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An Extraction of Cancer Region from MR Images Using Fuzzy Clustering Means and Morphological Operations

Ramandeep Kaur*
Department of Computer Engineering,
University College of Engineering,
Punjabi University, Patiala, Punjab, India

Abstract-

Cancer diagnosis is very difficult task. MRI (Magnetic resonance imaging) scan used to produce image of any part of the body and provides an efficient way for diagnosis of cancer or tumor. In existing method FCM(Fuzzy clustering mean) is used to diagnosis of the tumor .In the purposed method FCM is used to diagnosis the cancer of the foot.FCM finds the centroids of the clusters of the foot cancer obtained from MRI images. FCM thresholding result shows the extract region of the cancer. Morphological operations are applied to get extracted region of cancer.

Keywords- MRI (Magnetic resonance imaging), Fuzzy C Mean clustering, Segmentation, Morphological operations.

I. INTRODUCTION

Cancer is known as a broad group of various diseases, which is involving, unregulated growth of cells. In cancer, cells are divided and grow uncontrollably, and are forming malignant tumors, and different parts of the body. The cancer might also spread to additional distant parts of the body through the bloodstream. . There are over 200 variant known cancers that afflict human body parts. Image intensity of MRI images depends upon different parameters. These parameters affect the intensity of MRI images. When we capture the image through the lens of the camera its clarity depends upon the wavelength of the light which is focused on the image trough lens. In the same way medical resonance images intensity depends upon the wavelength of the x-rays. In MRI images radio frequency are applied to magnetic field to systematically align the magnetization. MRI provides the wide information about the cellular tissues of the human .Medical resonance images used to study the behavior of cancer or cellular cells known as tumor that grows in different parts of the body. The images acquired are known as normal and abnormal behavior images. The proposed method works in 4 steps. Firstly MR image is converted to gray scale image and filtering of an image is done with high pass filter and image enhancement filter. After that FCM thresholding is done with morphological operations. Cancer results from the abnormal growth of tissues in the foot. Cancer can affect any person at any stage of age. It has variety of shapes and sizes. It can appear at any location like foot, brain, finger etc. The purposed method is used for the image of foot for the extraction of cellular part known as tumor or cancer.

Many different ways are used for the detection of the growth of cellular tissues that cause the cancer. These may be CT (computed tomography) or MRI (medical resonance image).MRI seems to be the efficient way of supplying the location of the cancer or tumor with proper size. Details of the overview are given in the section 2. Experimental results are given in section 3. Conclusion and the future work are defined in the section 4.

II. METHODOLOGY USED

Pre processing is done by Gray scale conversion of an image followed by filtering of an image. High pass filter and image enhancement filters are used to remove the noise. not good for all types of the MRI images. FCM thresholding is used for the segmentation of MR image followed by morphological operations.

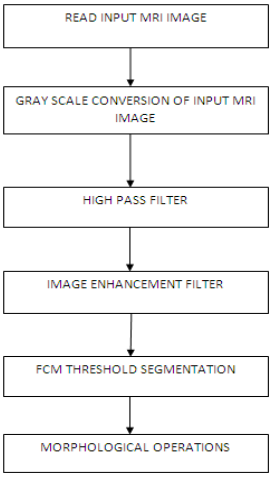


Figure 2.1 Block Diagram of Proposed work

III. METHODS

3.1 Preprocessing:

In preprocessing some basic image enhancement and noise reduction techniques are implemented. Apart from that different ways to detect edges and doing segmentations have also been used. The purpose of these steps is basically to improve the image and the image quality to get more surety and ease in detecting the tumor. The basic steps in preprocessing are the following:-

- Image is converted to gray scale image in first step.
- Noise is removed if any
- The obtained image is then passed through a high pass filter to detect edges.
- Then they obtained image is added to original image to enhance it.

3.2 Threshold segmentation: Segmentation is done on basis of a threshold, due to which whole image is converted into binary image. Basic matlab commands for thresholding are used for this segmentation.

3.3 FCM thresholding: fcm is used for the feature extraction of an image. The extracted region is processed for thresholding.

In approximated regioning area of tumor is extracted using morphological operations.

IV. DESIGN AND IMPLEMENTATION:

MODELLING TECHNIQUES:

4.1Fuzzy C Mean Clustering:

4.1.1 Detailed Procedure of Fuzzy c-mean

- Select centers of cluster 'c'.
- Initialize fuzzy matrix "μ_n" for membership check.
- Calculate the fuzzy centers "v_c".
- Update membership matrix after calculating centers.
- Check if | μ_n-v_c|< threshold value.
- Stop the work.

