challenges that we need to work on. Such as

  a. Weak boundaries are not determined hence we may miss them.

  b. Region may get merge with short but high contrast boundaries.

  c. Images found are blur with no high resolution.

  d. Background is not retained and hence image is noisy.

V. CONCLUSION & FUTURE SCOPE

Here by comparing the papers we found that fast interactive image segmentation to locate multiple similar colored objects is better than other methods. But still it has some drawbacks such as loss of information and resolution of image is low. So in our future work we deal with this problem by using L0 smoothening filter.

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