ISSN :2455-0108 Impact Factor :2015-3.462
IJO–Science
INTERNATIONAL JOURNAL ONLINE OF SCIENCE
Volume II, Issue IX December 2016

A REVIEW OF DIFFERENT SEGAMENTATION AND THRESHOLD OPERATIONS TO DETECT BRAIN TUMOR

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Abstract- The brain is the front most part of the focal sensory system. The area of tumors in the mind is one of the variables that decide how a mind tumor impacts an individual's working and what side effects the tumor causes. Alongside the Spinal rope, it frames the Central Nervous System (CNS). Mind tumor is a strange development brought about by cells duplicating themselves in an uncontrolled way. Magnetic Resonance Imager (MRI) is the regularly utilized gadget for finding. In MR pictures, the measure of information is as well much for manual translation and investigation. Amid past few a long time, mind tumor Segmentation in Magnetic Resonance Imager (MRI) has turned into a rising examination region in the field of restorative imaging System. Precise discovery of size and area of mind tumor assumes a basic part in the analysis of tumor. In this paper, we survey different Segmentation And Threshold operations using to detect the brain tumor.

Index Terms— Central Nervous System, Magnetic Resonance Imager, Computed Topology.

I. INTRODUCTION

A tumor can be characterized as a mass which develops with no control of ordinary strengths. Ongoing determination of tumors by utilizing more solid calculations has been the principle center of the most recent improvements in restorative imaging and discovery of mind tumor in MR pictures and CT check pictures has been a dynamic exploration territory. The partition of the cells and their cores from whatever remains of the picture substance is one of the fundamental issues confronted by the vast majority of the therapeutic symbolism finding frameworks. The procedure of partition i.e. Segmentation, is paid at most significance in the development of a vigorous and viable analysis framework. Pictures Segmentation is performed on the data pictures. This empowers less demanding examination of the picture along these lines prompting better tumor recognition proficiency. Thus picture Segmentation is the crucial issue in tumor identification. Various techniques have been proposed in the past for mind tumor discovery.

1.1. Operations and Types of Tumor

In medical imaging, 3D segmentation of images plays a vital role in stages which occur before implementing object recognition. 3D image segmentation helps in automated diagnosis of brain diseases and helps in qualitative and quantitative analysis of images such as measuring accurate size and volume of detected portion. Accurate measurements in brain diagnosis are quite difficult because of diverse shapes, sizes and appearances of tumors. Tumors can grow abruptly causing defects in neighboring tissues also, which gives an overall abnormal structure for healthy tissues as well. We will develop a technique of 3D segmentation of a brain tumor by using segmentation in conjunction with morphological operations.[1]

1.1.1. Tumor

The word tumor is a synonym for a word neoplasm which is formed by an abnormal growth of cells Tumor is something totally different from cancer.

1.1.1.1. Types of Tumor

There are three common types of tumor:

1) Benign;

2) Pre- Malignant;

3) Malignant (cancer can only be malignant).[1]

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1) Benign Tumor: A benign tumor is a tumor is the one that does not expand in an abrupt way; it doesn't affect its neighboring healthy tissues and also does not expand to non-adjacent tissues. Moles are the common example of benign tumors.

2)Pre-Malignant Tumor: Premalignant Tumor is a precancerous stage, considered as a disease, if not properly treated it may lead to cancer.

3) Malignant Tumor: Malignancy (mal- = "bad" and –ignis = "fire") is the type of tumor, that grows worse with the passage of time and ultimately results in the death of a person. Malignant is basically a medical term that describes a severe progressing disease. Malignant tumor is a term which is typically used for the description of cancer.

1.1.2. Operations for detection of tumors

MRI is basically used in the biomedical to detect and visualize finer details in the internal structure of the body. This technique is basically used to detect the differences in the tissues which have a far better technique as compared to computed tomography (CT). So this makes this technique a very special one for the brain tumor detection and cancer imaging. [2]

CT uses ionizing radiation but MRI uses strong magnetic field to align the nuclear magnetization then radio frequencies changes the alignment of the magnetization which can be detected by the scanner. That signal can be further processed to create the extra information of the body.

1.1.2.1. MRI and CT analysis

Fused images from CT and MRI imagers are used for detection of tumor. The fused images are obtained from multiple modality images like Computed Tomography (CT) and Magnetic Resonance Image (MRI) as shown in Fig. (a) and (b). These multiple modality images play a key role in medical image processing; CT images which are used to ascertain the difference in tissue density andMRI provide an excellent contrast between various tissues of the body. CT images signify the difference in tissue density depending upon the tissues ability to react the X-rays, while MRI images provide contrast between different soft tissues. The above features make CT and MRI more suitable for the detection of tumor. The complementary and redundant information of both the source images are retained in the fused image, these information including the tumor size and location, which enable better detection of tumor, when compared to the source images.

