Research Article

Implementation Of Ct-Scan And Mri (Magnetic Resonance Imaging) For Medical Record Data

Parlindungan[1]

[1]Widyatama University
[1]Parlindungan@widyatama.ac.id

Abstract:image processing is any form of signal processing where the input is an image such as a photo or video frame. Image acquisition or that produces an input image in the first place is called imaging. This process has the characteristics of input data and output information in the form of images. The term digital image processing is generally defined as two-dimensional image processing by computer. In a broader definition, digital image processing also includes all two-dimensional data. A digital image is a series of real or complex numbers represented by certain bits. In the field of modern medical science, a doctor is able to analyze a patient's disease through a visual image of the results of an internal disease or more modern a doctor can use the CT-SCAN reading technique (Computed Tomography) which is able to draw visually as well as more modern MRI techniques displaying data in 3 dimensions so that it is more accurate.

Keywords: image processing, CT-SAN, MRI, C language.

1.   Introduction

MRI technology is currently an important part in the health sector where this technology can read and identify symptoms or disease in the section the human inner body, at first the technology used in the form of using an x-ray machine and the patient is given fluid sspecifically so that a process of reading data readable and displayed in the form of window film. weakness of this technology is the detection system can only read and displays data on patients who have had muscle spasms or fracture and disable detect if the patient had blockage or damage to internal organs, another problem the most important thing is the type of radiation generated and dangerous in the long term and dangerous, researchers in the health sector finally developed a new technology in the form of a scanning tool that is safer and easier to use and is based on computer technology, the requirements for this technology have the impact of the side effects that can be reduced ie one of the technologies used is engineering image processing that displays a data from reading data generated from the electromagnetic waves used mto scan the inner body, the data is then processed by computer and displayed the organs of the body scanned into 3D, so a doctor can observe image generated from the image processing earlier and perform the analysis process [1].

This technology is known as the term MRI (*Magnetic Resance Imaging*) or commonly known with the term CT-SCAN, this technology has a deep reliability detect tumors in the body and pass through a system of analysis against existing blockages in blood vessels and brain [2]. This system doesn't have a side effect but there is one special procedures that need to be adhered to by the patient opening items which contains metallic elements because it will affect the reading system from the MRI device itself [3].

2.   Study literature

MRI machines work by reading with the aid of a moleculeatoms that are fired into the patient's body like a CT-SCAN machine, but the MRI machine works by firing a signal electromagnetic strength so that patients who have metal objects on his body are not allowed to be scanned, the resulting resolution of the MRI machine is better in comparison by using a CT-SCAN machine and capable of cutting and displaying human organ data is up to 256 chunks and dimensions normally this technology is used to scan the inner body patient or brain and spine [4].

The basis of magnetic resonance imaging (MRI magnetic resonance imaging) where a nucleus of an object is exposed to a magnetic field and then produces an image of the object. The magnetic resonance itself is a vibration of the atomic nucleus due to equalization of the nuclear magnetic moment of the material by means of an external magnetic field and stimulation of an EM wave corresponding to the frequency of the motion of the nuclear gasification. Earlier it was explained that the magnetic field used is of size from 0.064 - 1.5 tesla. From this interval, MRI is divided into 3 types with respect to the strength of the magnetic field:one. High Tesla MRI (High Field Tesla) has strengths above 1 - 1.5 T, b. Medium field Tesla MR has an output of 0.5 – T, c. A low Tesla MRI (Low Field Tesla) has an effect below 0.5 T. [5]

A review of the benefits of MRI is that according to current medical knowledge, there is no detrimental effect on the patient. Compared to CT scans "computer axial tomography"

using computer axial tomography involving DOS ionizing radiation, MRI uses only strong magnetic fields and non-ionizing radiation "non-ionizing" in the radio frequency pathway. However, it should be noted that sick people carrying metal objects (such as spherical fragments) or embedded implants (such as artificial titanium bones or pacemakers) should not be scanned inside an MRI machine due to the use of strong magnetic fields [6].

