Interactive image segmentation with adhoc selection with base threshold

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***Abstract*:**

In areas such as computer vision and image processing, segmentation on image has been and still is a relevant research area due to its wide spread usage and application. This Interactive image segmentation can be used in image segmentation. This work uses a region growing and region merging aporoaches to segment image. Region growing uses homogeneity criterions, these criterions are relative to seed point and growing region respectively Region Growing is an approach to image segmentation in which neighboring pixels are examined and added to a region class if no edges are discovered. This process is repeated for each boundary pixel in the area. If adjacent regions are found, a region with merging algorithm is used. Region Growing offers several advantages over conventional segmentation techniques. The region merging only uses color information and considers the size of fragmentary region.

(*Index Terms: Image Segmentation, Adhoc selection, Threshold*)

I. Introduction:

In computer vision, image segmentation is the process of partitioning a digital image into multiple segments (group of pixels, also known as superpixels). The goal of segmentation is to simplify and/or change the representation of an image into something that is more meaningful and flexible to analyze. The segmentation on image is typically used to locate objects and boundaries (lines, curves, etc.) in images. Frequently segmentation on image is the process of allotting the label to every pixel in an image such that pixels with the same label share certain visual characteristics.

The result of image segmentation is a set of segments that collectively cover the whole image, or a set of contours retrieved or extracted from the image (see edge discovery). Individual pixels in a region are similar with respect to some attributes or calculative property, such as color, intensity, or texture based attribute. Neibouring regions are significantly varies with respect to the same characteristic(s) or attributes. When applied to a pool of images, typical in medical imaging, the resulting contours after image segmentation can be used to create 3D reconstructions with the help of interpolation algorithms like Marching cubes.

II. Thresholding:

The simplest method of image segmentation is called the thresholding method. This method is based on a clip-level (or a threshold value) to turn a gray-scale image into a binary image. The main point of this method is to select the threshold value (or values when multiple-levels are chosen). Many popular methods are used including the maximum entropy method, Otsu's method (maximum variance), and general clustering.

Recently, methods have been developed for thresholding computed tomography (CT)

images. The key idea is that, unlike Otsu's technique, the thresholds are derived from the transmission graphs instead of the (rebuilt) image.

III. Clustering methods:

The K-means algorithm is an iterative technique that is used to partition an image into K deferent clusters / divisions. The main seed algorithm is:

1. Pick K cluster centers, either randomly or based on some heuristic
2. Allot each pixel in the image to the relevant cluster that minimizes the distance between the pixel and the cluster center
3. Re-compute all the cluster centers by averaging all the available pixels in the cluster
4. Repeat steps 2 and 3 until convergence is attained (i.e. no pixels change clusters)

In this case, distance is the squared or absolute difference between a pixel and a cluster center. The difference is mainly based on pixel attributes like color, intensity, texture, and location, or a weighted with respect to combination of these factors. K can be chosen manually, randomly, or by heuristic approach. This algorithm is guaranteed to get the convergence, but it may not return the feasible solution. Mainly quality of solution quality of the solution depends on the initial set of clusters and the value of K.

Objective:

The main objectives of "Interactive Image Segmentation with a Novel region-Based Algorithm" are:Here develop a novel region growing technique.It finds the similar pixel values and grows regions according to similarity.For each pixel it iterate through all its neighbors.Then combines the regions using region merging

Interactive image segmentation has many applications in image processing, computer vision, and computer graphics. From view of feature extraction and object recognition people is good at recognizing and locating object, whereas computer is expert in extracting object accurately. When combining two abilities with each other, image segmentation can achieve better result. In many image editing tasks, the goal is to cut out an object from its background. Small amount of user input is desirable on any device, but especially on mobile devices with small screens and inaccurate input methods, it is crucial that only few inputs are required. It is even more attractive when the exact boundary is detected automatically, since zooming in and adding strokes or dragging markers so they precisely align with a complex object boundary is tedious both on desktop and mobile devices. However, all interactive image segmentation methods we are aware of require some further input from users to refine boundaries when the initial algorithm fails. Generally, the user has to put markers or scribbles along the boundary, or even has to do the segmentation all over. Aiming to make the interactive image segmentation more robust and to require as little user effort as possible, we propose the following Novel algorithm consisting of three major steps. First, over segmented regions are merged according to input of a few strokes. Second, low-contrast object boundaries are detected by adaptively thresholding the boundary regions. Third, boundary regions are relabeled by incorporating local information of pixels and global information of regions.

