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Tumor Segmentation & Detection of a Specific Lobe in a Brain

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ABSTRACT

Medical Image Processing (MIP) is the most challenging and emerging field now days. MATLAB has become a widely used tool in MIP for high Quality medical imaging. The segmentation of brain tumors in Magnetic Resonance Images (MRI) is a challenging and difficult task because of their variety in terms of various image intensity, position as well as their shapes. In the present paper we proposed the strategy to detect and abstract the brain tumor from patient using MRI scan images of a brain. MRI is a primary diagnostic technique for image acquisition for image segmentation. There are several techniques proposed for image segmentation in different parts of body. Few of them are threshholding, clustering methods and soft computing techniques. Several methods incorporate with noise removal functionalities, segmentation and morphological operations which are the basic concepts of image processing. Extraction and detection of tumor for MRI scan images of the brain is done by using MATLAB R2013a.

Keywords: *Brain Tumor, Segmentation, Magnetic Resonance Images(MRI), Medical Image Processing(MIP).*

INTRODUCTION

Information is conveyed through images. Image processing is a process where input image is processed to get output also as an image. Main aim of all image processing techniques is to recognize the image or object under consideration easier visually. All the images used in today's world are in digital format. Normally the anatomy of the Brain can be viewed by the MRI scan or CT scan. Moreover, Brain tumor analysis is

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done by doctors but its grading gives different conclusions which may vary from one doctor to another. Medical image segmentation had been a vital point of research, as it inherited complex problems for the proper diagnosis of brain disorders.

In the present research, it provides a foundation of segmentation and edge detection, as the first step towards brain tumor grading. Current segmentation approaches are reviewed with an emphasis placed on revealing the advantages and disadvantages of these methods for medical imaging applications. The use of image segmentation in different imaging modalities is also described along with the difficulties encountered in each modality. The segmentation of medical images is very important for medical science, as opposed to natural scenes, has the significant advantage that structural and intensity characteristics are well known up to a natural biological variability or the presence of pathology. Most common is pixel(Smallest element of image or picture) - or voxel-based statistical classification using multiparameter images.

Leemput et al. developed automatic segmentation of MR images of normal brains by statistical classification, using an atlas prior for initialization and also for geometric constraints.

We propose a fully automatic method for segmenting MR images presenting tumor and edema, both mass-effect and infiltrating structures. This method builds on the previously published work done by. Additionally, tumor and edema classes are added to the segmentation. The spatial atlas that is used as a prior in the classification is modified to include prior probabilities for tumor and edema. As with the work done by other groups, we focus on a subset of tumors to make the problem tractable. Our method provides a full classification of brain tissue into white matter, grey matter, cerebrospinal fluid (csf), tumor, and edema. Because the method is fully automatic, its reliability is optimal.

Tumor Characteristics: We assume that tumors are ring-enhancing or fully enhancing with contrast agent. The major tumor classes that fall in this category are meningiomas and malignant gliomas. The basic characteristics of meningiomas are a) smooth boundaries b) normally space occupying and c) smoothly and fully enhancing with contrast agent. The basic characteristics of malignant gliomas are a) ragged boundaries, b) initially only in white matter, possibly later spreading outside white matter, c) only margins enhance with contrast agent, and d) accompanied by edema.

OBJECTIVES

- To study and analyze the various lobes in the brain.
- To detect the tumor residing in a specific lobe namely temporal lobe.
- To undergo various images processing steps to detect the abnormality (Tumor).
- To segment the possible tumor using various method.

RESEARCH METHODOLOGY

The algorithm has two stages, first is pre-processing of given MRI image and after that segmentation. Steps of algorithm are as following:-

Give MRI image of brain as input: The image of brain acquired through MRI is imported using command **'imread'** in MATLAB.

