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A Hybrid Technique of Medical Image Segmentation Using Drlse Algorithm

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Abstract: **Image segmentation plays very significant position in medical image segmentation. For diagnose lacerations presented on magnetic resonance image (MRI) segmentation is required, it can be manual segmentation or computer based segmentation. Manual segmentation cannot provide accurate results some times, for improve precision various computer based segmentation techniques are used. In this paper DRLSE (Distance Regularized Level set Evolution) algorithm has been discussed. This segmentation technique is based on contour generation.**

Keywords: **Magnetic Resonance Imaging, Vector Median Filter, DRLSE.**

1. INTRODUCTION

Medical image segmentation is very essential in computer aided diagnosis, because manual segmentation is very slow and less accurate then computer based segmentation. The objective of image segmentation is to partition an image into homogeneous and meaningful parts with respect to intensity and texture of that medical image. For this method the step is preprocessing step. In preprocessing step image denoising has been performed. For removal of various types of noise presented on the magnetic resonance image denoising is important. There are various types of impulsive noise can be present in any MRI. It can be salt-and-pepper type noise also called impulse noise, shot noise or spike noise. It is typically caused by flawed pixel elements in the camera sensors, faulty memory locations, or timing errors in the digitization process .For the removal of noise filters can be useful, in this project for denoising vector median filter has been applied. After preprocessing step segmentation has been performed. For segmentation an advanced watershed algorithm has been applied. Watershed transform is used to segment gray matter, white matter and cerebrospinal fluid from magnetic resonance (MR) brain images. The basic mechanism of this approach is shown in below figure:

2. LITERATURE SURVEY

There are so many research works has been performed on segmentation of medical images. First of all we should know about various segmentation methods which are follows:

- Thersholding approach
- Region growing approach
- Classifiers
- Clustering approach
- Markov random field approach
- Artificial neural networks
- Deformable modals
- Atlas guided approach

All these methods or approaches shown above are evaluated from literature survey.

3. PROBLEM IDENTIFICATION

After literature survey some problems have been identified. In medical images usually some attributes can be present such as low SNR and CNR ratios, because of various types of artifacts introduced during the acquisition process which can be imperfection of experimental process, such as magnetic field inhomogeneities for MRI external RF interference. High SNR is always enviable because of its benefit for image segmentation, visibility of the vessels or improvement of larger structures. There are so many other limitations present in Magnetic Resonance Imaging such as:

- Partial volume
- RF noise
- Intensity homogeneities
- Gradients
- Motion
- Wrap Around
- Gibbs Ringing
- Susceptibility

There are some disadvantages are also occurs in MRI:

- MR acquisition takes considerably longer time as compared to CT.
- In case of MR it is more difficult to obtain uniform image quality.

4. METHODOLOGY

A new level set formulation has been performed in this paper, which is called as DRLSE. The proposed DRLSE formulation has an fundamental capability of maintaining regularity of the level set function, particularly the desirable signed distance property in a surrounding area of the zero level set, which ensures accurate computation and stable level set evolution. DRLSE can be implemented by a simpler and well-organized numerical scheme than conventional level set methods. DRLSE also allows more flexible and resourceful initialization than generating a signed distance function as the initial LSF. As an application example, we have applied DRLSE to an edge-based active contour model for image segmentation, and provided a simple and efficient narrowband implementation of this model. This active contour model in DRLSE formulation allows the use of relatively large time steps to significantly decrease iteration numbers and computation time, while maintaining sufficient numerical accurateness in both full domain and narrowband implementations, due to the essential distance regularization embedded in the level set evolution. Given its efficiency and accuracy, we expect that the proposed distance regularized level set evolution will find its convenience in more applications in the area of image segmentation, as well as other areas where level set method has been and could be applied. The narrowband implementation of the DRLSE consists of the following steps:

Step 1) Initialize an LSF to a function. Then, construct the initial narrowband.

Step 2) Update the LSF. Update on the narrowband.

Step 3) Update the narrowband. Determine the set of all the zero crossing pixels.

Step 4) Assign values to new pixels on the narrowband.

Step 5) Determine the termination of iteration. go to Step 2.

5. EXPERIMENTAL RESULTS AND CONCLUSION

According to methodology first of all the preprocessing step has been applied on the input MRI image ,after preprocessing step the basic steps of DRLSE algorithm has been applied on the preprocessed image. Fig 1 and 3 are input images, Fig 2 and 3 are segmented images. The resultant images are shown below after applying DRLSE algorithm are follows:

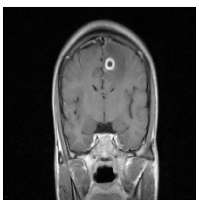

Fig 1:Input image

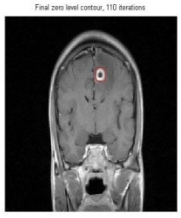

Fig 2: Segmented Image

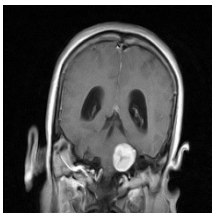

Fig 3:Input Image

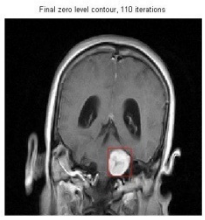

Fig 4: Segmented Image

After this research the conclusion is that we have to overcome all the problems which are time complexity, length of code and authentic knowledge. This paper represents various methods of segmentation and clustering which can be helpful for medical image segmentation. This survey can be helpful for upcoming researchers.

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