State of the Problem:

Compared with previous methods, the region growing and merging can consider not only the pixel's color but also its spatial domain distribution. Especially, fully automatic general segmentation is an unsolved problem in complex applications, and user interaction is usually required. The region growing is more suitable to this interactive image segmentation. Thresholding based image segmentation aims to partition an input image into pixels of two or more values through comparison of pixel values with the predefined threshold value T individually. Failure to find the most suitable algorithm to determine the thresh-old value(s) T leads to over segmentation.

Edge based segmentation is the location of pixels in the image that correspond to the boundaries of the objects seen in the image. Then it is assumed that since it is a boundary of a region or an object then it is closed and that the number of objects of interest is equal to the number of boundaries/regions in an image. For precision of the segmentation, the perimeter of the boundaries/regions detected must be approximately equal to that of the object in the input image

Solution of the Problem:

Region Growing and Region Merging are widely used color image segmentation. The Segmented results depend on the selection of the seed point and the region growing and merging. Region growing processes are more appropriate than clustering or thresholding approaches because the processes operate directly in color space and simultaneously take into account both color distribution in color space and its repartition in the spatial domain. They proposed a color segmentation algorithm that combines region growing and region merging processes. The region growing takes into account color similarity and spatial proximity. The region merging takes into account only color similarity.

Region-Based Segmentation Methods:

Region-based methods mainly rely on the assumption that the neighboring pixels within one region have similar value. The common procedure is to compare one pixel with its neighbors. If a similarity criterion is fulfilled , the pixel can be set belong to the cluster as one or more of its neighbors. The selection of the fulfilled similarity criterion is significant and the results are influenced by noise in all instances.

The main goal of segmentation is to partition an image into regions. Some segmentation methods such as "Thresholding" achieve this goal by looking for the boundaries between regions based on discontinuities in gray levels or color properties. Region based segmentation is a technique for determining the region directly. And this criteria can be specified by following conditions

$$R_1 \cup R_2 \cup R_3 \cup \ldots \cup R_i = I$$

Where $R_1, R_2, R_3, \ldots R_I$ are the region in the image I, and

Further, $R_1 \cap R_2 \cap R_3 \cap \ldots \cap R_i = 0$

This is as per the set theory of homogeneity.

Existing System:

Automatic image segmentation methods does not give chance to select a particular part of the image. So that it creates unnecessary segmentation parts of the image. Which leads to unnecessary comparisons due to this system may become complicated one.

Proposed System:

From view of feature extraction and object recognition people is good at recognizing and locating object, whereas computer is expert in extracting object accurately. When combining two abilities with each other, image segmentation can achieve better result. In many image editing tasks, the goal is to cut out an object from its background. Small amount of user input is desirable on any device, but especially on mobile devices with small screens and inaccurate input methods, it is crucial that only few inputs are required. It is even more attractive when the exact boundary is detected automatically, since zooming in and adding strokes or dragging markers so they precisely align with a complex object boundary is tedious both on desktop and mobile devices. However, all interactive image segmentation techniques we are aware of require some further input from users to refine boundaries when the initial algorithm fails. Generally, the user has to put markers or scribbles along the boundary, or even has to do the segmentation all over.

Aiming to make the interactive image segmentation more robust and to require as little user effort as possible, we propose the following Novel algorithm consisting of three major steps. First, over segmented regions are merged according to input of a few strokes. Second, low-contrast object boundaries are detected by adaptively thresholding the boundary regions. Third, boundary regions are relabeled by incorporating local information of pixels and global information of regions.

IV. Literature survey:

Proposed work: The proposal is totally based on segmentation on 2 main attributes. 1 the randomnly selected region 2 difference of the estimated threshold . The estimated threshold is always a challenge in the previous work. So in this work the threshold is totally choice selected region. But this selected regions tentatively with little distorted areas surrounded with big depends on the image preceding pixel's combinational values ie more concentration on blue intensity. This threshold in the current work always gives more percentage of the distorted pixel for further process in any angle to process . In this case the further process can be any angle clearing the pixel intensity , updating with main preceding four with left and right pixel intensities. So this wok is open for further process of the distorted pixels in any clearance of RGB values to get the best pixel with respect to avoid the patch output.

