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Brain Tumor Detection

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Abstract—**The brain is the anterior most part of the central nervous system. The location of tumors in the brain is one of the factors that determine how a brain tumor effects an individual's functioning and what symptoms the tumor causes. Along with the Spinal cord, it forms the Central Nervous System (CNS). Brain tumor is an abnormal growth caused by cells reproducing themselves in an uncontrolled manner. Magnetic Resonance Imager (MRI) is the commonly used device for diagnosis. In MR images, the amount of data is too much for manual interpretation and analysis. During past few years, brain tumor segmentation in magnetic resonance imaging (MRI) has become an emergent research area in the field of medical imaging system. MRI has the added advantage of being able to produce images which slice through the brain in both horizontal and vertical planes. This paper presents a vector quantization segmentation method to detect cancerous mass from MRI images. In order to increase radiologist's diagnostic performance, computer-aided diagnosis (CAD) scheme have been developed to improve the detection of primary signatures of this disease: masses and micro calcification.**

Keywords- **Brain tumor, Tumor detection, MRI scan, Image segmentation, Vector quantisation.**

INTRODUCTION

A tumor can be defined as a mass which grows without any control of normal forces. Real time diagnosis of tumors by using more reliable algorithms has been the main focus of the latest developments in medical imaging and detection of brain tumor in MR images and CT scan images has been an active research area. The separation of the cells and their nuclei from the rest of the image content is one of the main problems faced by most of the medical imagery diagnosis systems.

A. 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. Vector quantization is a classical quantization technique from signal processing which allows the modeling of probability density functions by the distribution of prototype vectors. It was originally used for data compression. It works by dividing a large set of points (vectors) into groups having approximately the same number of points closest to them. Each group is represented by its centroid point, as in k-means and some other clustering algorithms .Vector Quantization (VQ) is an efficient technique for data compression and has been successfully used in various applications such as index compression. VQ has been very popular in a variety of research fields such as speech recognition and face detection. VQ is also used in real time applications such as real time video-based event detection and anomaly intrusion detection systems, image segmentation speech data compression, content based image retrieval CBIR and face recognition.

LITERATURE SURVEY REVIEW

[1] Roopali. R. Laddha: A tumor can be defined as the mass which grows without control of normal forces. Fused images of CT and MRI images are used for the tumor detection. Real time diagnosis of tumors are by using reliable algorithms has been the main focus the latest developments in medical imaging and detection of brain tumor in MRI and CT scan image has been an active research area. The separation of cells and their nuclei of rest of the image content is one of the main problem faced by most of the medical imagery diagnosis system

[2] T. Logeswari1* and M. Karnan2]: The Segmentation of an image entails the division or

separation of the image into regions of similar attribute. Relevance of these techniques is the direct clinical application for segmentation. We studied the performance of the MRI image in terms of weight vector, execution time and tumor pixels detected. The Segmentation of an image entails the division or separation of the image into regions of similar attribute. The ultimate aim in a large number of image processing applications is to extract important features from the image data, from which a description, interpretation, or understanding of the scene can be provided by the machine. The segmentation of brain tumor from magnetic resonance images is an important but time-consuming task performed by medical experts The digital image processing community has developed several segmentation methods many of them ad hoc.

[3] Dr.Tanuja Sarode : Image Segmentation plays a crucial role in many medical imaging applications by automating or facilitating the delineation of anatomical structures. In the human brain imaging and diagnosis, Magnetic Resonance Imaging (MRI) can provide volumetric images of the brain with good soft tissue contrast -segmentation is then a post processing operation which abstracts quantitative description of anatomically relevant structures. The objective of segmenting different types of soft-tissue in MRI brain images is to label complex structures with complicated shapes, as white matter, grey matter, CSF and other types of tissues in neurological conditions. This leads to the development of quantitative algorithms to analyze the neuro anatomical structures. Furthermore, the correspondence between disease status and degree of shape deformations in clinical neurology necessitates the use of computational methods to improve the techniques

VECTOR QUANTIZATION

Vector quantization is a classical quantization technique from signal processing which allows the modeling of probability density functions by the distribution of prototype vectors. It was originally used for data compression. It works by dividing a large set of points (vectors) into groups having approximately the same number of points closest to them. Each group is represented by its centroid point, as in k-means and some other clustering algorithms Vector Quantization (VQ) is an efficient technique for data compression and has been successfully used in various applications such as index compression.

