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Advanced Diagnosis of Human Brain Using 2D Visualisation

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ABSTRACT: Inmedical diagnostics, digital image processing becomes more and more important in health care. Different methods such as an X-Ray, MRI, CT, PET, ECG, Ultrasound etc...In the existing system brain tumour segmentation is very difficult due to complex brain structure and time consuming process. If the hardcopy is seen by the doctor; it takes time to the process and also finds out the problem. In the proposed system, represents 2D visualization of images which can be accessed using android apps, the Magnetic Resonance scanning Images are used to detect the tumor growth in the brain cells.It can perform different operations like filtering, enhancement, segmentation, feature extraction & classification to detect the problem in the human brain. The system consists of three stages to detect the brain tumor. For that an automatic brain tumor diagnostic system from MRI are using in the ARM7.The challenges are improved with the support of ARM7 processor. The project identifies the brain tumor in MR Images using image processing in MATLAB. The system is implemented using UTLP kit and ECLIPSE.

KEYWORDS: ARM processor, MRI scanning, MATLAB, 2D visualisation.

I. INTRODUCTION

Medical electronics is a specialized discipline, which integrates the Engineering with Biomedical science. Medical Electronics engineers develop Magnetic Resonance Imaging devices to advance health care treatment, including diagnosis, monitoring and therapy that solve health related problems. In this project brain tumor is caused by an abnormal growth of cells in the human brain. Normally, the brain tumor appears from brain cells, blood vessels or nerves that are present in the brain. It is mainly focused on 2D visualization of medical images. In order to overcome the drawbacks in the existing system the proposed system is employed.

In this proposed system mainly focused medical imaging techniques to create visual representation of the internal structure of human brain which can be deployed for many useful medical applications. Manual detection of brain tumor requires human interaction and is time consuming. Also it depends on the ability of the observer to identify the location, shape and size of the tumor. Thus, a need of completely computer aided system CAD for brain tumor detection is inevitable.[1] ARM processor (Advanced RISC Machine) is used and to controls all sub devices connected across it. To monitoring the system performance, and also that process contains a repository [Storage device] and communication protocol this is used to communicate the doctor. MATLAB (Matrix Laboratory) is a high-level technical computing language and interactive environment for image processing, communications, data visualization, data analysis, and numerical computation [2]. Using image processing technology the images are segmented and identify the tumour. By using eclipse and UTLP the system model is simulated.

II.LITERATURE SURVEY

2.1 Training for Planning Tumour Resection: Augmented Reality and Human Factors (IEEE2015)

Kamyar Abhariet al explained about the Planning surgical interventions is a complex task, demanding a high degree of perceptual, cognitive, skills to reduce intra- and post-operative complications. This process requires spatial reasoning to coordinate between the preoperatively acquired medical images and patient reference frames. In the case of neurosurgical interventions, traditional approaches to planning tend to focus on providing a means for visualizing medical images, but rarely support transformation between different spatial reference frames.

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This system introduced a mixed augmented/virtual-reality system to facilitate training for planning a common neurosurgical procedure, brain tumour resection. The proposed system is designed and evaluated with human factors explicitly in mind, alleviating the difficulty of mental transformation. The results indicate that, compared to conventional planning environments, the proposed system greatly improve the no clinicians' performance, independent of the sensorimotor tasks performed (p <0.01).Furthermore, the use of the proposed system by clinicians resulted in a significant reduction in time to perform clinically relevant tasks.

2.2 Multichannel Double-Row Transmission Line Array for Human MR Imaging at Ultrahigh Fields (IEEE2015)

Xinqiang Yan et al focused on the Microstrip Transmission Line (MTL) transmit/receive (transceive) arrays used for ultrahigh field MRI, the array length is often constrained by the required resonant frequency, limiting the image coverage.

