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An Improved Region Based Segmentation By Using Edge Detection and Filter Technique

Vivek Jain[1], Shanu Sharma[2]

[1]Department of Computer Science, SRCEM, Banmore
[2]Department of Computer Science, SRCEM, Banmore

Abstract- *In computer vision effective image segmentation and object recognition are an important task. Interactive image segmentation is an important part in medical images, remote sensing and real time images .This paper presents an effective interactive image segmentation based on region merging method with fuzzy switching median filter, canny Edge detection & Anisotropic diffusion filter Technique . For natural images or Medical images, completely automatic image segmentation is usually inflexible. Interactive schemes are very helpful with a few simple user inputs are high quality solution. Experimental results shows that proposed scheme is reliably extract the object contour from the background and making the edges sharp. The main objective of this present work is to provide an efficient approach for image merging using MSMR and for increase the accuracy of the segmented image, we use fuzzy median filter and Anisotropic Diffusion filter. For edge detection, we use canny edge detection method .*

Keywords-*Image Segmentation, Region Merging, Similarity Measure, Object and Background Marking ,Anisotropic diffusion filter, Fuzzy Switching median filter, Canny edge detection technique.*

I.INTRODUCTION

Segmentation refers to the technique of partitioning a digital image into multiple regions (sets of pixels to boot referred to as super pixels). The target of segmentation is to change and/or modification the illustration of an image into one issue further vital and easier to analyze. Image segmentation techniques work by locating objects and limits (lines, curves etc.) and distribution labels to every component such pixels with an identical label share visual characteristics.

The result of image segmentation may be a set of regions that together the whole image,wherever every pixel during a region is comparable with relevance some characteristic or computed property, like color, intensity, or texture. Regions that region adjacent to every alternative region considerably completely different with relevance identical characteristics.

I mage segmentation is the most important task in many image processing systems, such as pattern recognition, image retrieval and small surveillance. The result of segmentation is mainly used for image content understanding and visual object recognition through the identification of region of interest. The objective of segmentation is to make things easier and/or change the symbol of an image into something that is more meaningful and easier to examine. Image segmentation is use to situate the objects and boundaries (lines, curves, etc.) in images and assigns a marker to every pixel in an image, in a manner that pixels with the equal label share definite visual characteristics. In medical imaging, the aim is to separate different parts of the anatomy, which is proving to be very challenging with the overwhelming number of visual patterns in an image. Thus, image segmentation has been, and still is, a related study area in Computer Vision. Even though, several hundreds of segmentation algorithms have been proposed for natural images in the last 30 years, it is still evasive in botanical field.

Segmentation is that the method of partitioning a picture into non crossed regions specified every region is consistent and also the union of no two adjacent regions is consistent and it can even be used the method of analytic objects of interest from the remainder of the scene. This constituent level process is of preponderant importance for several image process applications.

This system gives no over segmentation as in different systems, while preserving well the edge data of the information. Due to no over segmentation, the measurement elements of every district, which will be abused by the proposed region merging system, can be all the more powerfully computed and afterward can be utilized as a part of directing the locale combining procedure. In the proposed plan, the interative data is presented as markers which are information by the clients to generally demonstrate the position and main fearture of the item and background.

The markers are straightforward lines (e.g. Green shading). At that point the proposed technique will computed the comparability of diverse districts and consolidation them in light of the proposed maximal similarity principle with the assistance of these markers.

II. LITERATURE REVIEW

Chen Jian et. al. [1] suggests that a new algorithm for maximal similarity based region merging. Low level segmentation methods like watershed, mean shift and level set can be used for initial segmentation for merging. For Initial segmentation they use SLIC super pixels. Because it is easy to control the pre-segmentation regions. It is also include the texture features differences and for region similarity they used probabilistic region merging.

Jifeng Ning et.al. [2] described the capable image segmentation is a significant task in computer vision and object recognition. A proposed maximal-similarity based region merging algorithm is proposed to lead the merging process among the help of markers. And for initial segmentation used a Mean shift segmentation. This proposed method does not depend on mean shift segmentation and other color image segmentation.

