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Detection of Brain Tumour with Filtering Techniques

Mrs. K. Padmavathi[1], Ms.C.Megala[2]

Assistant Professor, Dept. of Computer Science, PSG College of Arts and Science, Coimbatore, India[1]

Research Scholar, Dept of Computer Science, PSG College of Arts and Science, Coimbatore, India[2]

Abstract: All information is conveyed through images. Images play a vital role in every field that makes the problem easier to understand. Image processing techniques are most widely used in medical imaging to identify the affected area through x-ray, MRI, CT scan. Medical image processing is used to detect and identify the inner most portions of the human body. Due to several abnormalities in human body such as visualization, heart diseases, cancer, brain tumor, blood clotting which can be identified through image processing techniques. Using spatial filtering algorithm, we can filter the brain tumor of an image. The algorithm is been used on different images of the brain detected with tumor and filter the desired output.

Keywords: Pre-processing, MRI, spatial filtering, segmentation, tumour detection.

I. INTRODUCTION

Nowadays, all information are conveyed to digital process. It plays a important role especially in medical field. Brain tumours are caused by the abnormal formation of cells within the brain. The cells in the brain may include the neurons or the glial cells which are the atrocities and the ependymal cells. Sometimes they may be caused by cancers which are primarily located in other organs which are called as primary tumour. Secondary tumours of the brain are meta static and have invaded the brain from cancers originating in other organs. This means that cancerous neoplasm has developed in another organ elsewhere in the body and that cancer cells have leaked from that primary tumour and then it entered into the lymphatic system and blood vessels. Then it can circulate through the bloodstream, and are deposited in the brain. Brain tumours are caused by some abnormal formations of cells within the brain. Brain tumours can affect people of any age, including children, and which they are tend to be more common in older adults. More than 9,000 people are diagnosed with primary brain tumours in the UK each year, of which about half are benign and half are malignant. Many others are diagnosed with an secondary brain tumours The proposed algorithm is to detect the troubleness and filter the affected area of brain. In this paper, we can detect the tumour with visualization, image segmentation, filtering operations. From the MRI images the information such as tumours location provided by radiologists, an easy way to diagnose the tumour and plan the surgical approach for its removal.

A. TYPES OF BRAIN TUMOUR

There are several types of brain tumour .It can be classified as benign and malignant (non cancerous).Normally the tumours, first we depend upon size of the tumour, location and symptoms etc. Detecting an brain tumour with brain images and filtering the image with morphological segmentations. There are more than 120 types of brain tumour diseases and central nervous system (CNS) tumours. The health organization classifies brain tumours by cell origin and how the cells behave, from the least aggressive (benign) to the most aggressive (malignant). Some tumour types are assigned a grade, ranging from Grade I (least malignant) to Grade IV (most malignant types), which are normally signifies the rate of growth. There are variations in grading systems, depending on the tumour type.

1. Characteristics and Symptoms

It arises from cells that form a protective sheath around nerve fibres.
Typically it grows around the eighth cranial nerve, but can be found around other cranial or spinal nerves.
Hearing loss in one ear.
Dizziness or vertigo.
Tinnitus (in the ear).
Tingling or numbness in the face.
Walking and balance problems.
Lack of Coordination.

B.RISK FACTORS OF BRAIN TUMOUR:

Brain tumour are caused mostly by radiation-induced brain tumours are by radiation to the head given to treat other cancers. They occur most often in people who received radiation to the brain as children as part of their treatment for leukaemia. These brain tumours usually develop around 10 to 15 years after the radiation. Radiation-induced tumours are still fairly rare, but because of the increased risk (as well as the other side effects), radiation therapy to the head is only given after carefully weighing the possible benefits and risks. For most patients with other cancers involving the brain or head, the benefits of radiation therapy far outweigh the risk of developing brain tumour years later. The possible risk from exposure to imaging tests that use radiation, such as x-rays or CT scans, is not known for sure. This has been the subject of a

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great deal of debate in recent years. Cell phones give off radiofrequency (RF) rays, a form of energy on the electromagnetic spectrum between FM radio waves and those used in microwave ovens, radar, and satellite stations. Cell phones do not give off ionizing radiation, the type that can cause cancer by damaging the DNA inside cells. Still, there have been concerns that the phones, whose antennae are built-in and therefore are placed close to the head when being used, might somehow raise the risk of brain tumours.