The purpose of this study is to increase the imaging coverage and also improve its parallel imaging capability by utilizing a double-row design. A 16-channel double-row MTL transceive array was designed, constructed, and tested for human head imaging at 7 T. Array elements between two rows were decoupled by using the induced current elimination or magnetic wall decoupling technique. Inhuman head images were acquired, and g-factor results were calculated to evaluate the performance of this double-row array. Testing results showed that all coil elements were well decoupled with a better than –18 dB transmission coefficient between any two elements.

2.3 2D-Visualization of 3D Medical Images within a Distributed System: A Short Survey (WCECS 2014)

Masoud Davari Dolatabadi et al described the Current standalone systems in the area of Minimally Invasive Cancer Treatment (MICT) are not providing satisfying possibilities for researchers and Interventional Radiologist(IRs) to share their contributions. There are a lot of standalone simulation software implementations, which provide different services for the mentioned purpose. However, in all of the services, one of the most important concepts, transferring the experience which has gained from one simulated procedure, is missed. In contrast, by using a web based system, different communities would be capable of sharing the medical data and simulation. These potential advantages lead us to developing a web based system for visualizing the medical data.

2.4 A Review on Image Segmentation Techniques(IEEE2010)

Nikhil pa et al compared Many image segmentation techniques are available in the literature. Some of these techniques use only the gray level histogram, some use spatial details while others use fuzzy set theoretic approaches. Most of these techniques are not suitable for noisy environments. Some works have been done using the Markov Random Field (MRF) model which is robust to noise, but is computationally involved.

Neural network architectures which help to get the output in real time because of their parallel processing ability have also been used for segmentation and they work fine even when the noise level is very high. The literature on color image segmentation is not that rich as it is for gray tone images. This paper critically reviews and summarizes some of these techniques. Attempts have been made to cover both fuzzy and non-fuzzy techniques including color image segmentation and neural network based approaches.

2.5 Segmentation of Multispectral MR Images Using a Hierarchical Self-organizing Map (IEEE2012)

Suchendra Bhandarkar et al presented a flexible approach Magnetic resonance imaging (MRI) was introduced in clinical medicine in 1981 and is regarded as one of the most significant advancement in medical imaging since the discovery of X-rays a century ago. The fundamental physical principle underlying MRI is the interaction of proton spins with a strong static magnetic field and carefully code signed dynamic magnetic fields that vary as precisely defined functions of both space and time. Image contrast in MRT depends primarily on three intrinsic parameters: the proton density (PD) which quantifies Tillie number of hydrogen nuclei (protons) within the sample volume, the longitudinal relaxation time (Tl) where is the time taken for the spies ill a sample volume to return from an excited state to a ground state the transverse relaxation time (T2) which is the time taken for the spins in the excited state to lose phase coherence.

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III.PROPOSED SYSTEM

In order to overcome the problem in the existing system, the conventional method of the proposed system is employed. In the proposed system focused on 2D visualization of medical images are extracted and viewed the tumour problems. In the ARM processor is used to monitor and control the system performance. The Repository is used to manage all the data in the system and also the image processing techniques is used to find the problem in the scanned images. Magnetic Resonance Imaging of brain image computing has very increased field of medicine by providing some different methods to extract and visualize information from medical data, acquired using various acquisition modalities. Brain tumor segmentation is a significant process to extract information from complex MRI of brain images. Diagnostic imaging is a very useful tool in medical today.

Magnetic Resonance Imaging (MRI), Computed Tomography (CT), digital mammography, and other imaging processes give an efficient means for detecting different type of diseases. The automated detection methodology have deeply improved knowledge of normal and diseased examination for medical research and are an important part in diagnosis and treatment planning when the number of patients increases.Standard x-rays and Computed Tomography (CT) can initially be used in the diagnostic process. However, MRI is generally more useful because it provides more detailed information about tumor type, position and size. For this reason, MRI is the imaging study of choice for the diagnostic work up and, thereafter, for surgery and monitoring treatment outcomes. That process is done in image processing using MATLAB.