An approach for interactive image segmentation with user experience is describing Ramya Hebbalaguppe et. al. [17] the goal of the interaction is to get an associate correct segmentation of the item with the nominal quantity of human effort. to enhance the usability and user expertise mistreatment interactive image segmentation we tend to gift 3 interaction ways and study the result of every mistreatment each objective and subjective metrics, such as, accuracy, quantity of effort required, psychological feature load and preference of interaction methodology as voted by users. A good vary of applications together with image redaction, medical specialty image analysis, and digital image composition encourage the event of economical interaction ways for image segmentation

Radhakrishna Achanta et. al. [5] proposed a SLIC super pixels have become more and more standard to be used in computer vision applications. SLIC manufacture the super pixels with lower process value and segmentation value is equal or bigger than state of the art ways. Super pixels area unit increase the performance over the opposite state of the art ways.

Sameena Banu et. al. [6] approach that, an edge detection formula is employed to detect the sides. Through edge detection formula to seek out their regular elements of edge and every one the sides square measure clear and effective. Maximal similarity based mostly formula is employed for interactive image segmentation. Initial segmentation is performed mean shift formula. For edge detection formula used a canny edge detection technique.

Joachim Weickert [16] It proposed a technique by presenting a multi level technique in which a nonlinear diffusion filter is steered by the so-called interest operator .These novel scheme use a additive operator splitting which guarantee equal treatment of all coordinate axis. This paper proposed a anisotropic diffusion filter for enhancement the image.

R.Pushpavalli P et.al.[18] is proposed a the digital image is affected from impulse noise. A filter cluster based adaptive switching median filter for removal of noise. This filter consists of a impulse noise detector and a detail preserve noise filter. The noise detector has been used to discriminate the uncorrupted pixels from the corrupted pixels. This filter is capable to suppress high density of impulse noise, at the similar time preserving fine details, texture and edges.

III. PROPOSED METHOD

3.1 Presegmentation

In our methodology, initial segmentation is needed to partition the image into undiversified regions for merging. Any existing low level segmentation ways, like super-pixel, mean shift, watershed and level set, may be used for this step. During this paper, we elect to use the SLIC super pixels methodology for initial segmentation as a result of it to regulate the amount of pre segmentation regions [8].

3.2 Representation Of the Regions

After the initial segmentation is finished, we've got several tiny regions obtainable. we want to represent these regions to guide the region merging method using some descriptor. In several aspects the regions will be outlined like color, edge, texture, form and size of the regions. The key issue in region merging is the way to confirm the similarity between the unmarked regions with the marked regions, in order that the similar regions will be incorporated with some logic control. Therefore, we want to outline a similarity live between two regions R and Q to accommodate the comparison between numerous regions. There regions some well-known applied mathematics metrics like the Euclidian distance, Bhattacharyya coefficient [8]. Here, we decide to use the geometrician distance to measure the similarity between R and Q. The RGB color space is used to calculate the Mean value of dissimilar regions. We consistently calculate the mean value of the object under consideration, let it be and the mean value of its neighbor, let it be 'Q'. If the mean value is less than or equal to the pre defined threshold value than the R will gets merged with Q otherwise not.

$$E.D. = |(R-Ri)| + |(G-Gi)| + |(B-Bi)|.$$

Where, E.D is the Euclidean distance, and R,G,B are the color values of region R, and Ri, Gi, Bi are the color values of region Q. If two regions have similar contents, their mean values will be almost similar.

3.3 *Object And Background Mark*

The user got to specify the object within the interactive image segmentation, the users will input interactive data by drawing markers, that might be lines, curves and strokes on the image. The regions that have pixels within the object markers regions therefore known as object marker regions. The marker regions cover solely small parts of the regions. While the regions that have pixels inside the background markers are called background marker regions.

3.4 Merging Rule for Maximal Similarity

After object marking and background marking a challenging problem to extract accurately the object contour from the background because only a portion of the object is marked by the user. The proposed region merging method merge .Two adjacent regions whose similarity is above a preset threshold. These methods have difficulties in adaptive threshold selection. A big threshold will lead to incomplete merging of the regions belonging to the object, while a small threshold can easily cause over-merging, i.e. some object regions are merged into the background. Moreover, it is difficult to judge when the region merging stops. Therefore a proper threshold has to be selected for proper region merging.

3.5 The Merging Process

The entire MSRM process can be divided into two stages [1] which are continually executed until no new merging occurs. 'First, the marked object regions are merged with the unmarked object regions until no similar object region left. Secondly, the left unmarked regions are then merged together, and thus the object can be successfully extracted from the complex background. Once we merge all the background regions, it is equivalent to extracting the desired object. Some two step strategies have been used for image pyramid construction.

