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A REVIEW OF BOUNDARY DETECTION AND SEGMENTATION TECHNIQUES IN MEDICAL IMAGAES

Mr. P.R.Choube
Department of Electrical Engineering, MMCOE, Karve Nagar, Pune
Mr. A. M. Suryawanshi
Department of Electrical Engineering, MMCOE, Karve Nagar, Pune
Mrs. Disha A. Potdar
Department of Electrical Engineering, MMCOE, Karve agar, Pune
Prof. Amardeep S. Potdar
Department of Electrical Engineering, Zeal Polytechnic Pune

Abstract

A chain of research has been carried out to improve the quality of medical images in last decade. Researchers have proposed and implemented various models in MATLAB, written plenty of programs to achieve high accuracy of images. In this paper, we have presented the review of few techniques for the same. The paper introduces the scenario of the boundary detection, extraction and edge detection techniques implemented by researcher in past few years. The accuracy of the image detection plays a vital role in medical field. Object segmentation is the problem in medical field which was challenging the researchers, while the solutions introduced to address this problem have given satisfactory results. Researchers have carried out the experimentation to improve the accuracy in segmentation of body part and still the work is going on to complete this task by optimizing the previous solutions.

Key words: ***Image segmentation, edge detection, edge following, vector field model, vector information***

I. INTRODUCTION

A deep research has been carried out in last decade in the field of biomedical applications of image processing. The paper presents a review of various algorithms and techniques implemented and analyzed by different researchers in the field of biomedical image processing and image segmentation. The main objective of this paper is to sum up the research work carried out and to compare the proposed methods with each other. Authors have studied several research papers on the same topic and tried to make correction in one of the method proposed as a part of masters of technology project. The results of proposed method will be extended in final research paper on the same topic.

Image segmentation is one of the primary steps before object identification; it is used to locate the objects and boundaries in image. The process is important step in object examination of human body [1].

The segmentation of image stands for dividing the image in to regions analogous with respect to certain features, and which hopefully match to real objects in the actual view. The detailed information is extracted from image and the analogous regions were grouped together. The criteria for grouping is depends upon several factors e.g. Intensity, color etc. Segmentation plays an important role in image understanding, image analysis and image processing [2].

There are two types those exists in image segmentation for boundary detection one which is based on edge data and another one which is based on regional data. Roberts, Sobel, Prewitt, Laplacian, and Canny, are segmentation methods on the basis of edge data and all of these based on the difference of gray levels. Thresholding, clustering, region growing, and splitting and merging are the segmentation methods on the basis of regional data. Both of these methods have some limitations in boundary detection if the image includes noisy signals. These limitations can be overcome by various algorithms present in image processing. Gradient is also an important for detection of boundary but it has several difficulties. In medical image, correct boundary is never detected because of noise content. Most of methods cannot gives the correct estimation of boundary. Normally medical images are very complex and too much noisy and hence different approaches are attempted to address these problems [3]. Images are also helpful in several other applications like surveillance, weather

forecasting, medical diagnostics, and non-destructive testing etc [4] [5]. The main goal of segmentation is to simplify and/or change an image representation into something that is analyzed easily. The main goal of image segmentation is to cluster the pixels into salient image regions, i.e., regions are corresponding to objects, or natural parts of objects. [6].

II. LITERATURE REVIEW

Krit Somkantha, Nipon Theera-Umpon and Sansanee Auephanwiriyakul: have designed a novel edge following technique for detection of boundary and applied it to object segmentation problem in medical images. Edge following technique used has included a vector image model and the edge map information. The technique used can be implemented to detect the boundaries of several raucous images. For performance assessment of this model is done by five admired methods i.e., the ACM, GAC, ACWE, GVF, and VFC snake models. The distorted images were tested for assurance of accuracy. The feedback of expert and experienced doctors has been taken in to consideration for different medical images like prostates in ultrasound images, left ventricles in cardiac MR images, aortas in cardiovascular MR images, and knee joints in CT images. Apart from this, the results were evaluated by possibility of errors in segmentation and Hausdorff distance. The implemented method is found more efficient than five contour models. The method can also be used for application of image processing other than biomedical applications where it is necessary to use accurate edge detection [1].

Vijendra P. Meshram, Rajesh.D. Thakare, Prashant Wanjari, Vishwas V. Balpande, Ishan A. Patil: have productively used k-means clustering algorithm. In the evaluation it is found that, for low values of k the results of algorithm are precise, while for higher values, the segmentation is very coarse; many clusters emerge in the images at discrete places. It happens since Euclidean distance is not a very excellent metric for segmentation processes. Different initial separation can result in various final clusters. In order to evaluate the excellence it is essential to re-run the code several number of times for same and different values of k. The analysis carried out to improve the quality of images for various medical applications including, locate the tumors, measure tissue volume, face recognition, finger print recognition and in locating an object clearly from a satellite image and in more. The advantage of K-Means algorithm is uncomplicated and quite competent. It is suited when clusters are not well separated from each other. This is possible in web images. The anticipated a framework of unsupervised clustering of images based on the color feature of the image. It diminishes intra-cluster discrepancy, but does not guarantee that the result has a global minimum of variance. The number of clusters decides the quality of image [2].