VQ has been very popular in a variety of research fields such as speech recognition and face detection. VQ is also used in real time applications such as real time video-based event detection and anomaly intrusion detection systems ,image segmentation, speech data compression ,content based image retrieval CBIR] and face recognition . The rest of the paper is organized as follows. Section 2 describes Morphological Segmentation method and Kekre's Median Codebook Generation (KMCG) algorithm used for image segmentation of MRI images. Followed by the experimental results for mammographic images for comparison in section 3 and section 4 concludes the work.

In this segmentation method, basic morphological transformations are used to separate the tumor mass from MRI image. The algorithm is as given below.

1. Gaussian Filter: The Gaussian filter is used to blur images and to remove detail and noise.It smoothes out the high frequency components making some of the noisier areas more uniform and easier to segment.

2. Threshold: Threshold is the simplest method of image segmentation. From grayscale image, threshold can be used to create binary images.

3. Dilation: Border of zeros is added to the image. Starting at appoint on this border, all connected components in the image with a value of zero are extracted. If all other pixels are set to one, the holes are removed from the image.

4. Open: Morphological open operation is used to remove small peninsulas coming out of the tumor and to strip off any non-tumor areas.

5. Restore: The tumor details will be restored by dilating the transformed image and performing a logical and operation with the original untransformed image

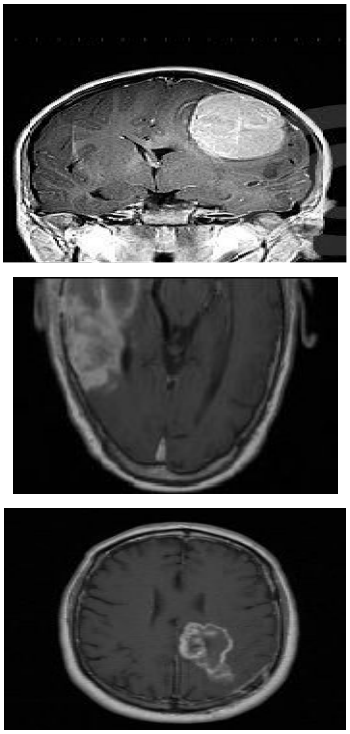

FIG: BRAIN TUMOR DETECTED MR IMAGES

CIRCUIT DESCRIPTION

Embedded part consists of measurement of heart rate and reading RFID cards. Microcontroller is being connected to LCD to display the readings, Sand heart beat sensor and RFID card display. First in LCD it displays the project name and then shows the command to swipe the card .at this time we need to give the RFID card number and this no is transmitted to LCD. In mat lab section if tumor is present it displays brain tumor detected and then data is transmitted to take the patient details. If tumor is not detected then it takes the present heart beat and temperature and displays it on LCD.

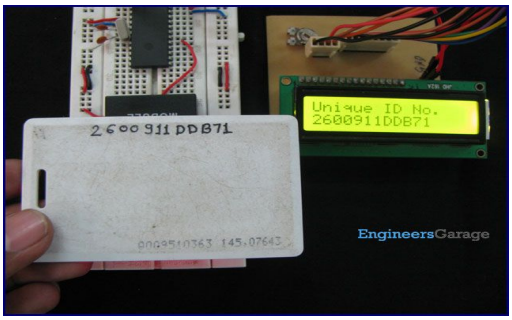

FIG : RFID INTERFACING WITH MICROCONTROLLER

APPLICATIONS

The Magnetic Resonance Imaging (MRI) method is the best due to its higher resolution than the other methods. Its resolution is approximately 100 microns. MRI is currently the method of choice for early detection of brain tumor in human brain. Generalization of brain screening programs requires efficient double reading of MRI, which allows reduction of false negative interpretations, but it may be difficult to achieve. Computer aided detection systems are dramatically improving and can now assist in the detection of suspicious brain lesions, suspicious masses. And automated segmentation method is desirable because it reduces the load on the operator and generates satisfactory results. The aim of this work is to provide an automated tool which locates the tumor on MR image and predicts the area of tumor.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

CONCLUSION

In our first phase we completed our embedded section which measures heart beat and reads RFID cards. In this section we can measure the heart rate and temperature of patient and can also receive message from MATLAB section whether brain tumor is detected or not. If brain tumor is detected we get patients details and if it is not present we can measure the present heart rate and temperature. We swipe the card to get corresponding details of the patient and check whether tumor is detected or not .Our next section deals with the software part which consists of brain tumor detection module and interactive database MATLAB is the programming language used and image processing with multi sensory images are used as potential source to detect brain tumor. Here we process MRI and CT images in MATLAB to enhance the redundant and complimentary information to enhance tumor detection in fused images.

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