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REVIEW ARTICLE

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A Review on Image Segmentation for Medical Images

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Abstract- *Image segmentation is frequently characterized as a segment of pixels or picture blocks into homogeneous gatherings. These gatherings are described by a prototypical vector in histograms, e.g., the space of Gabor filter reactions, by prototypical histograms of components or by pair wise dissimilarities between picture squares. For each of the three information positions cost capacities have been proposed to measure distortion and, in this manner, to encode the nature of a segment. Robust algorithms for picture preparing are planned by taking after three stages. In this paper, the performance of PFCM algorithm is discussed and compared to those of many derivatives of FCM algorithm. Experimental results on segmentation of synthetic and real images demonstrate that the proposed algorithm is effective and robust.*

Keywords: *Segmentation, Using morphological operator, implement multi-fractal algorithm.*

1. INTRODUCTION

IMAGE SEGMENTATION

The division of a picture into important structures, image segmentation is frequently a vital stride in picture examination, object representation, perception and numerous other image processing tasks. Segmentation partitions an image into distinct regions containing each pixel with similar attributes. To be meaningful and useful for image analysis and interpretation the region should strongly related to depicted or features of interest. It deals with the procedure for separating out different parts from an image. Meaningful segmentation is the first step from low level image processing transformation a grayscale or colour image into one or another image to high level image description in terms of features and objects and scenes.

Medical images here refers to images of any part of the human anatomy taken with the aid of medical imaging devices/machines like magnetic resonance, computed tomography, X-ray, magnetic resonance angiography and taken in accordance with stipulated procedure. One of the main characteristics of medical images that distinguished it from other type of mages is its weak edges meaning there is a continuous flow of image information from one region to the adjacent one. This characteristic makes it more difficult to segment medical images into distinct regions for proper examination and accurate analysis in addition to the fact that no single segmentation technique is perfect in all respect.

A variety of approaches has been proposed both for image segmentation as well as medical image segmentation. Different types of image segmentation techniques are used for different types of images.

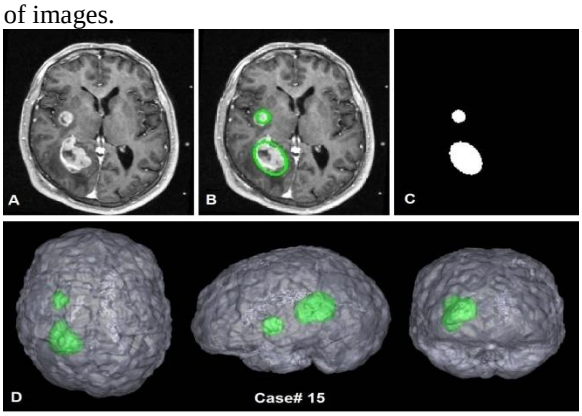

Fig. 1. Medical image segmentation

In this paper we discuss about the comparative study of Fuzzy c Means (FCM), penalized fuzzy c means algorithm (PFCM) and Kernelized Fuzzy c-means (KFCM) algorithms.

2. METHODS OF SEGMENTATION

Region Based- In this method pixels that are identified with an item are gathered for division. The thresholding method is bound with area based division. The zone that is distinguished for division bought to be shut. District based division is additionally termed as "Likeness Based Segmentation". There won't be any hole due to missing edge pixels in this locale based segmentation.

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Edge Based- In this technique the limit is distinguished to segment. Edges are recognized to distinguish the discontinuities in the picture. Edges on the area are followed by distinguishing the pixel worth and it is thought about with the neighboring pixels. For this characterization they utilize both altered and versatile component of Support Vector Machine (SVM)

Threshold- Thresholding is the most straightforward method for segmentation. It is done through that limit values which are gotten from the histogram of those edges of the first picture. The limit qualities are acquired from the edge distinguished picture. So, if the edge detections are accurate then the threshold too. Division through thresholding has fewer calculations contrasted with different strategies. Segmentation depends on "his ton". For a specific section there might be set of pixels which is termed as "his ton". Unpleasantness measure is trailed by a thresholding technique for picture division.