3.6 Anisotropic Diffusion Based Filter ,Fuzzy Switching Median Filter & Canny Edge Detection Technique.

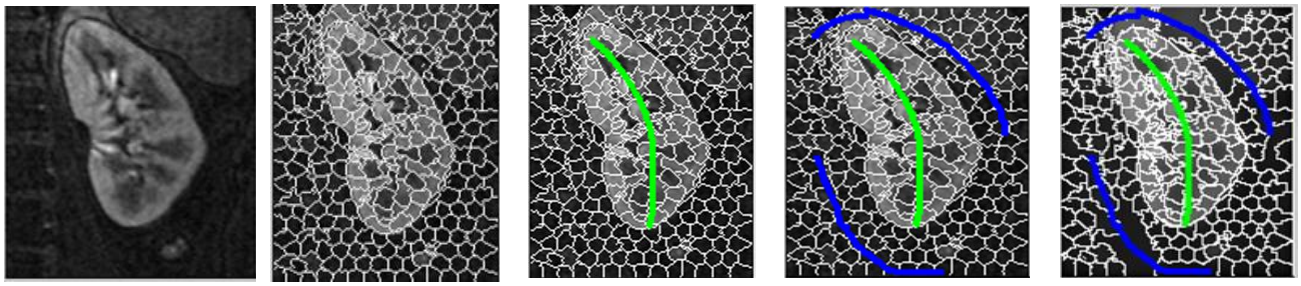
Methods of noise removal were known a long time before the Anisotropic Diffusion case was first claimed1990.[16] Most of the methods are typically forms of applying a blur filter to the image, as Blurring it hopefully results in a smooth, noise-less product .Such a product, with low noise levels called Anisotropic diffusion filter. Anisotropic Diffusion filter describes smoothing specifically edges, without loosening significance.

Fuzzy Switching median filter is used for removing the impulse noise and increase the accuracy of the image. And it is also preserving the texture and edges.

The Canny operator was designed to be an optimal edge detector there are other detectors around that also claim to be optimal with respect to slightly different criteria). It takes as input a gray scale image, and produces as output an image showing the positions of tracked intensity discontinuities.

IV. EXPERIMENTAL RESULTS

The MSRM method is essentially an adaptive region merging method. By the User used input markers, It will automatically merge regions and label the non-marker regions as object or background. Figure 1(a) The original image is pre segmented with SLIC super pixels. Figure:1(b),(c)After the initial segmentation of SLIC Super pixels, the user inputs some interactive information: the green marker represents the object while the blue markers represent the background.Figure1(d),(e),(f),(g),(h)The object and background marker regions will propagate to all non-marker regions via iteratively implementing the two stage region merging process. The kidney picture is well extracted that the mean shift initial segmentation results in severe over segmentation for both the marker object and background in comparison of Super pixels. In this image, since the kidney lies relatively in the center of the image, we implicitly specify the regions which locate in the border of the image as background markers. The kidney is well extracted from the complex background. The proposed MSRM method can still extract the desired object accurately. The proposed MSRM scheme can be naturally extended to extract multiple objects. The proposed method still successfully separates it from the background. Show a Figure1.(i),(j)In the last segmented image was lots of noise and image looks like a blur or not clear. So we use an anisotropic diffusion filter for an efficient method of noise removal that is able to clarify the image. And also integrate canny edge detection technique for sharpening the edges and fuzzy switching median filter for image accuracy.