VI.BLOCK DIAGRAM DESCRIPTION OF PROPOSED SYSTEM

The block diagram shown below represents the monitoring and controlling of the system. It consists of ARM7, scanned image, repository, communication protocol, etc…

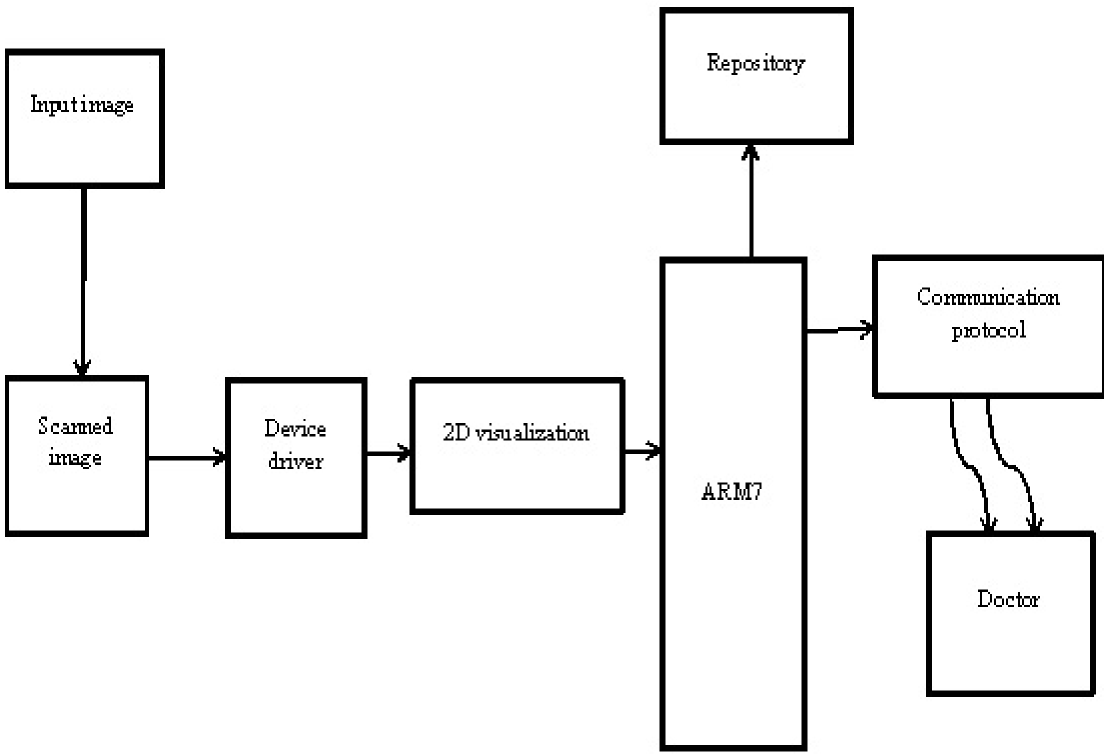

Fig.4.1 Block diagram for 2D Visualization in scanned images

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The input scanned images are given to the processor before sending the image; the image can be extracted and viewed in the 2D visualization using the image processing techniques in the MATLAB. Then only the report content store in the repository to go through the all details about patient whenever required. Finally the image sends to the doctor using the communication protocol

Diagnostic imaging is a very useful tool in medical today. Magnetic Resonance Imaging (MRI), Computed Tomography (CT), Digital Mammography, and other imaging processes give an efficient means for detecting different type of diseases in the MRI tumor images are taken to find out the problem in the scanned image.

The system consists of three stages to detect and segment a brain tumor. In the first stage, MR Image of brain is acquired and pre-processing is done to remove the noise and to sharpen the image. In the second stage, global threshold segmentation is done on the sharpened image to segment the brain tumor. In the third stage, the segmented image is post processed by morphological operations and tumor masking in order to remove the false segmented pixels. MATLAB (Matrix Laboratory) is a high-level technical computing language Using image processing technology the images are segmented and identify the tumor. After the 2D visualization images are given to the ARM processor.