II. LITRATURE REVIEW

Segmentation is the procedure where a picture is separated into the distinctive areas on some similitude bases. Fundamental capacity of the Segmentation is that we can without much of a stretch concentrate data and diverse components from the pictures. As mind tumor discovery is an extremely tedious procedure which is finished by medicinal specialists. So to handle this issue numerous Segmentation methods are produced by the picture preparing specialists. [3]

At the point when specialists chip away at tumor pictures then they utilize three distinct sorts of calculations. A percentage of the procedures in light of pixel based, some taking into account composition of pictures and some of them in view of structure of pictures.

Gopal,N.N. Karnan, M. [4] proposed a calculation which utilized multi-scale picture Segmentation, this calculation depended on fluffy c-mean calculation for the recognition of mind tumor.

Joshi, D.M.; Rana, N.K.; Misra, V.M. [5] recommended an enhanced strategy for tumor recognition, this calculation utilized neuro fluffy method for the Segmentation for the tumor location.

Ming niwu,chia-chen Lin and button chenchang[6], proposed a calculation which utilizes a grouping technique(k-means) to identify the mind tumor in MR pictures. Most importantly

ISSN :2455-0108 Impact Factor :2015-3.462
IJO–Science
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they change over the dim scale pictures into shading pictures and after that by the help k implies bunching.

Hossam M. Moftah, Aboul Ella Hassanien, and MohamoudShoman [7], they utilized k mean calculation with associated segment marking. Bunching should be possible with the assistance of article rendering process in 2D cuts and after that 3D patch is gotten.

P.Vasuda, S.Satheesh [8], proposed a method to recognize tumors from MR pictures suing fluffy grouping strategy. This calculation utilizes fluffy C-implies however the significant disadvantage of this calculation is the computational time required. This paper likewise thinks about the FCM and enhanced form of FCM.

Cerebrum tumor cells have high proteinaceous liquid which has high thickness and henceforth high force, in this manner watershed Segmentation is the best device to order tumors and high force tissues of mind. Watershed Segmentation can order the intensities with little distinction additionally, which is impractical with snake and level set strategy. A comparative technique for tumor identification is proposed by Rahul Malhotra, however multi-parameter extraction was not utilized. Hossam and P Vasuda have proposed a technique for cerebrum tumor location and Segmentation utilizing histogram thresholding distinguishes the tumor however the outcome indicated crops over the top territory of mind. An effective and enhanced mind tumor identification calculation was produced by Rajeev Ratan, Sanjay Sharma and S. K. Sharma which makes utilization of multi-parameter MRI investigation and the tumor can't be fragmented in 3D unless and until we have 3D MRI picture information set. Along these lines, a moderately straightforward strategy for identification of mind tumor is displayed which makes utilization of marker based watershed Segmentation with change to evade over and under Segmentation. The Segmentation of a picture involves the Segmentation or partition of the picture into comparative property. A definitive point in countless picture preparing applications is to remove critical highlights from the picture information, from which a depiction, elucidation, or comprehension of the scene can be given by the machine. The Segmentation of cerebrum tumor from attractive reverberation pictures is an imperative however timeconsuming errand performed by therapeutic experts.[4] The advanced picture handling group has areas of built up a few Segmentation strategies, a large number of them specially appointed. Four of the most regular strategies are:

- Amplitude Thresholding,
- Texture Segmentation,
- Template Matching, and
- Region-developing Segmentation.

It is essential for distinguishing tumors, edema and necrotic tissues. These sorts of calculations are utilized for partitioning the mind pictures into three classes:

- Pixel based
- Region or Texture Based
- Structural based.

A few creators recommended different calculations for Segmentation (Hillips et al., 1995; Aidyanathan et al., 1995; Sai et al., 1995; HanShen et al., 2005; Livier et al., 2005). Suchendra et al. (1997) recommended a multiscale picture Segmentation utilizing a various leveled self-sorting out guide; a rapid parallel fluffy c-mean calculation for mind tumor Segmentation; an enhanced execution of mind tumor identification utilizing Segmentation in light of neuro fluffy procedure planned a strategy on 3D variational Segmentation for procedures because of the high assorted qualities in appearance of tumor tissue from different patients. At the point when specialists take a shot at tumor pictures then they utilize three diverse sorts of calculations. A percentage of the procedures taking into account pixel based, some taking into

ISSN :2455-0108 Impact Factor :2015-3.462
IJO–Science
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account surface of pictures and some of them taking into account structure of pictures.[13]

III. DETECTION ISSUE AND TECHNIQUE

Segmentation of brain tumor based on Watershed and thresholding .