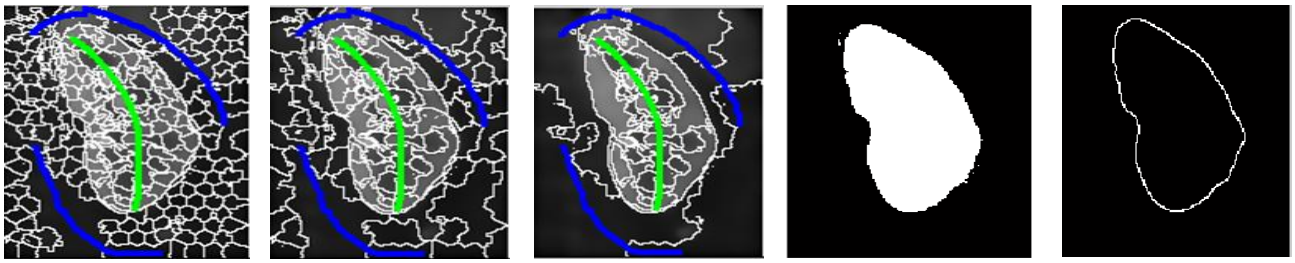
(a) Original image

(b)Initial segmentation with SLIC Super pixels

(c)Object mark

(d) Background mark

(e) 2nd Merging process in stage1 round1



(f) 4th Merging process in stage 1 round 1

(g)1stMerging process in stage2 round 1

(h)Merging process in stage2 round 2

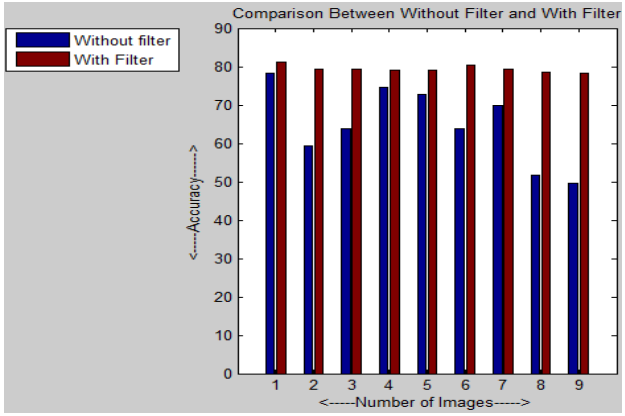
(i) Segmented image without filter

(j) Segmented image with filter

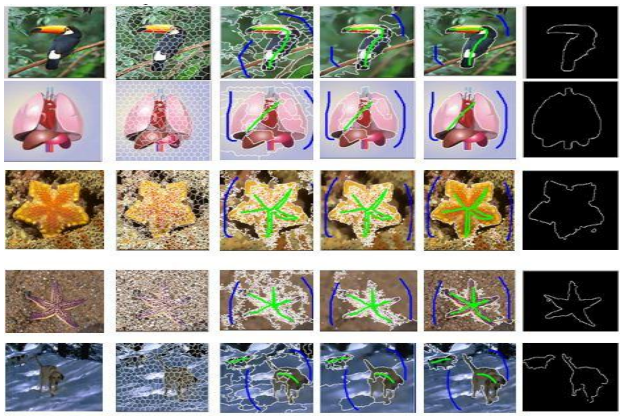
Figure 1

Image name	Accuracy without filter	Accuracy with filter
Bird	78.1631	81.0531
Lung	59.4213	79.4494
Star fish	63.7355	79.2563
Star fish2	74.5846	78.9556
Two dogs	72.7045	79.196
Cameraman	63.8997	80.3304
Heart	69.9935	79.4166
Kidney	51.6052	78.4736
Flower	49.557	78.1789

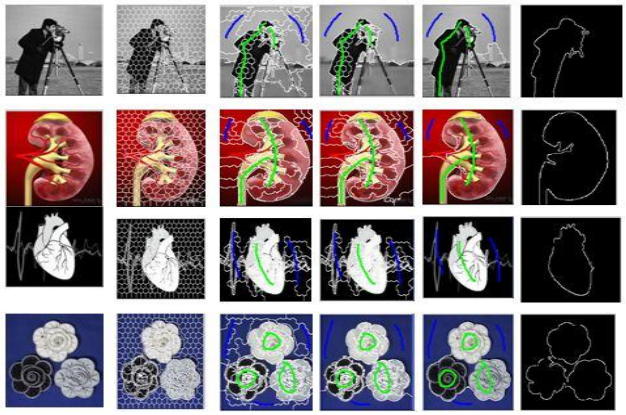
(a)Table shows Accuracy of various images



(b) Graph shows a comparison between accuracy with and without filter.



(C)Image set 1



(D)Image set 2

Figure 2

V.CONCLUSION

Image segmentation has a promising future as the universal segmentation algorithm and has become the focus of contemporary research**.** This paper proposed a novel semi- interactive object segmentation framework using similar region merging, Fuzzy switching median filter and
Canny edge detection technique. The similar region merging can systematically capture the relationships among different image regions to perform effective object segmentation. The image is first initially segmented into SLIC super pixels and, After the initial segmentation object regions having similarity are merged after applying region merging based on Euclidian distance. This model performs region-merging based on Euclidean distance on the regions. After merging with MSRM we integrate an anisotropic diffusion filter and fuzzy switching median filter for smoothing the image or reduce the impulse noise and for edge detection we used Canny edge detection technique. This proposed scheme is obtain the high accuracy results and making the sharp edges.