II. LITERATURE REVIEW

The image segmentation is a division or separation of the image into regions of similar features. In this paper, we will discuss an techniques of image processing filtering and segmentation. It approaches the improvements in filtering and segmentation performance that can be achieved by combining methods from distinct regions of the tumour image. This paper deals with a new image, filtering and segmentation technique combining region growing & detection of edges. The combination of this two method helps to avoid characteristic segmentation errors and noise removal of an image which occurs when using region growing or edge detection separatively. Several other authors defined the brain tumour detection using image filtering and segmentation with different algorithms and methods.

III. PROPOSED APPROACH

The proposed approach focuses the image pre processing technique such as filtering and segmentation. The filtering is used to remove the noise from brain tumour image. Segmentation is used to segment and divide the region .The algorithm is based on filtering of brain images which is used for removing the noise over an image and segmented with filtering images.

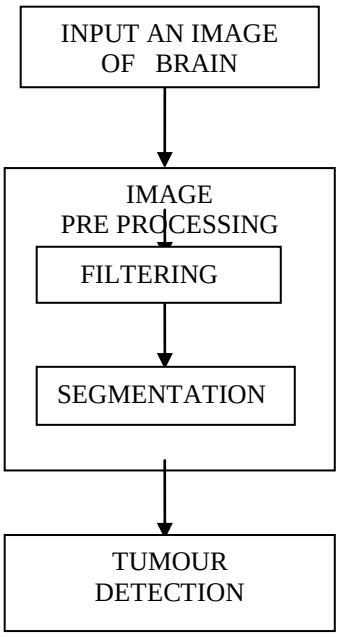

Fig1. Steps for Proposed Approach

A.STRUCTURE OF BRAIN TUMOUR

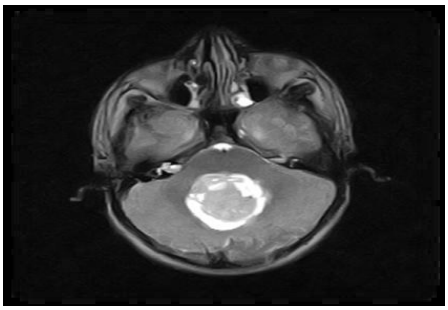

Fig2. The identification of tumour region

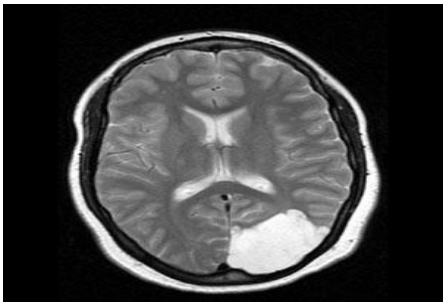

Fig3.Output image of brain with tumour

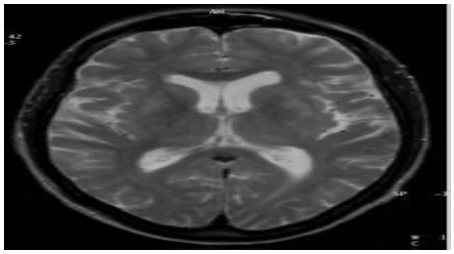

Fig4. Filtered and segmented image of tumour.

IV. IMAGE PRE-PROCESSING

In this phase image is enhanced in the way that finer details are improved and noise is removed from the image. The first step is to get the MRI image and application of pre-processing steps. Pre-processing include the input MRI (magnetic resonance imaging) brain tumour image. Input an image of a brain with tumour and process with an filtering techniques. Analysing an image with appropriate tumour of brain and identify the most affected region. Processing an image with segmentation process and analyse with an appropriate solution to detect the tumour. This technique of MRI has dependence over relaxation properties of magnetically-excited hydrogen nuclei of water molecules in the body. MRI is advantageous in creating better soft tissue contrast than X-rays which leads to production of high quality images, mainly in brain and spinal cord scans. So, MRI scanning methods to identify the tumour. The median filter has to be passed with mask for better image, to achieve this we are using sober operator.

a. SPATIAL FILTERING:

In spatial filtering process it consists of the neighbourhood pre-defined pixels values at a centre point. Linear and

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Non-linear filtering are the two types of filtering process. The general concept of linear filtering is also used in statistics, data analysis, and mechanical engineering among other fields and technologies. This includes non-causal filters and filters in more than one dimension such as those used in image processing; those filters are subject to different constraints leading to different design methods. In Linear filtering, the output of the image is weighted with a sum of input pixels. Spatial filtering is a form of FIR (finite impulse response) filtering. The value in a filter sub image is referred as coefficients, rather than pixels. Spatial filtering term is the filtering operations that are performed directly on the pixels of an image. The filter is actually a mask of weights arranged in a rectangular pattern. The process is one of sliding the mask along the image and performing a multiply and accumulate operation on the pixels covered by the mask.

