



DECOMPOSED DICOM VIDEO INTO FRAMES USING MATLAB

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ABSTRACT

Nowadays, the medical world has become more sophisticated and numerous changes have been made specially to ensure convenience and comfort of the medical field such as MRI machines, advanced angiogram and others medical equipment. The file format for this equipment is DICOM which used for handling, storing, printing, and transmitting information in medical imaging. Digital Imaging and Communication in Medicine (DICOM) is a standard for medical images and it's executed for medical equipment likes radiology, radiotherapy and cardiology. The advantage of using DICOM is it allowed connectivity of engineering information to exchange images and info within the hospital and telemedicine. In this paper, the objective is to play DICOM video which taken from X-ray Angiography (XA) using multimedia format and decomposed it into frames by using MATLAB software. The purpose is to make the physician display the video in single frame and as a result to get better view of diseases and improved the efficiency and diagnose quality better.

Keywords: DICOM image, multimedia format, aneurysm.

INTRODUCTION

In medical, MRI can also be used to visualize functional activity in the brain. Functional MRI, or fMRI, measures changes in blood flow to different parts of the brain. The main form of fMRI involves blood-oxygen-level dependent (BOLD) contrast. An angiogram uses a radiopaque substance, or contrast medium, to make the blood vessels visible under x ray. The key ingredient in most radiographic contrast media is iodine. Arteriography is a type of radiographic examination that involves the study of the arteries.

DICOM (Digital Imaging and Communication in Medicine) is a standard for handling, printing and storing that covers information model in medical image [1]. DICOM is described by National Electrical Manufacturers Association (NEMA) and by American College of Radiology (ACR) because back in 1980s, radiologist and physicists found difficulties to decode the images from computed tomography (CT scan) or magnetic resonance imaging (MRI)[2]. Then NEMA and ACR joined together to form a standard committee in 1982 to create their first version in 1985 named standard version 1.0 [3]. In the year 1993 its name was change to DICOM when International has accept its standard. There are number of multi-frame images in DICOM files which showed the dynamic process of diagnose patients and common software not allowed the image to be process or convert the file format because DICOM is a complex file [4].

LITERATURE REVIEW

DICOM files contains one or more monochrome or colour images and a rich set of standardized meta information such as in Figure-1. NEMA has created this to help in improving the efficiency on medical department and there are few medical equipment that supported DICOM images as the output such as computed tomography (CT scan) or magnetic resonance imaging

(MRI), Doppler ultrasound and various imaging technique [5]. DICOM supports a number of compression algorithms, including JPEG. The different between DICOM image with others format like TIFF,JPG, JPEG is DICOM will have header in every image which consists information of the patients that will help to identified the patient but another format it will stores images and header separately [3].



Figure-1. DICOM image of artery in a skull.

DICOM header

In DICOM there is data dictionary that consists on naming, acquisition parameter, formatting and processing that include name, date of birth, gender, date, time and etc. and besides that it consists image data. Every time an image was captured the DICOM will include the patient name, sex, date of birth, age and so on automatically by using Information Object Definition



(IODs) that showed in Figure-2. [4]. The header consists 128 bytes of Preamble file and 4 byte of DICOM prefix which are 'D', 'I', 'C', 'M' follow by header info [3].

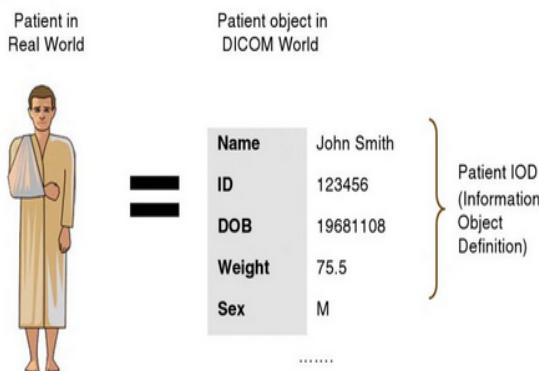


Figure-2. From real data to DICOM IODs.

Data set

A Data Set is made of data elements and each file contains only single data but a file may consist 2D image frame. The data set is collection of data elements is desired when a file is written and includes tag, value length (VL), value representation (VR) and value. The value of trailing padding data (FFFC, FFFC) can be process in Meta information or data sets nested in sequence. All DICOM are identified by tag and VR will specifies the data type of data element.