REFERENCES

[1] Chen Jian, Yan Bin, Jiang Hua, Zeng Lei and Tong Li, "Interactive image segmentation by improved maximal similarity based region merging" 2013 IEEE.
[2] Jifeng Ning, Lei Zhang , David Zhang, Chengke Wub, "Interactive Image Segmentation By Maximal Similarity Based Region Merging" 2009 elsevier.
[3] Richard Szeliski, "Computer Vision:Algorithms and Applications", Springer, September 3, 2010.
[4] Banudevareddy. B, Prasanna Kumari. P, "Similarity Based Region Merging Interactive Image Segmentation" International Journal of Information Systems and Computer Sciences Volume 1, No.1, September - October 2012.
[5] Radhakrishna Achanta, Appu Shaji, Kevin Smith, Aurelien Lucchi, "SLIC Superpixels"
School of Computer and Communication Sciences (IC),Ecole Polytechnique F_edrale de Lausanne (EPFL).
[6] Sameena Banu, Apparao Giduturi, Syed Abdul Satta ,"Interactive Image Segmentation and Edge Detection of Medical Images" International Journal of Advanced Computer Research ISSN Volume-3 Number-4 Issue-13 December 2013.
[7] Prabhishek Singh , Ramneet Singh Chadha , "A Novel Approach to Image Segmentation"
International Journal of Advanced Research in Computer Science and Software Engineering Volume 3, Issue 4, April 2013 ISSN: 2277 128X.
[8] Neha verma, Deepak Sharma, "Advanced Maximal Similarity Based Region Merging By User Interactions" International Journal of Engineering Research and Applications (IJERA) ISSN: 2248-9622 www.ijera.com Vol. 3, Issue 4, Jul-Aug 2013.
[9] Vrushali Mendhule, Gaurav Soni, Rajesh Nigam ,"Review Paper on Technologies used for Interactive Image Segmentation" (IJCSIT) International Journal of Computer Science and Information Technologies, Vol. 6 (1) , 2015, 116-120.
[10]S.Dhanalakshmi, Dr.T.Ravichandran, "A New Method for Image Segmentation" International Journal of Advanced Research in Computer Science and Software Engineering Volume 2, Issue 9, September 2012 ISSN: 2277 128X.
[11] D.Selvaraj, R.Dhanasekaran, "A Review on Tissue Segmentation and Feature Extraction of MRI Brain images" International Journal of Computer Science & Engineering Technology (IJCSET) ISSN: 2229-3345 Vol. 4 No. 10 Oct 2013.

[12]Garima Singh Rawat ,Jov Bhattachariee. Roopali Soni. "Proposed Method for Image Segmentation Using Similarity Based Region Merging Techniques" The International Journal of Computer Science & Applications (TIJCSA) Volume 1, No. 7, September 2012 ISSN – 2278-1080.

[13] Y. Cheng, "Mean shift, mode seeking, and clustering" IEEE Transactions on Pattern Analysis and Machine Intelligence 17 (8) 790-799, 1995.

[14] Rajeshwar Dass, Priyanka, Swapna Devi, "Image Segmentation Techniques" IJECT Vol. 3, Issue 1, Jan. - March 2012.

[15] Neha Verma, Deepak Sharma ,"Region Merging Based Image Segmentation Using Maximal Similarity Mechanism" International Journal of Engineering Research and Development e-ISSN: 2278-067X, p-ISSN: 2278-800X, Volume 7, Issue 7 (June 2013).

[16] Joachim Weickert, "Coherence-Enhancing Diffusion Filtering" International Journal of Computer Vision 31(2/3), 111–127 (1999).

[17] Ramya Hebbalaguppe, Kevin McGuinness, Jogile Kuklyte, Graham Healy, "How Interaction Methods Affect Image Segmentation: User Experience in the Task".

[18] R.Pushpavalli, G.Sivarajde,"A Fuzzy Switching Median filter with highly corrupted image" International Journal of Scientific and Research Publications, Volume 3, Issue 6, June 2013 1 ISSN 2250-3153.

