International Journal of Engineering Technology and Management Sciences
Website: ijetms.in Issue: 4 Volume No.6 July – 2022
DOI:10.46647/ijetms.2022.v06i04.0041 ISSN: 2581-4621

LIVER SEGMENTATION IN CT SCAN FOR OPTIMIZED METHOD

S.Subha[1], Dr.U.Kumaran[2]
[1,2]Noorul Islam Centre for Higher Education, Kumaracoil, Thuckalay.

ABSTRACT

In a medical side liver segmentation is a major problem. It is a much more challenging task among other segmentation than a liver segment. So we have to introduce automatic segmentation of liver in CT images and MRI has become significance in medical area, so we are focusing the managing on domain from MRI to CT volumes on the example of 3D and 2D liver segmentation. Here, we are implemented to fuzzy clustering method and cuckoo optimized method to used in this method. In additional that the purpose of this method is to used for liver boundary calculation and segment the values using fuzzy C-means and fuzzy clustering using Support Vector Machine (SVM) for classification). The spatial liver boundary by constraints are named with different method such as the user can choose on particular region of interest and contour method until more accurate results to be obtained.

Keyword: Fuzzy Clustering, Cuckoo Search Optimization, Liver boundary, MRI, SVM.

I. Introduction

In clinical area organ segmentation is an important task for clinical experiments, as it often used for preoperative planning and aids in medical image based diagnostics. Normally the liver is an organ only found in such synthesis which are detoxifies various than metabolites and synthesizes proteins by produced in biochemical necessary for digestion. The liver segmentation particularly segmented in essential volume of measuring and computerbelow of diaphragm. In image segmentation the liver has a kind of complexity tosegment the part, and which rises from the similarity between intensity value of liver and while other surrounding organs in the abdomen as spleen, stomach and kidney MRI (Magnetic Resonance Imaging) is a well known modality of liver imaging and CT(Computed Tomography) images have been widely used for liver diseases in diagnosis and measurement of liver volume in surgery or transplantation. In sematic segmentation of real images have been adapted from some special properties of medical image in a various yield modalities. So we have to improve the segmentation for basic of step regarding other image processing algorithms.

II. Related work

In[7] liver segmentation in MRI:A fully automatic method based on stochastic partitions, F.Lopez-Mir, V.Naranjo, I.Angulo are address the problem of fully automatic liver segmentation in medical images is currently on unsolved problem and they present a new method for liver segmentation based on the watershed transform and stochastic partitions. Optimal parameters of the method are turned using a training dataset and they are applied to the rest of studies in (17 datasets). The algorithm presented directly applied in the 3D data instead of following a 2D strategy case.

In[5] an Efficient and Clinical- Oriented 3D liver segmentation method, Qin-zhang, Yingfang fan, Jiafu Wan and Yanxia Liu address the problem liver is a solid organ, it only radiological methods can observe the position and size of a tumor in liver, which makes precise

International Journal of Engineering Technology and Management Sciences
Website: ijetms.in Issue: 4 Volume No.6 July – 2022
DOI:10.46647/ijetms.2022.v06i04.0041 ISSN: 2581-4621

liver surgery panning is possible. This paper gives an efficient and semi automatic method for segmenting the liver in clinical cases. Portal vein branches was provided on the basis of automatic segmentation thus, adaptability to various cases was implemented.

In[3] Deep Belief Network Modelling for automatic liver segmentation, Mubashir Ahmad, Dannis Ai, GuiwangXie, and Yian Yang addressed the problem automatic methods are usually initialized with a certain threshold and morphological operations to deals with some issues . semi-automatic methods with minimal user interaction and initialization can obtain a better results. In this paper they proposed an automatic feature learning algorithm based on the deep belief Network (DBN) for liver segmentation. This algorithm achieved 94.80% dice similarity co-efficient on images while 91.83% on pathological liver images, which is better than those of the state-of the art method.