- Detection of brain tumor.
- Boundry Extraction of Tumor.
- Size of Tumor.

3.1. Segmentation of brain tumor based on Watershed and thresholding

The watershed and thresholding algorithm techniques are useful for segmentation of brain tumor. Image segmentation is based on the division of the image into regions. Division is done on the basis of similar attributes. Similarities are separated out into groups. Basic purpose of segmentation is the extraction of important features from the image, from which information can easily be perceived.

Threshold Segmentation: Threshold segmentation is one of the simplest segmentation methods. The input gray scale image is converted into a binary format. The method is based on a threshold value which will convert gray scale image into a binary image format. The main logic is the selection of a threshold value for segmentation. We choose a single threshold value from the image using histogram. An image histogram is a type of histogram that acts as a graphical representation the tonal distribution in a digital image. It plots the number of pixels for each tonal value. By looking at the histogram for a specific image a viewer will be able to judge the entire tonal distribution at a glance. Watershed segmentation is one of the best methods to group pixels of an image on the basis of their intensities. Pixels falling under similar intensities are grouped together. It is a good segmentation technique for dividing an image to separate a tumor from the image Watershed is a mathematical morphological operating tool.

3.2. Detection of Brain Tumor

After applying Watershed and thresholding segmentation we get a high intensity portion from whole image and this portion is called tumor. This portion contains only high intense pixels and its showing with totally white portion. The stages of detection of brain tumor are shown in following figure.

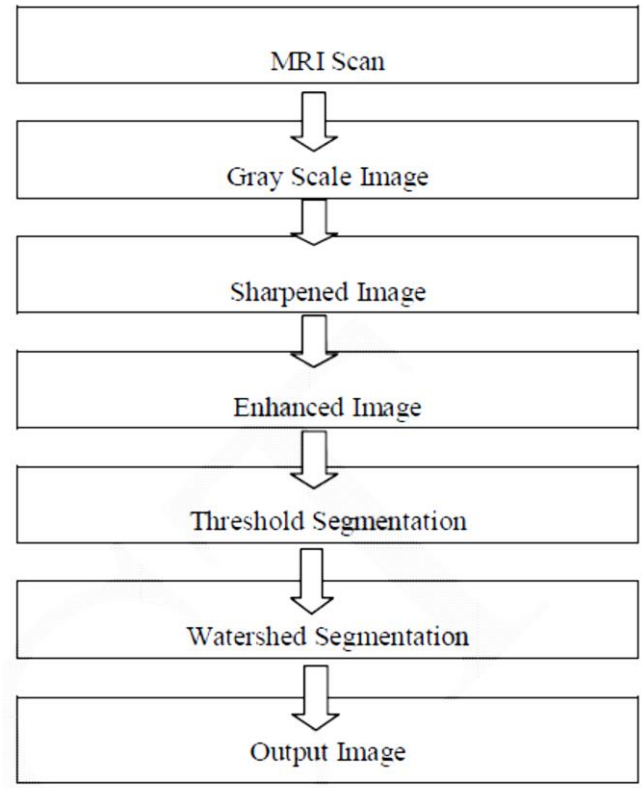

Figure 1: Stages of operation to detect the tumor

In this way first we are taking MRI scan image after that we are taking Gray Scale image then sharpening and Enhancing the image for removing noise from the Image. Finally applying the Threshold Segmentation and Watershed Segmentation for tumor detection from the whole image and we get tumor detected image.

3.3 Boundry Extraction of Brain Tumor

Boundry Extraction of Brain tumor is the third part of our research, Edge based segmentation is the most common method based on detection of edges i.e. boundaries which separate distinct regions. For brain tumor boundry extraction

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various edge detection operators are used which are prewitt edge detection, canny edge detection operator and robert edge detection operator. In this part we are finding only boundry of tumor which we are getting from thresholding segmentation.

3.4 Shape and Size of Brain Tumor

The finding shape and size of brain tumor is the last part of our research, Once's we are getting the boundry of the tumor, from that we can easily decide the shape of the tumor. If we are getting circular boundry then its shape is circular and so on. After that we are finding the size the brain tumor, it is measured in the matrix form (m*n).

IV. COCNCLUSION

This research was conducted to detect brain tumor using medical imaging techniques. The main technique used was segmentation, which is done using a method based on threshold segmentation, watershed segmentation and morphological operators. The main problem is to find out tumor proper location and size in the brain. MRI and CT Scan is methos to detect the loaction and size of brain tumors. MRI is most efficient technique to detect the problem.

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