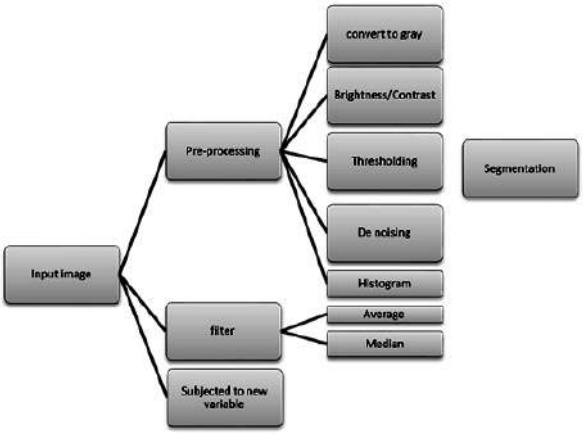
Convert it to gray scale image: If the image is colored then we will convert the image into Grey scale using 'RGB2Gray' command.

Contrast Enhancement: To improve contrast and to obtain uniform intensity histogram equalization is used. This approach can be used on whole image or part of an image. In this system, enhancing the contrast of images is done by transforming the values in an intensity image, such that the histogram of the output image approximately matches a specified histogram. The output signal is of same data type as the input signal.

Use histogram to represent the grey scale intensity

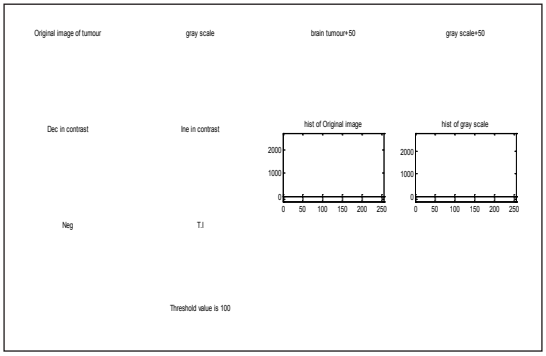
Apply high pass filter for noise removal: The removal of noise and enhancement of image intensity is critical task due to curative and diagnostic applications. More specifically, heterogeneous magnetic field, patient motion while MRI process is running and external noises, foreign material, are some sources of undesired effects on images. Therefore it is necessary to remove noises and enhance image quality. **High pass** and **Average filter with 3*3, 5*5 and 9*9** are applied using command '**imfilter ( )'** and **'avgfilt2 ()'** respectively then increasing contrast of the image using command '**histeq ()'.**Histogram equalization is contrast enhancement technique that stretch out intensity value along total range of values.

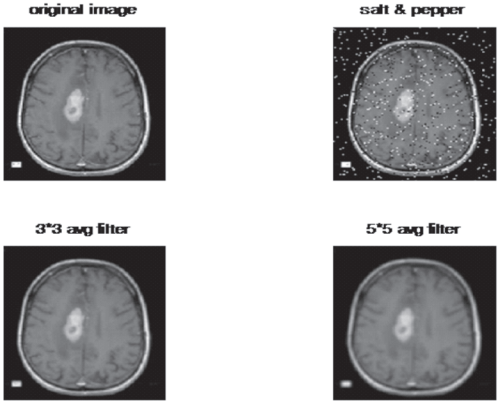
Compute threshold segmentation: By using the adequate value of threshold we got the value corresponding to the tumor detection in the temporal lobe



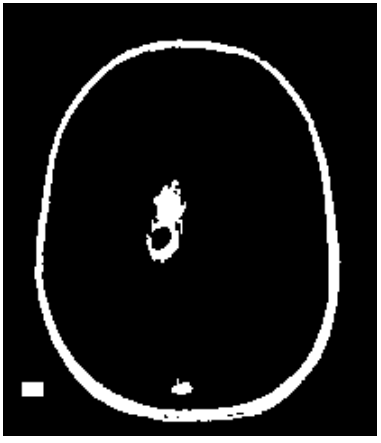
Model for Detection of Brain Tumor

Result





Brain Segmentation



CONCLUSION

The present research work is based on various applications of image processing used in Medical Science especially in the domain of RADIOLOGY. Images have been taken of tumor affected temporal lobe portion. Various image processing steps have been used to detect the brain tumor. The present paper detects the tumor in the segmented region. The results are promising and the present methods used in this paper can be used in many other applications of our internal organs for the detection of any abnormalities.

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