In[6] Liver segmentation in MRI images based on whale Optimization algorithm AbdallaMostafa, Aboul Ella Hassanien, Mohamed Houseni, HeshamHefny was proposed tested using a set of 70 MRI images, annotated and approved by radiology specialists. The resulting image is valid to using Structural Similarity Index Measure (SSIM), Similarity Index (SI) and other five measures. The purpose of Whale Optimizer Algorithm (WOA) is a bio-inspired technique which is used to get the optima solution, where the optimal solutions is considered the image clusters. When we cluster the image theclustered image is multiplied by the statistical image. This removes a part of the abdomen includes other organs. It required clusters to representing the liver pixel is picked up manually to get an initial segmented liver. The overall accuracy of the experimental result showed accuracy of 94.75% using SSIM and 96.5 using SI%.

In [10] A comparative study of K-means and Graph cut 3 method of liver segmentation ShraddhaSangewar and Premadaigavane to comparative analysis between K-means and graphcut segmentation technique for extraction of liver organ is done and on the basis of the result obtained different parameters related to liver are computed. It is based on comparison between two different segmentation techniques. In order to obtain enhance view of liver organ, region growing and canny edge detection is used.

III. Methods

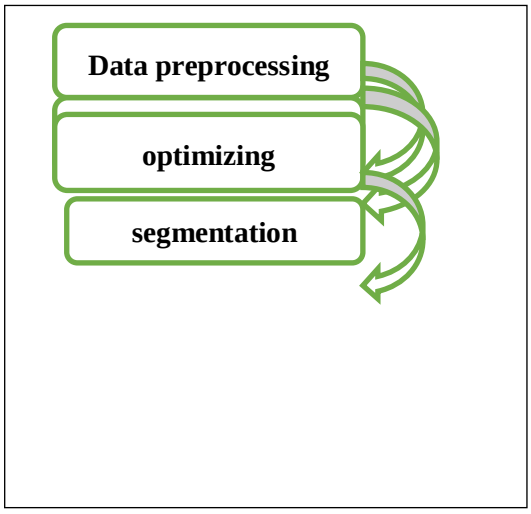

Fig1.Clustering, optimizing, segmentation method

A) CT/MRI

CT(Computed Tomography) scan, it is the detailed images of internal organs are obtained by this type of sophisticated x-rays devices. The CT scan reveal anatomic details of internal organs that cannot be seen in conventional X-rays. MRI (Magnetic Resonance Imaging) scan produces an

International Journal of Engineering Technology and Management Sciences
Website: ijetms.in Issue: 4 Volume No.6 July – 2022
DOI:10.46647/ijetms.2022.v06i04.0041 ISSN: 2581-4621

image of the body using a strong magnet and radio waves. MRI scan can show the muscles, ligaments and tendons, nerve roots and cartilage with precisions.

B) Pre-Processing

In preprocessing median filter is used in this techniques. A median filter operates over a window by selecting the median intensity in the window. Median filtering is a non linear method used to remove noise from images. It is widely used as it is very effective at removing noise while preserving edges. It is particularly effective at removing ‘ salt and pepper ‘ type noise. According to the median filter, the center pixel of a M*M neighborhood is replaced by the median value of the corresponding window. Note that noise pixels are considered to be very different from the median using this idea median filter can remove this type of noise problems. We use this filter to remove the noise pixels on the protein crystal images before binarization operation. In this median filtering includes cleaning, normalization, transformation, feature extraction and selection etc.