An added advantage of MRI scanning is that the image quality obtained is usually revolutionary better than a CT scan. This is even truer for scans of the brain and spine, although it should be noted that CT scans are sometimes more useful for bone defects. Unlike a CT scan, MRI is painless due to radiation because X-rays are not used in the process. Some of the advantages that MRI has is its ability to make coronal, sagittal, axial and oblique incisions without much manipulation of the patient's body position, making it particularly suitable for diagnosing soft tissue. The MRI imaging technique is relatively complex because the resulting image depends on many parameters. If the choice of these parameters is correct, the quality of MRI images can provide a detailed picture of the human body with contrasting differences so that the anatomy and pathology of body tissues can be evaluated carefully. [7].

A CT scan is a procedure used to obtain images from various small angles of the skull and brain. Customer weight is something to consider. The client's body weight that can be checked for a CT scan is a client weighing less than 145 kg. This is taken into account at the current scanner level. Before doing a CT scan on a client, a test should be done to see if the client has the ability to remain silent without making changes for 20-25 minutes as this is related to the length of the examination required. The client's assessment must be carried out before the examination is carried out to determine whether the client is free from iodine allergy because the client will undergo a CT examination. The scan is injected with a contrast agent in the form of a 30 ml iodine-based contrast agent. If the client has a history of allergies, or if the examination turns out to be allergic, the administration of iodine contrast agents should be stopped. Because the removal of the contrast agent must be done within 24 hours. After that, the client's kidneys must be in normal condition [8, 11].

The purpose of using a CT scan Find pathology of the brain and spinal cord with radioisotope scanning / examination techniques. Thus, CT scan can be used to assess almost any organ in the body, even abroad, it has been used as a screening tool to replace X-rays and ultrasound. What is important in a CT scan is that the patient will perform a cooperative examination, meaning that he is calm and does not move during the recording process. CT scans should be used to Assess the condition of blood vessels, for example in coronary heart disease, pulmonary embolism, aortic aneurysm (enlarged blood vessels) and various other blood vessel disorders [9]. Assessment of tumors or cancer, such as metastasis (cancer spread), location of cancer and type of cancer. Trauma / injury cases such as head trauma, spinal trauma and other accidents. Usually this should be done if there is loss of consciousness, vomiting, fainting or other neurological symptoms. Assess internal organs, for example in case of stroke, indigestion, etc. Helping the tissue biopsy process or the process of draining / removing fluid that has accumulated in the body. Here, the CT scan acts as the doctor's "eye" to see the exact location of the surgery. Assistive examination if the results of other radiological examinations are unsatisfactory or there are conditions that do not allow you to perform examinations other than CT scans [10].
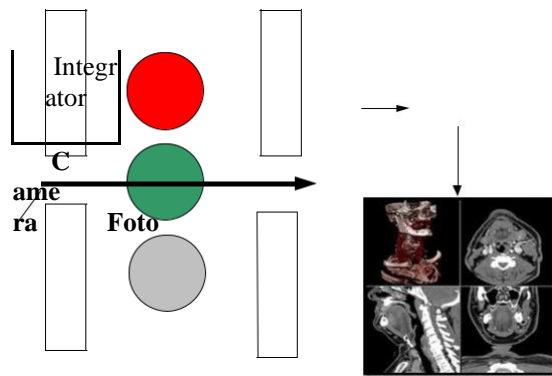
3. RESEARCH METHOD
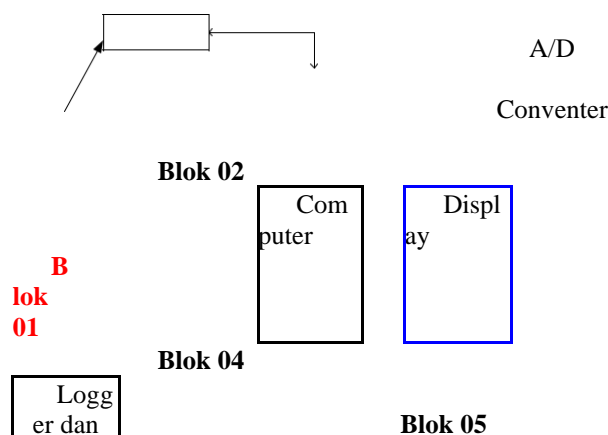
Figure 1. How MR works