Algorithms:

1. Seeded Region Growing Algorithm

Step1: Select seed pixel in the image

Step2: For each seed its 4 neighbor pixels push into stack and label the pixels have been processed

Step3: While (start<=end), start presents the top of the stack, end for the end

Of stack

If yes,

i) Calculate the aggregated mean value of the pixels in stack, and choose the 4 neighbor pixels as the current pixel.

ii) If not, go to step step6

Find out the mathematical Euclidean distance, NBS distance, and saturation.

If so, go to step 4.

Otherwise go to step3.

Step 4: The pixel satisfied the homogeneity criterions

i. Push the pixel at the end of the stack and label(recognition) it and calculate the sum value of the pixels in stack

Step 5: The pointer to the end of stack point to the next

Go to step 3.

Step 6: Segment region with right color.

Similarity Criteria:

If the Saturation value is less than 0.1, then use RGB color space the color vector of pixel as C=(r,g,b) For example two color vectors C1=(r1,g1,b1), c2=(r2,g2,b2) then the Euclidean distance between two color vectors is calculated as to find similarity of pixel values. D(c1,c2)=sqrt(r1-r2)^2+(g1-g2)^2+(b1-b2)^2.

2. **Region Merging Algorithm:**

Step 1: Calculate the selected rectangle of the region ***N***_region:

rect_region(N_region,left,bottom,top)

Step 2: Extract the sub selected regions from the main and original rectangle(seed image):

for(x=left;x<=right;x++)

for(y=bottom;y<=top;y++)

ifLab_image[x*hight+y]!=0, take the next point mark thepixel region number in labeled image

{

push the point in stack:push_stack(x,y);

do{

take point of stack:pop_stack(cx,cy)

if its adjacent point satisifiesLab_image[(cx+I,cy+j) nd calculate the region size.

}while(size of the fragmentary region/area is larger than threshold or stack empty)

}

Step 3: Extract Merged Regions.

Segmentation algorithm:

Algorithm:

Input → Original image and selected Square image

Output → distorted pixel display

Initialization: $\sum P$ // Total pixels in the image

$\sum S_r$ // Selected region pixels

$\sum B_p$ // All Base pixels index

$\varphi_r \rightarrow$ 12

$\varphi_a \rightarrow$ 24

$\varphi_b \rightarrow$ 30

$\sum d_p \rightarrow$ Distortion cleared pixels.

For each p in S_r

Loop starts

I_r =getR(p)

I_g =getG(p)

I_B =getB(p)

$\sum d_p$ = CALCULATE (I_r, I_g, I_B)

End loop

V. Screens:

Experimental results: 1

The picture sets containing 2 deferent categories from nature and games. Once the picture(1) is selected all the pixels are in the buffer for further process. The buffer will be continued for the process of single selection ie the session for once process.The selected adhoc and choice squreregion(2) will be seed for segmented drawing(3) on the sub square region. This process of session will sustain till the distorted pixels are discovered and marfed as result(4) .

Picture 1

Picture 3

Picture4

Experimental results: 2

Picture2

Picture 3

Picture

VI. Conclusion:

In areas like computer imagination and image processing along with photograph finalizing, segmentation upon photograph have been nonetheless can be a applicable investigation place because endemic use along with program. That Interactive photograph segmentation can be employed inside photograph segmentation. That Venture works on the area developing along with area merging processes to section photograph. Region developing utilizes homogeneity criterions, these kind of criterions usually are relative to seeds position along with developing area respectively Region Growing is usually a technique for photograph segmentation where nearby pixels usually are looked at along with included in an area course if absolutely no perimeters usually are identified. This process is usually recurring for every border pixel in the community. In the event that adjoining parts are simply, an area along with merging formula is employed. Region Growing presents various benefits in excess of regular segmentation methods. Areas merging merely utilizes colour details along with thinks how big is fragmentary area.

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