V.SOFTWARE RESULTS

Image of the brain is acquired and pre-processing is done to remove the noise and to sharpen the image. In the second stage, global threshold segmentation is done on the sharpened image to identify the brain tumor. In the third stage, the segmented image is post processed by morphological operations and tumor masking in order to remove the false segmented pixels.In this step the normal images are acquired for tumor detection. The pre-processing is done to remove the noise and also sharpen the image.

Fig.5.1 Normal Brain images

Fig.5.2 pre-processing

Fig.5.3 Gray scale conversion

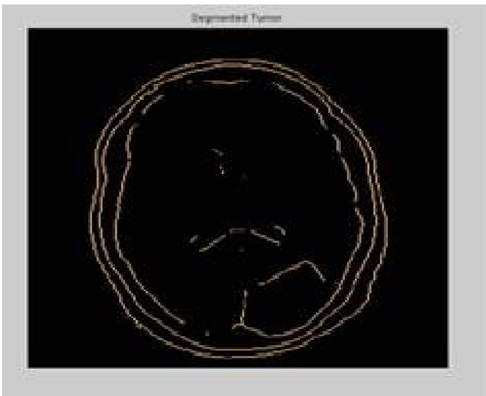

Fig.5.4 The outline of segmented image

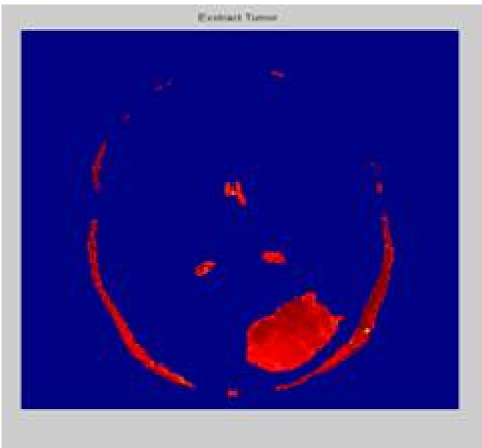

Fig.5.5 Segmentation

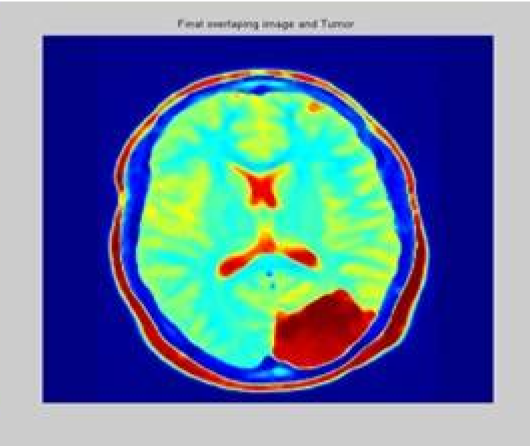

Fig.5.6 Tumor masking

In this process the image colour is converted into a white and block to identify the problem. The outlines of the images are used for easy verification of tumor. This is done for identify the segmented tumor image in the brain. In this process to identify the exact location of tumor.

VI.HARDWARE RESULTS (UTLP)

The UTLP kit is used to monitor and view the 2D images automatically. By using the ARM processor of eclipse software, the parameters like normal and abnormal condition can be mentioned by using the LCD. If the parameters move to an abnormal condition, it can be displayed by using the GLCD. GLCD (Graphical Liquid Crystal Display) is used to represents the variations in the colour format. In the ARM8 processor, the control panel consists of 2D visualization image.