In this section, the system provides input from objects that can be images or photos scanned using X-rays. Conversion The Convert section analyzes the data from the scan results and then converts them to matrix format using the C language which is known as an image processing technique. . On the computer side, the data is processed in C language format and then stored in memory, on the computer part the metric data is reordered to be displayed in 3-dimensional form and converted back to Scan and MRI data formats. Display The display section shows the results of the process. The scanned image is in the form of a 3D scanned image, and the data can be displayed in CT-SCAN or MRI format. Teknik Pemrosesan citra.(AD Converter). The image processing system is on the machine tube frame and is the part of the system that faces directly to the object / patient. The scanner consists of an X-ray source, collimator, detector, and data collection section. Block diagram of a CT Scan machine scanner.
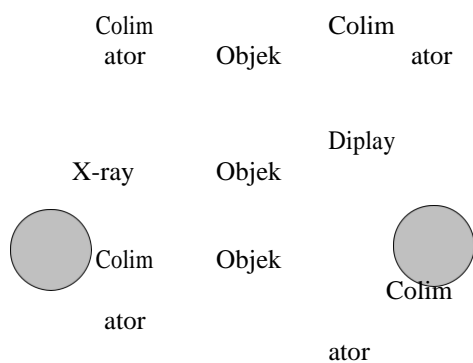

Figure. 2 Block diagram of a CT Scan scanner
(image processing)

4. IMPLEMENTATION SYSTEM

A magnetic resonance imaging (MRI) machine works by taking cross-sectional images of the brain from the front, top, and sides to give a complete picture of the brain. Reading the brain images presented in MRI isn't difficult, but it still requires a comprehensive understanding of brain anatomy. Anatomy books can be used as a reference for identifying brain components in a healthy state. However, to get a more accurate interpretation, it still needs to be read by a radiologist.

How to read MRI results:

•   Place the MR film in front of the light source to contrast the image.

- On the MRI film, the brain is an area that appears gray, with dark areas representing the cerebrospinal fluid and sinuses.

- Use an anatomy book as a reference to identify and compare the most important anatomical components of the brain represented in MRI images.

- Try to identify the frontal, temporal lobe, and occipital cortex at the base of the skull on the MRI film.

- Compare the images on the MRI film with the normal brain anatomy from an anatomy book to determine which non-symmetrical (non-symmetric) areas have differences in color, shape, and size from a normal brain.

- Asymmetrical areas that appear darker than usual indicate a lesion with leaking cerebrospinal fluid.

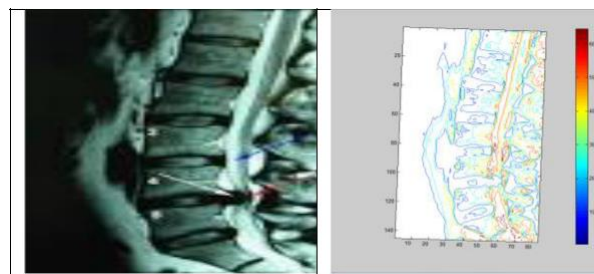- Bright areas that are almost completely white indicate a possible tumor.

Figure. 3 Spine Ditection

With the pattern recognition process, CT scan results and MRI results of benign tumor types can be expressed and converted into digital form using imaging techniques. Principal component analysis can determine the dominant characteristic value of the pattern of benign tumor types that able to for identification in the artificial neural network. Modeling to distinguish the classification of types of benign tumors can use artificial neural networks. The Perceptron method in artificial neural networks is a learning and adaptation of an object that is quite good and suitable for modeling the identification of tumor types. Achieve the development of software for the identification of tumor types based on artificial neural networks
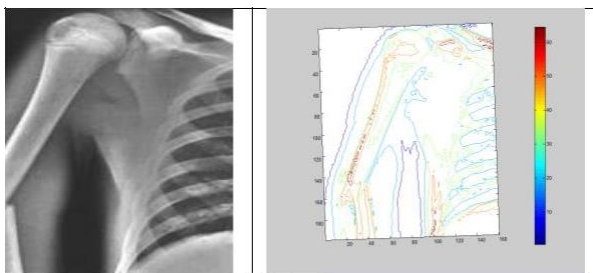