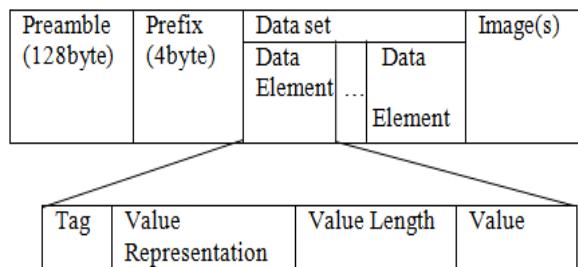


Figure-3. The structure of DICOM file [3].

IMAGE COMPRESSION

Compression is one of process to reduce file size by encoding its data to be more efficiently. It can reduce the number of bits and bytes to store information and can speed up the data transmission. DICOM images can be compress to another format so that we will get a smaller image file types. There are several types of digital image file format such as joint photographic experts group (JPEG), tagged image file format (TIFF), portable network graphics format (PNG) and graphic interchange format (GIF).

METHODOLOGY

In this paper, all the data and information was taken from UKM Medical Centre. The data is collected from X-ray Angiography (XA) which showed images or

videos related to aneurysm. Aneurysm is a weakness in the wall of an artery that caused bulging and fills with bloods. Normally, it causes no symptoms and when it rupture it will releasing the blood and can cause a stroke, brain damage and sudden death [6] [7]. The size of aneurysm is typically small about less than one half inch in diameter but it will press on the brain and may result various neurological symptoms. In this project, an approaches using MATLAB are conducted to play the DICOM video in multimedia format and decomposed it into frame.

Algorithm

- Step 1: Select DICOM file from the directory.
- Step 2: Get the information for the specific file.
- Step 3: Create the AVI file and name the file.
- Step 4: Set the frame rate for the video.
- Step 5: Set 'm' which is number of the frames.
- Step 6: Set 'i' to be the first frame.
- Step 7: Set 'getframe' to capture movie frame.
- Step 8: Display the frames of the video.
- Step 9: Read multi frame image for all frame.
- Step 10: Write the data from an image to a video file.
- Step 11: Play the file.

Firstly, create the AVI, WMV or MPEG-4 multimedia format and name it as filename.avi. Then, give open command to specified file to be open in appropriate application. Third, create a name file and read the multi-frame image to be in a frame and call them in a loop. Set the video frame rate for the video so the video will play according to the frame rate. Set the number of the frame by using 'm' and set 'i' to be the first frame. After that, get the information for the DICOM images before displaying the image. When the current axes get a frame, write the data that in image to be a video file. Run the codes and the video will be play and all the frames will be display.

RESULTS AND DISCUSSION

As a result, in Figure-4 several image from the video that have been decomposed by using MATLAB is shown. The video consists of 27 frames about blood flow in the artery at the skull and every frame show how the blood flow and it can be seen clearly and can be analyse at the single frame.

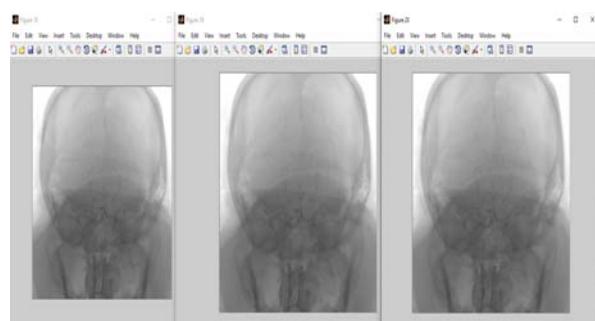


Figure-4. Several frame of DICOM image from the video using MATLAB software.



CONCLUSIONS

Nowadays, in medical world the demands on having a better equipment, programming and software are really needed to help them achieved a good diagnose and enhance quality. Therefore, converting a DICOM image into multimedia format and decompose video into frame really help and give advantages to the physicians in diagnose the aneurysm patient. Finally, I expect this research paper to contribute to the study subject of image processing and play an important role in the medical imaging and prediction research in the coming years.

ACKNOWLEDGEMENTS

This research was supported by Ministry of Science, Technology and Innovation (MOSTI) Government of Malaysia. We also want to thank our colleagues from Universiti Teknologi Petronas who has provided insight and expertise that greatly assisted the research.

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