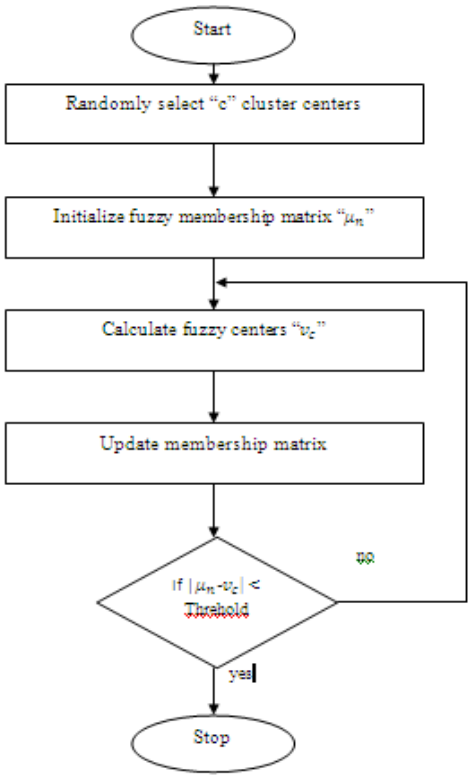


Figure 4.1 Algorithm of Fuzzy C-Mean

From qualitative results, it shows that standard c mean clustered the image properly but it does not separate (detected) cancer from original image figure (a).Morphological operations are applied for fuzzy c mean clustering algorithm shown in figure 5.1(b) But in case, if these operation are applied on simple gray scale image, it cannot detect tumor properly results are shown in figure 5.1(b)that's why we use it after applying c mean clustering for enhancing the performance of standard c mean clustering. In case of c mean clustering, it separates the tumor from original image properly result is shown in figure 5.1 (c). Other results are also computed by using same procedure as mentioned above shown in figure 5.2 to figure 5.12.Quantitative results are shown in table 5.1 to table 5.2 conclude that c mean clustering have good performance.

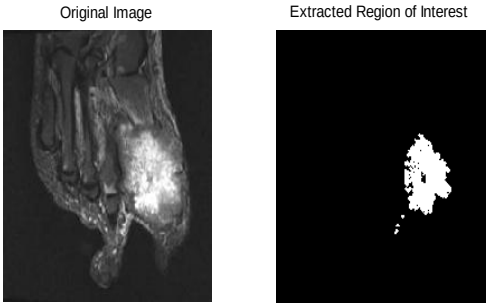


Figure 4.2(a) input image of foot.

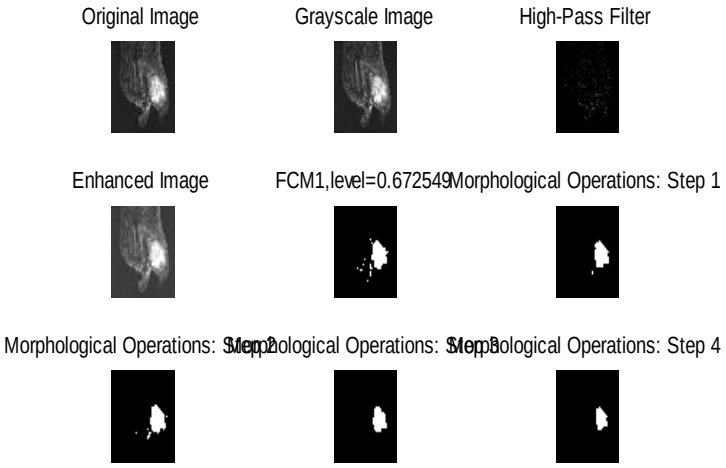


Figure 4.2(b) shows the original image with Gray scale conversion, high pass filter, enhanced image, Fuzzy c mean followed with morphological operations.

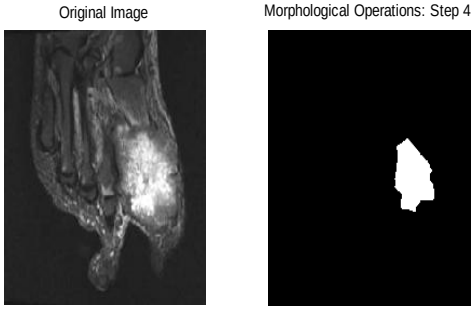
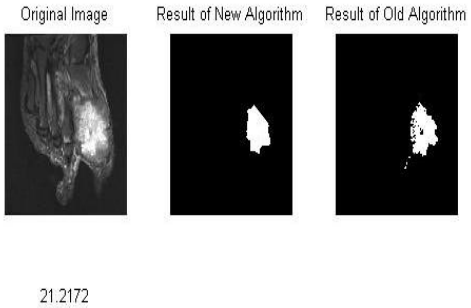


Figure 4.2 (c) output image of extracted region of affected portion of foot.



V. CONCLUSION

Aim of this work is to extract or detect the tumor area from MRI images of different affected body parts. The extraction of tumor area from MRI images of different body parts is having a great importance in the field of Medical Sciences and Medical Imaging.

This algorithm results can be enhanced on MRI images clicked from different angles of tumor affected body part, to analyze the tumor area from various angles and a new kind of MRI report generation using this algorithm. Accuracy of this algorithm can be also enhanced

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[10] A.Sivaramakrishnan1, Dr.M.Karnan2 Assistant Professor, Department ofComputer Application, Karunya University, India 1 Professor and Head, Department of Computer Science and Engineering, Tamil nadu College of Engineering, India 2