Prof. S. S. Kattire, Prof. A. V. Shah: have proposed another algorithm for boundary detection of various types of medical images. It is implemented in two stages. The first part is calculation of vector information of image while in the second stage texture information is calculated. Magnitude and direction are considered in the analysis for first step in order to identify image edge. Texture details were used to derive edge map. The inclusion of magnitude and direction has given better outcomes. Computation cost for this method is very less as compared to previous methods [3].

V. Sai Kumar, V. Vijaya Kishore: have proposed another edge following technique for boundary detection and applied it to object segmentation crisis in medical images. The technique was helpful to detect the object boundaries in several types of noisy images where the ill-defined edges were encountered such as medical images including prostates in ultrasound images, left ventricles in cardiac MR images, aortas in cardiovascular MR images, and knee joints in CT images. Technique was applied for two cells to find its boundary for two contours which parallel completes edge detection for both in same time and results of detecting the object boundaries in noisy images show that the proposed technique is much better than the other contour models. The number of iterations needed was less than other models for edge detection. Processing time required is less for this method [4].

Gurbinder Kaur, Balwinder Singh: have discussed efficient segmentation is achieved by wavelet transform with consideration of DWT approximation band coefficients. The algorithm used is faster due to DWT consideration. The band computation time is less than non-parametric methods. The proposed algorithm is much better in terms of computation time and image quality index. It has been examined from the studies that fine details and small segments are detected well using Wavelet and GK clustering algorithm and even GK algorithm eliminates certain

problems such as local minima problem of Fuzzy c-means clustering. But still GK method consumes a great deal of time due to the Clustering of the entire data many times. From overall study it has concluded that, it is important to extend algorithms that reduce convergence time, computation time and are much superior in terms of image quality index in comparison to the existing methods [5].

Ms.S.Veeralakshmi, Mrs.S.Vanitha Sivagami, Ms.V.Vimala Devi, and Ms.R.Udhaya:

Medical images plays a vital role in examining and decision making which can be considered as non destructive testing. Understanding, description and analysis of object segmentation is very important tasks achieved with the help of boundary detection and edge map techniques. The method is proposed to detect the correct boundary of object in image. Vector image model and edge mapping models are implemented for achieving the same. Comparing to the existing model, the proposed method takes less computation time for detecting boundary of objects. The proposed method is not only applicable for medical image; it can be applied to any image processing problems in which ill defined boundaries are detected [6].

III. CONCLUSION

In this paper, we have taken a deep literature survey for understanding the proposed methods of image segmentation. At the same time an overview of areas of improvement in the algorithms proposed by researched are taken in to consideration. The various proposed methods along with their advantages and disadvantages are discussed in this paper. We have presented the review explaining exact aim and method implemented by researchers in order to achieve better image segmentation. Future areas for the research work can be identified from the previous work by overcoming the difficulties and problems in enhancement of image quality and segmentation process.

REFERENCES

[1] *"Boundary Detection in Medical Images Using Edge Following Algorithm Based on Intensity Gradient and Texture Gradient Features,"* Krit Somkantha, Nipon Theera-Umpon and Sansanee Auephanwiriyakul, IEEE TRANSACTIONS ON BIOMEDICAL ENGINEERING, VOL. 58, NO. 3, MARCH 2011

[2] "*Liver Segmentation using K-Means Algorithm and Mathematical Morphology,"* Vijendra P. Meshram, Rajesh.D. Thakare, Prashant Wanjari, Vishwas V. Balpande, Ishan A. Patil, International Journal of Advanced Research in Computer Science and Software Engineering, Volume 5, Issue 3, March 2015 ISSN: 2277 128X.

[3] *"Boundary Detection Algorithm Implementation for Medical Images,"* International Journal of Engineering Research & Technology (IJERT) Vol. 3 Issue 12, December-2014, ISSN: 2278-0181.

[4] *"Intensity and Texture Gradient Based Boundary Detection Algorithm for Medical Image,"* Sai Kumar, V. Vijaya Kishore, International Journal of Computer Trends and Technology (IJCTT) – volume 6 number 4– Dec 2013.

[5] *"Intensity based image segmentation using wavelet analysis and clustering techniques,"* GURBINDER KAUR, BALWINDER SINGH Indian Journal of Computer Science and Engineering (IJCSE), Vol. 2 No. 3 Jun-Jul 2011, ISSN: 0976-5166.

[6] "*Boundary Exposure Using Intensity and Texture Gradient Features,"* Ms.S.Veeralakshmi, Mrs.S.Vanitha Sivagami, Ms.V.Vimala Devi,and Ms.R.Udhaya, IOSR Journal of Computer Engineering (IOSRJCE), Volume 8, Issue 1 (Nov. - Dec. 2012), PP 28-33, ISSN: 2278-0661, ISBN: 2278-8727.