Figure 4 Screened in the Bone of the Arm

5. Conclusion

The use of MRI to examine the inside of the body is very effective because it has the ability to create chorus, sagittal, axial slice images without much manipulation of the patient's body, and the diagnosis can be made more detailed and accurate. MR planes use a magnetic field effect to create an image of the body so that it doesn't cause the effects of ionizing radiation like the use of an X-ray field. The image produced by the MR plane depends on the accuracy of parameter selection. During the operation, accidents can occur that can threaten the patient, staff and the environment. Considering the cost of MRI examination for patients is quite expensive and the side effects (especially latent effects) are not yet known, it is necessary to consider carefully before sending the patient for an MRI examination. Research should be conducted to find out if there are any side effects to the patient, staff and

the environment (especially latent effects), given the relatively high strength of the magnetic field accident prevention measures are required in an MRI examination.

Reference

1. Seyed Mohammad Amin Taleghani; Laleh Fatahi , "Application of Medical Imaging and Image Processing in Creating 3D Models of Human Organs," 2018 The First International Conference on Mechanics of Advanced Materials and Equipment, 201

2. Yi-Zeng Hsieh , Yu-Cin Luo , Chen Pan , Mu-Chun Su , Chi-Jen Chen , Kevin Li-Chun Hsieh , "Cerebral Small Vessel Disease Biomarkers Detection on MRI-Sensor-Based Image and Deep Learning," MDPI, 2019.

3. Jabarullah, N.H. & Othman, R. (2019) Steam reforming of shale gas over Al2O3 supported Ni-Cu nano-catalysts, Petroleum Science and Technology, 37 (4), 386 – 389.

4. E. D. SELEÞCHI; O. G. DULIU, "IMAGE PROCESSING

5. AND DATA ANALYSIS IN COMPUTED TOMOGRAPHY," Research gate , 2017.

6. Vijay P.B. Grover, Joshua M. Tognarelli, Mary M.E. Crossey, I. Jane Cox,Simon D. Taylor-Robinson, and Mark J.W. McPhail, "Magnetic Resonance Imaging: Principles and Techniques: Lessons for Clinicians," J Clin Exp Hepatol, vol. 5, no. 3, pp. 246 - 255, 2015.

7. Gail Dean Deyle, "The role of MRI in musculoskeletal practice: a clinical perspective," J Man Manip Ther , vol. 19, no. 3, pp. 152-161, 2011.

8. Jun Miao, "Quantitative image quality evaluation of MR images using perceptual difference models," Med Phys., vol. 35, no. 6, p. 2541–2553. , 2008

9. Kh. Mani Singh, Kh. Vyas, "STUDY OF COMPUTED

10. TOMOGRAPHY (CT) SCAN FINDING IN NEUROFIBROMATOSIS TYPE 2," Journal of Evolution of Medical and Dental Sciences, vol. 4, no. 105, pp. 17062-17065, 2015.

11. Peter Mygind Leth, "The Use of CT Scanning in Forensic Autopsy," Forensic Science, Medicine, and Pathology, 2006.obias Waecha,b, Shila Pazahrb,c, Vittoria Guardaa,b, Niels J.

12. Ruppb,d, Martina A. Brogliea,b, Gr egoiré B. Morand, "Measurement variations of MRI and CT in the assessment of tumor depth of invasion in oral cancer: A retrospective study," European Journal of Radiology 135 109480, 2020.

13. DEĞİRMENCİ, Y. (2019). Examination of prospective teachers' perceptions of homeland: A phenomenological study. Review of International Geographical Education Online, 9(2), 346-360.