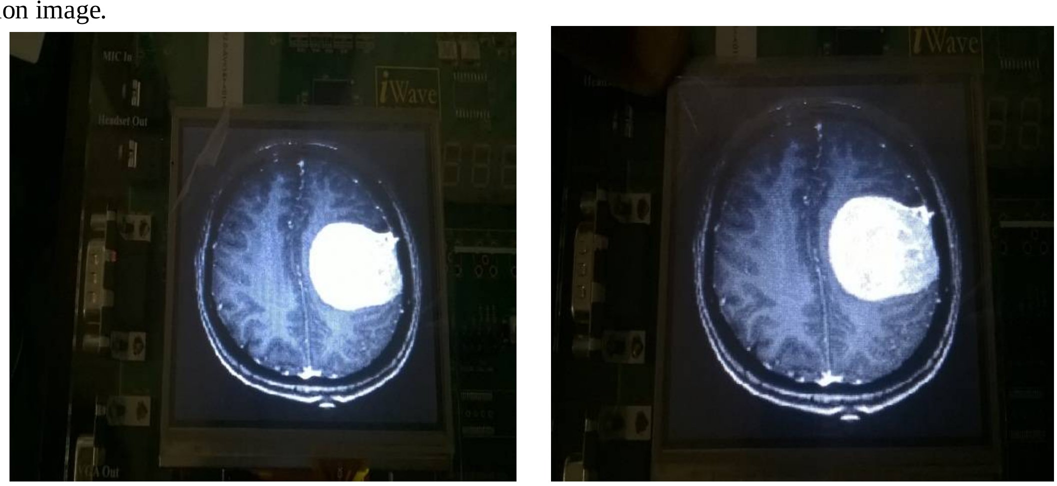

Fig.6.1 Normal image and gray scale conversion

When selecting the options 1, it to loads the brain image and below options done such as gray scale representation, negative conversion, binary conversion, change to keyboard mode, and exit. When selecting the option 2 and 3 the above process done with help of given input. The given Image into gray scale conversion, negative image and also the image converted into binary conversion as per the coding.

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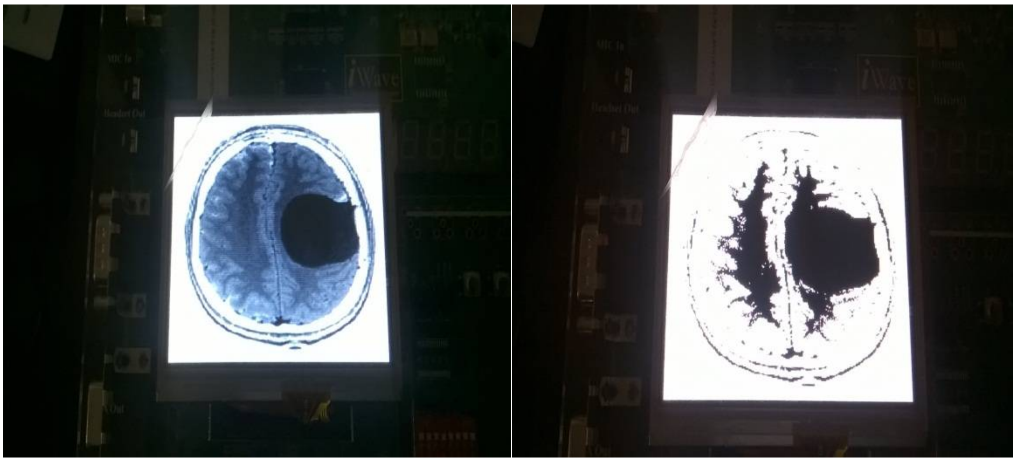

Fig.6.2 Negative image and binary scale conversion

By using hardware and software platform results, the brain tumour is identified automatically. In MATLAB the tumour image is captured and pre-processed. It is then converted to gray scale image followed by segmentation. Finally tumour masking is done to identify the tumour in the brain. The UTLP kit is used to implement is used to implement the tumour detection processes initially options 1, it loads the brain image and below options done such as gray scale representation, negative conversion, binary conversion, change to keyboard mode and exit. Therefore by using UTLP and MATLAB the brain tumour identification is done. So it is easy to automate three operations using the above statement.

VI.CONCLUSION

In this project the Magnetic resonance (MR) images are used to detect the tumor growth in brain. The system consists of three stages to detect and segment a brain tumor. It provides an excellent solution for the existing system by overcoming the drawbacks. The simulation results are obtained by MATLAB using image processing techniques and Eclipse software.

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