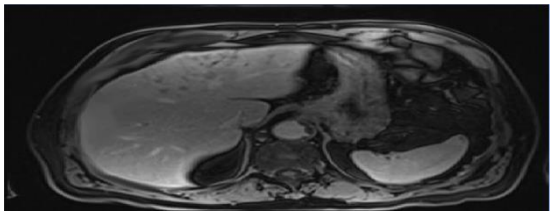

Fig .2. Normal liver

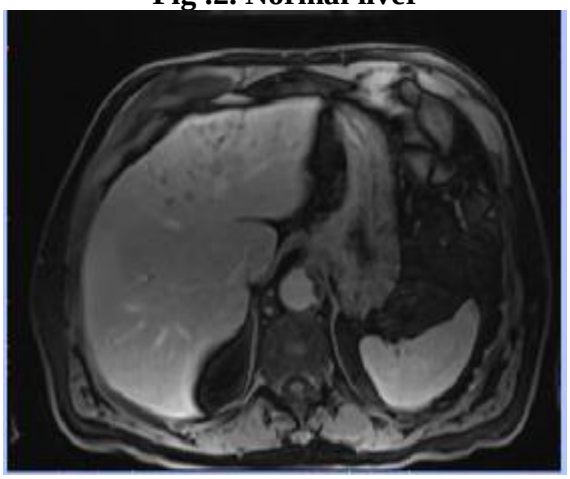

Fig.3. applied median filter image

C) Clustering

In clustering or cluster analysis involves assigning data points to clusters such that items in the same cluster analysis are as similar as possible, while items belonging to different clusters are as dissimilar as possible. Fuzzy clustering is separated a group in same cluster are as similar in possible. In fuzzy clustering every point has a degree belonging to clusters as in fuzzy logic, rather than belonging completely to just one clusters. Thus points on the edge of a cluster, maybe in the cluster to a lesser degree than points in the center of cluster.

The FCM algorithm is one of the most widely used fuzzy clustering algorithms. This technique was originally attempts to partition a finite collection of elements x={…} into a collection of C fuzzy clusters with respect to some given criterion. A finite set of data , the algorithms depends on list of clustering centers V, such that V=Vi, i=1,2…C, matrix U such that U=Uij, i=1,..C,j=1,…n.

In clustering set is used as each pixel can belong to many clusters based on membership degree resulting is better performance in image with poor contrast, region overlapping and inhomogeneity of region contrast such as CT images, compared to hard clustering where each pixel can only

International Journal of Engineering Technology and Management Sciences
Website: ijetms.in Issue: 4 Volume No.6 July – 2022
DOI:10.46647/ijetms.2022.v06i04.0041 ISSN: 2581-4621

belong to a single clusters.

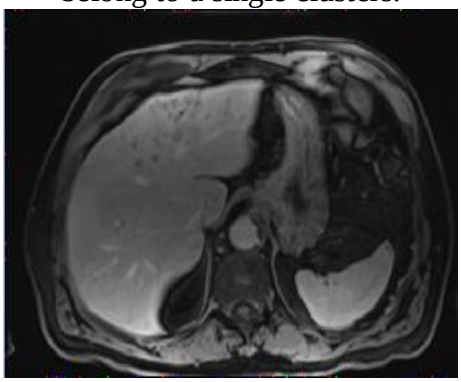

Fig 4. Median filter image for cluster analysis

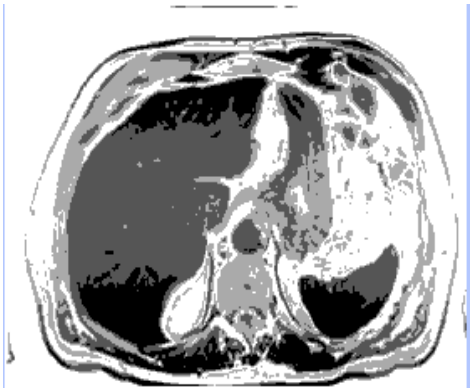

Fig.5. fuzzy C- means Clustering liver image

D) Optimization

In Optimization COA algorithm is used. The cuckoo optimization algorithm (COA) is used for continuous non-linear optimization. In randomly generate initial population of n host nest and assign the position to each nest xi and it evaluate the fitness value of each nest fi. To carry out levy flight to get new nest's position x1 and evaluate its fitness f1. For comparing the fitness of new nest fitness, f1 and host nest f1, with fraction p of the worst nests are replaces by new nests using a random flights. To comparing newly searched nest with worst discovered nest and keep the best nest, finally maximum iteration is reached the best iterate to take a best nest. And final objective is maximized then the prediction accuracy get enhanced.

