World Journal of Engineering Research and Technology

WJERT

www.wjert.org

SJIF Impact Factor: 5.924

REVIEW ON MEDICAL IMAGE SEGMENTATION ON MRI IMAGES

Dibyendu Roy Chowdhury and Dr. Dilip Kumar Shaw*

Assistant Professor, Dept. of Computer Science and Engineering National Institute of Technology, Jamshedpur-831014, India.

Article Received on 08/03/2022 **Article Revised on 29/03/2022** **Article Accepted on 18/04/2022**

***Corresponding Author**
Dr. Dilip Kumar Shaw
Assistant Professor, Dept. of Computer Science and Engineering National Institute of Technology, Jamshedpur-831014, India.

1. INTRODUCTION

Image processing is a method of enhancing images. raw photos from cameras and sensors put on satellites, space probes, medical instruments and other spacecraft aircrafts or photographs shot in everyday life for a variety of purposes. Several strategies have been developed in this field. During the previous four to five years, image processing has become more sophisticated. decades. The majority of the procedures are simple. created for the purpose of improving photos space probes and unmanned spacecraft as well as military reconnaissance flights. The use of processing systems is growing in popularity. because powerful persons are readily available. large-capacity memory devices, computers. Graphics software, for example.

2. Introduction to Medical images

a. Now days image processing is hugely used on different types of medical images like X Ray tomography, Magnetic resonance imaging (MRI), Ultrasounds etc. Clustering can be derived from different functional and structural data that is provided by medical image processing technology. This visual diagnosis large set of data can be partly help Doctor for their work.

b. The extraction of images or other data pixels of interest is called segmentation that have to be performed in image data pixel with similar types of features. In this paper we are presenting and discussing some previous existing fuzzy set literature and then we apply them in medical images.

c. In those we consider fuzzy c means (FCM), Possibilistic c means (PCM) and possibilistic

fuzzy c means (PFCM). In the next part we will discuss the application of the fuzzy clustering algorithm to the segmentation.

2.1 MRI image

Magnetic resonance imaging (MRI) is a medical imaging technique used in radiology to form pictures of the anatomy and the physiological processes of the body. MRI scanners use strong magnetic fields, magnetic field gradients, and radio waves to generate images of the organs in the body.

3. OBJECTIVE

Magnetic resonance imaging Segmentation is a difficult and complex issue. This paper purposes a newer modified version of previous existing algorithm for finding the output of proper number of cluster and segmentation. The purpose of this algorithm is that it would automatically divides the number of different image areas with respect to its entropy.it also increase the precision on segmentation. To solve this problem, we have used the combination of conventional fuzzy c means and modified version of it. Our experiment shows that the proposed method has a better improvement in the accuracy of image segmentation with comparison to all other similar methods.

4. Related Work

There is a huge amount of research work that had been done on image segmentation.

From last few years researchers have come up with new methods to modify and improve FCM algorithm. This part of this paper shows us the FCM related works those are on medical image processing.

i. A great approach for lung image as similar as MRI image detection was proposed by M. Antonelli et al. They described the machine learning based automated detection of computed tomography images. Combination of some image processing techniques are used in this to extract tissues. A region growing method on 3D image technique is applied on it. In this error rate is very low.

ii. A genetic algorithm on medical image segmentation was introduced and proposed by Ghosh et al. In their paper they proposed 2D slices on computed tomography images. In their paper they genetic algorithm they reviewed some previously existed image segmentation techniques. They used simple texture extraction techniques. Other thing is that they also used GA based tool called GENIE. They expected that their further

improvement should be on 3D images.

iii. In this paper by Ningning Zhou et al, they proposed the modified version of FCM.as of that FCM is sensitive to noise. This paper produces improved FCM based on MMTD (Medium truth degree). It uses medium similar pixels measure and correlation of Pixels and its neighbor pixel to define the median membership function. Proposed algorithm on their paper called MMTDFCM can classify pixels more correctly.

iv. In this paper Madallah Alruwaili and all others introduced a technique weighted spatial fuzzy c-means (wsFCM) by utilizing spatial context of images. That has been developed for the segmentation of MRI images. In the proposed algorithm, a spatial function is proposed the membership function of regular fuzzy c-means technique. This function considers the spatial characteristics of the image and assigns weights to the neighbours according to their correlation with central pixel in the neighbourhood. The help of spatial function into membership function modifies the robustness of the algorithm to noise and intensity thus providing better output of segmentation. The spatial function encourages the membership function which is helpful in preserving the edge regions in the image.

v. In "Modified Possibilistic fuzzy c means algorithm for segmentation of medical resonance image" J aparajeeta and all others focused on bias corrected image. The performance of the proposed algorithm is comparable with the others.

5. Background Work

- MR image Model: it consists of different tissues such as gray matter, white matter and cerebro spinal fluid with bias field. Here we can consider X is denoted as tissue classes,B is bias fiels and Y is observed image. Here our model is

Y = XB

Taking logarithm of both the sides Log(Y)=Log(X) + Log(B)

So, y = x + β

We know that in FCM and PCM, there have limitations when we clustering our data set. Previously we have seen that a method for bias field compensation with effect of neighboring pixels. Here Proposed algorithm is a modified version of FCM with regularizer. The neighborhood lebeling is a regularizer and bias is the solution of it.the helps to reduce noise effect and bias fields in segmented output.

$$J_m=\sum_{i=1}^{c}\sum_{j=1}^{p} u_{ij}^{m}\|y_j\text{-}\beta_j\text{-}v_i\|^2 + \frac{\alpha}{N_r}\sum_{i=1}^{c}\sum_{j=1}^{p} u_{ij}^{m}\left(\sum_{r\in N_k}\|y_j-\beta_j-v_i\|^2\right) \quad \ldots\ldots(1)$$

Where Jm denotes the objective function,

vi is the ith cluster of prototypes,

Nk is a set of Neighborhood pixels of yj.

Nr is the cardinality of Nk.

um is a fuzzy membership and another parameter α controls the neibourhood.

here c denotes the number of centers and p denotes the number of pixels on given image.

6. My proposed Work

- Image could be filled with noise with nonlinear field. The objective function is given as equation no 1.
- Fuzzy membership function is assigned to each and every pixel of this image.in order to deal with noise and neighborhood pixel by itself ,we assign a distance function on all pixels as fuzzy and topicalities membership combination.
- Isolated data points and noisy data points have been taken care using topicalities function hence we modeled noisy bias data field using typicality.
- The data points have been modeled with jointly typicality measure, fuzzy membership values and shows the proper typicality and fuzziness.
- Here we can use neighborhood pixel from cluster prototype.
- it jointly change the weighted typicality and fuzziness.
- Here we add penalty term on objective function for efficient modeling of data.

7. Future Work

In relation to the above proposed work, we are looking forward to do the following:

i) To implement the proposed model using python.

ii) Compare it with previous works.

iii) Writing the report.

REFERENCES

1. M. Antonelli, G. Frosini, B. Lazzerini, and F. Marcelloni, "Lung Nodule Detection in CT Scans," World Academy of Science, Engineering and Technology, 2005.
2. Payel Ghosh, and Melanie Mitchell, "Segmentation of medical images using a genetic algorithm," Proceedings of the 8th annual conference on Genetic and evolutionary computation, 2006; 1171-1178.
3. In "Modified Possibilistic fuzzy c means algorithm for segmentation of medical resonance image"