Linear filtering =

$$g(x,y) = \sum_{s=-a}^{a} \sum_{t=-b}^{b} w(s,t) f(x+s, y+t).$$

Blurring is used in preprocessing steps, such as removal of small details from an image prior to object extraction, and bridging of small gaps in lines or curves. The idea is replacing the value of every pixel in an image by the average of the gray levels in the neighbourhood defined by the filter mask.

b. SEGMENTATION:

In image analysis, segmentation is the partitioning of a digital image into multiple regions (sets of pixels), Segmentation is a process of identifying an object or pattern in the given work space. Segmentation is the process of partitioning an image into non-intersecting regions such that each region is homogeneous and the union of no two adjacent regions is homogeneous. The main objective of the digital image segmentation is the partition of an image into mutually exclusive and exhausted region. The aim of segmentation is to vary and simplify the cooperation of an input image into something which is more significant and lighter to analyze. According to some homogeneity criterion. The segmentation of brain tumor from magnetic resonance (MR) images is a vital process for treatment planning, monitoring of therapy, examining efficacy of radiation and drug treatments, and studying the differences of healthy subjects and subjects with tumor. There are many segmentation techniques which are useful in finding segregated area in an image. Following are the techniques available for segmentation process. Threshold, Region based, Edge based, clustering method.

C.TUMOR DETECTION:

If the brain image has the tumor region, this image is needed to do preprocessing. In order to detect the tumor, we apply a spatial filtering algorithm technique. The term "filtering" indicates that the desirable structural features of the original source pass through the filter, while the undesirable features are blocked. Spatial filtering is a technique that you can use to smooth, blur, sharpen, or find the edges of an image. Spatial Filtering is sometimes also known as neighborhood processing. Neighborhood processing is an appropriate name because you define a centre point and perform an operation (apply a filter) to only those pixels in predetermined neighborhood of that centre point. The result of the operation is one value, which becomes the value at the centre point's location in the modified image. Each point in the image is processed with its neighbors.

D.ALGORITHM FOR DETECTION OF TUMOUR

Step 1: Input the image of the brain.
Step 2: Converting the images into greyscale level image with equal size location.
Step 3: Using a Spatial linear filtering algorithm, we filter the noises from the image.
Step 4: Compute the Segmentation process, we partitioning an image into an multiple regions.
Step 5: Get the output of the image which is specific tumour region.

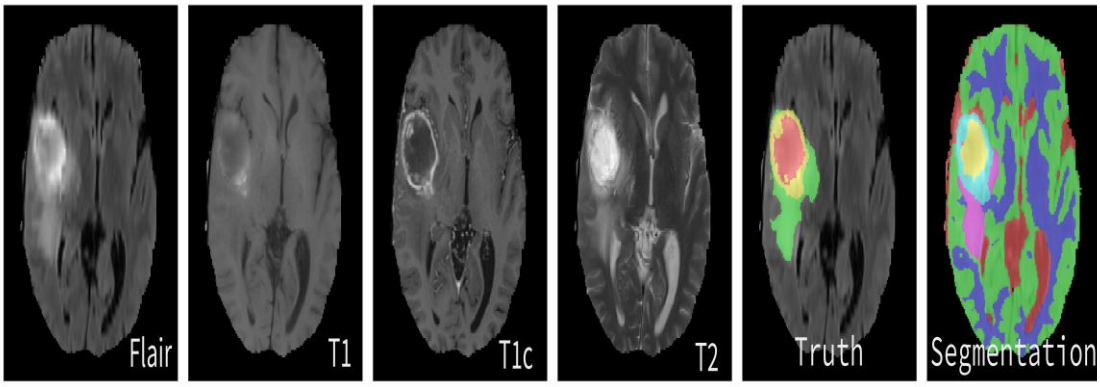

Fig5. Brain tumor results with filtering and segmentation.

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V.CONCLUSION

In medical reasons, the use of computer science plays an important role for analyzing various diseases. Magnetic resonance image (MRI) is a critical part in many researches. In this work, the brain image tumour testing process has been done. Pre-processing an image gives the result of an input image of tumour area. Segmentation and filtering process removes the noise over an image and regain the smoothed clear image of an tumour. Using the image processing techniques we filter an affected region over an tumour image. In near future we can implement several algorithms and techniques to detect the tumour more effectively.

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