Fig.6. layout liver cluster

International Journal of Engineering Technology and Management Sciences
Website: ijetms.in Issue: 4 Volume No.6 July – 2022
DOI:10.46647/ijetms.2022.v06i04.0041 ISSN: 2581-4621

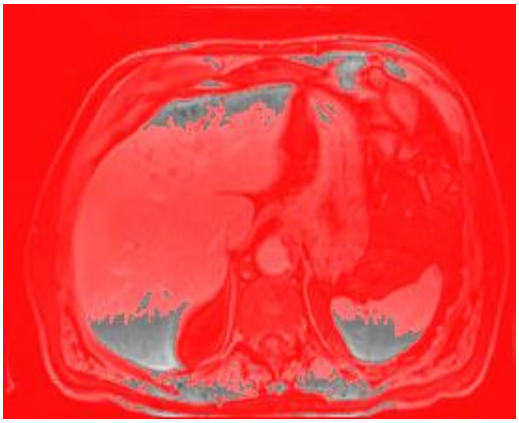

Fig.7.applied cuckoo search optimized liver

E) Segmentation

In segmentation Random Walker method (RW) method has been widely used to segment the organ in the volumetric medical image. However , it leads to a very large-scale graph due to a number of nodes equal to a voxel number and inaccurate segmentation because of the unavailability of appropriate initial seed point setting. The random walk is simple if xk=+-1, with P(Xk=1)=p and P(XK=-1) = 1-p=q. Imaging a particle performing a random walk on the integer points of the real life, where it in each step moves to one of its neighboring points. In Random method was performed in a set of marker pixels with L labels corresponding to desired segmentation regions, and mapping the image features such as intensities texture information or other image features to edge weights and built the laplacian matrix. It perform the random walker and obtain segmentation label for each region.

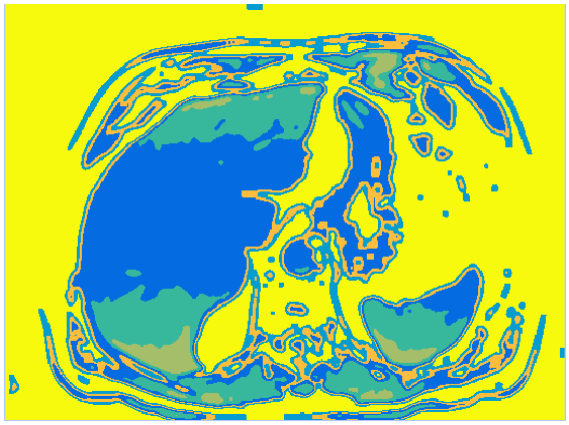

Fig.8.Random Walker segmentation in liver

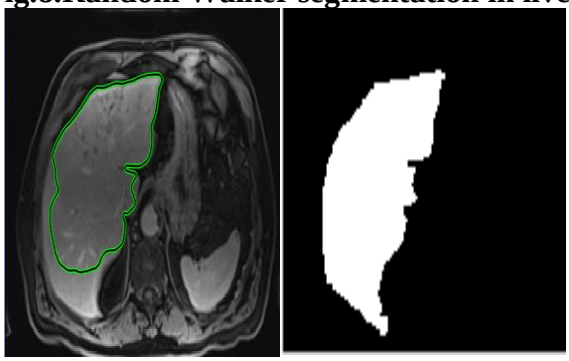

Fig.9. analysis a liver segmentation part

IV) Experiments Data & Implementation:

The experimental steps consists preprocessing an Image, fuzzy algorithm and Cuckoo

International Journal of Engineering Technology and Management Sciences
Website: ijetms.in Issue: 4 Volume No.6 July – 2022
DOI:10.46647/ijetms.2022.v06i04.0041 ISSN: 2581-4621

optimization in a liver part and performed in CT scan image.Enhanced Median filter:Median filtering is a smooth level technique to used in a linear Gaussian filtering. In a effective at removing noise is smooth patches and region of signal is effective. The contrast region level of CT image is increasing a intensity to identify a tumor level of original images in finalize in NS domain.

Liver Boundary Calculation: In volumetric boundary calculation of cross sectional imaging computed tomography (CT) scan of proposed in estimated by segmentation of liver volume.