Feature Based Clustering- Segmentation is additionally done through Clustering. They took after an alternate system, where the vast majority of them apply the method straight forwardly to the picture however here the picture is changed over into histogram and after that bunching is done on it. Pixels of the shading picture are grouped for division utilizing an unsupervised procedure Fuzzy C. This is connected for standard pictures. On the off chance that it is an uproarious picture, it results to fracture.

Model Based- Markov Random Field (MRF) based division is known as Model based division. An inbuilt area smoothness limitation is displayed in MRF which is utilized for shading division. Segments of the shading pixel tuples are considered as autonomous arbitrary variables for further handling. MRF is consolidated with edge recognition for recognizing the edges precisely.

Thresholding is the simplest segmentation method. The pixels are partitioned depending on their intensity value.

3. TYPES OF IMAGE SEGMENTATION ALGORITHMS

FCM-The Fuzzy C- means (FCM) [5], algorithm, proposed by Bezdek, is the most widely used algorithm in image segmentation because it has robust characteristics for ambiguity and it can retain much more information than hard segmentation methods. FCM has been successfully applied to feature analysis, clustering, and classifier designs in fields such as astronomy, geology, medical imaging, target recognition, and image segmentation. An image can be represented in various feature spaces and the FCM algorithm classifies the image by grouping similar data points in the feature space into clusters. In case the image is noisy or distorted then FCM technique wrongly classify noisy pixels because of its abnormal feature data which is the major limitation of FCM.

Kernelized Fuzzy c-means (KFCM) Fuzzy C-means (FCM) [3] clustering algorithm is the soft extension of the traditional hard C-means. It considers each cluster as a fuzzy set, while a membership function measures the possibility that each training vector belongs to a cluster. As a result, each training vector may be assigned to multiple clusters. Thus it can overcome in some degree the drawback of dependence on initial partitioning cluster values in hard C-means. However, just like the C-means algorithm, FCM is effective only in clustering those crisp, spherical, and non-overlapping data. When dealing with non-spherical shape and much overlapped data, such as the Ring dataset FCM cannot always work well .Therefore we use the kernel method [3][5] to construct the nonlinear version of FCM, and construct a kernel-based fuzzy C-means clustering algorithm (KFCM). The basic ideas of KFCM is to first map the input data into a feature space with higher dimension via a nonlinear transform and then perform FCM in that feature space.

PENALIZED FCM ALGORITHM (PFCM)

It is noted from (1) that the objective function of the traditional FCM algorithm does not take any spatial information into account; this means the clustering process is related only to gray levels independently of pixels of the image in segmentation. This limitation makes FCM very noise-sensitive. The general principle of the technique presented in this paper is to incorporate the neighborhood information into the FCM algorithm during classification. In order to incorporate the spatial context into FCM algorithm, the objective function of (1) is penalized by a regularization term, which is inspired by the above NEM algorithm and modified based on the FCM algorithm criterion. The new objective function of the PFCM is defined as follows.

$$J_{PFCM} = \sum_{k=1}^{n}\sum_{i=1}^{c}(u_{ik})^q d^2(I_k, v_i) + \gamma \sum_{k=1}^{n}\sum_{j=1}^{n}\sum_{i=1}^{c}(u_{ik})^q (1-u_{ij})^q w_{kj}$$

.

4. CONCLUSION

Image segmentation is a process of extracting the information from a particular image on the basis of different approaches. Segmentation has been used for extraction of hidden information available in the medical images. In the medical images some contents cannot be seen through naked eyes. These images have to be pre processed and segmented using different segmentation approaches. These approaches used for segmentation does not provide proper information because sometimes edges and structure of input image get dispersed. Above discussion, show that the proposed method is effective and more robust to

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Gaussian noise and other artifacts than the conventional FCM algorithm in image segmentation.

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