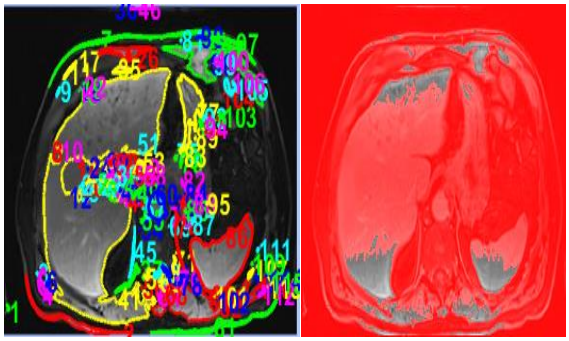

Fig .10. Liver boundary calculation

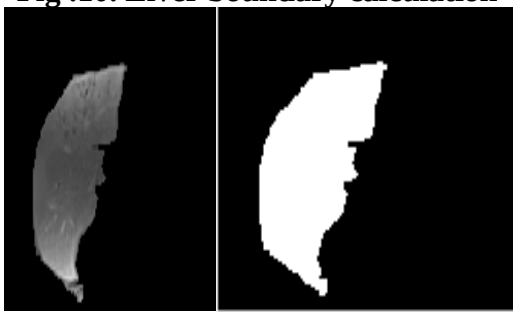

Fig.11. liver segmentation part

V) Results and Discussions:

This work has developed a new fuzzy C-means algorithm. Here the input image was subjected to segmentation, where the initial centroid were optimally selected by an improved C-means clustering following segmentation, the proposed Cuckoo search optimization used for extracted from the segment image and boundaries of liver can be accurately segmented. This method take full advantage of the intensity and shape of liver. The method displays both the accuracy of the confidence connected method and time efficiency of fully automatic processing.

VI) Conclusion and future work:

In this paper, we have to detect the noise image and using centroid point of C-means fuzzy clustering and finalize the Cuckoo Search Optimized from the liver boundary segmentation. In future work decrease the error time detection.

References:

1.Zachary Augenfeld, Ming De Lin, Julius Chapiro “Automatic multimodal Registration via Intra procedural cone- beam CT segmentation using MRI Distance maps, Biomedical Imaging p.p-692-695, 2020.

2. NasimNasiri, Amir HosseinForuzan, Yon-weichen, “ A controlled generative model for segmentation of liver tumors, electrical engineering p.p-1742- 1745, 2019.

3. Xinu Jin, Huimin Ye, Lanjuan Li, “ Image segmentation of liver CT based on fully convolutional network” computational Intelligence and design. P.p-210 -213, 2017.

4. D.D.Pham, G. Dovletv and J. Pauli, “ Liver segmentation in CT with MRI data: zero shot domain adaption by contour extraction and shape priors, p.p-1538- 1542, 2020.

DOI:10.46647/ijetms.2022.v06i04.0041 ISSN: 2581-4621

5. MinfengXu, Yu Wang, Ying Chi, XianshengHua, " Training liver vessel segmentation deep neural network on noisy labels from contrast CT imaging, "Biomedical imaging.p.p-1552-1555,2020.
6. Abdallamostafa, Aboul Ella Hassanien, Mohammed Houseniheshamhefny, "Liver segmentation in MRI image based on whale optimization algorithm" Dec-2018.
7. F.Lopez-Mir, V.Naranje, J. Angulo, M.Alcaniz, L.Luna, " Liver segmentation in MRI: A fully automatic method based on stochastic partitions. P.p-11-28, 24 December 2013.
8. MinyoungCung, Jingyu Lee, Jeongjin lee and Yeong- Gil Shin, " Liver segmentation in abdominal CT images via abdominal CT images via auto-content Neural network and self supervised contour attention 14, feb 2020.
9. Seong-Jae Lim, Yong- YeonJeong, Yo-sung Ho" Automatic liver segmentation for volume measurement in CT images" visual communication and Image representation volume 17, issue 4, August 2006, p.p-860-875.
10. Karsten Roth, Jurgenbesses, Tomasz Konopczynski" mask mining for improved liver lesion segmentation", biomedical imaging.p.p-943-947, 2020.