MEDICAL X-RAY 2D AND 3D IMAGE VIEWER:ROLE FOR THE MEDICAL IMAGE IN DICOM STANDARD

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***Abstract*—: A variety of software exists to interpret files or directories compliant to the Digital Imaging and Communications in Medicine (DICOM) standard and display them as individual images or volume rendered objects. Some of them offer further processing and analysis features. The surveys that have been published so far are partly not up-to-date anymore, and neither a detailed description of the software functions nor a comprehensive comparison is given. This paper aims at evaluation and comparison of freely available, non-diagnostic DICOM software with respect to the following aspects: data import; data export; header viewing, 2D image viewing,3D volume, viewing, support portability, workability and usability. DICOM has become a standard for medical imaging. Its purpose is to standardize digital medical imaging and data for easy access and sharing. There are many commercial viewers that support DICOM image format and can read metadata, but image displaying is not always optimal.**

***Keywords*—(DICOM) Digital Imaging and Communications in Medicine**

I. INTRODUCTION

A DICOM Information Object Definition

As computer technologies advanced and imaging modalities allowed acquisition of digital images, Picture Archiving and Communications Systems (PACS) began to rapidly develop. Nowadays, many hospitals are undering the clinical operation using filmless full PACS and many diagnoses are being made based on medical if there are real values on each item, it is called Information Object instance.

softcopy image display system rather than conventional film-on-light box display. However, in comparison with the latter, medical softcopy image display may compromise image quality, and some unexpected effects on the accuracy of diagnosis may be introduced. Also, there are many other issues like the viewer soft related to display quality unsettled in medical softcopy display system. Using high-end monitors may decrease those drawbacks. However, for those developing countries such as China, the cost savings is needed in displaying medical image. To this end, many hospitals are using the commercial displays for replacing medical grade displays. These result in baddish quality in softcopy display. The visual quality of medical images is the key factor affecting diagnosis accuracy in PACS. Moreover, X-ray CR images are used widely in the clinical diagnosis. Therefore, it is necessary to improve the visual quality of X-ray CR images. DlCOM specifies that image information represents an Information Object which is defined in Information Object Definition (IOD) as shown in Figure 2, and commanding word is relating to Service Class which is defined in DICOM Message Service Element (DIMSE). IOD specify information for medical image where is corresponding to patient's name, examination type, date and it looks like a format dealing with standardized medical information. With these items.

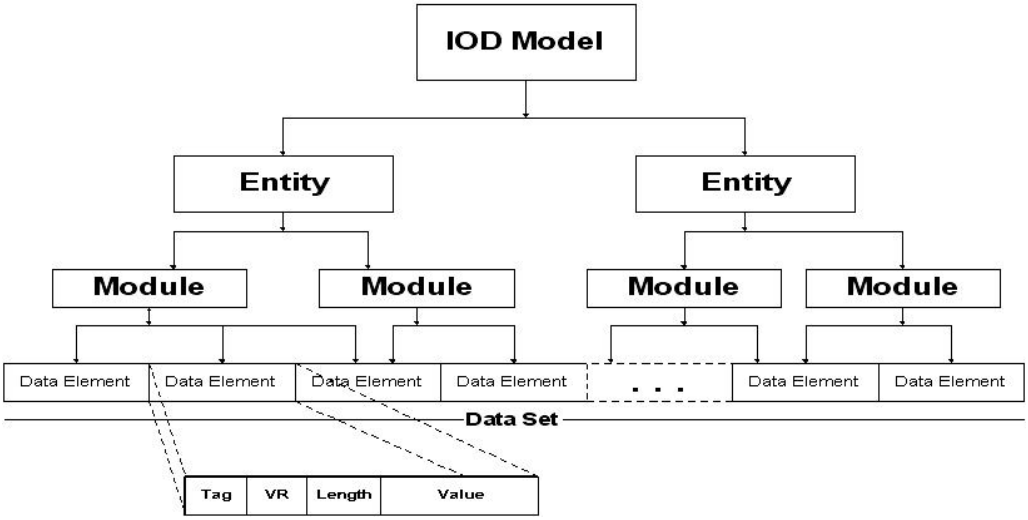

Fig 1. Information Object Definition (IOD) Model

One attribute, and several data element should be necessary for B.Data Element

DlCOM communicates each attribute as shown in Figure 3. One data element communicates IOD instance whole. That is, several data element must be combined as shown in Figure 2 to make any person IOD instance. One data element's details structure of them is a form in Figure 2 lower columns. Tag (0010, 0020) here is consisted of two integers representing patient's ID. VR (value representation) specify the characteristics of information.

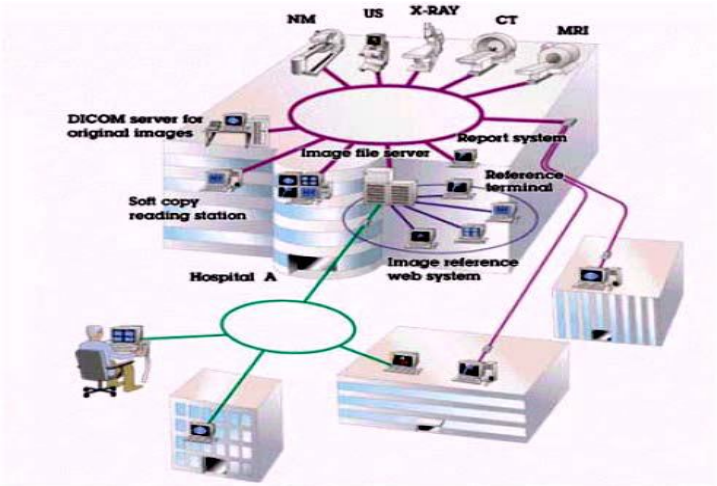

Fig 2. DICOM as standard of image format

II. RELATED WORK

Sometimes VR may be omitted. The value length is the number that displays how much length of data in value field and value field corresponds to data actually. If value field is a name (date), it can be represented as PN (DA). Here, PN means the patient name and DA means date. Figure 4 describes the example for data element of any tag. Value field used often like patient's name may understand even if do not clarify PN. It is known that this is implicit

Whether we should inform the information transmission. Otherwise, we are called explicit VR in characteristics.
The steps of DICOM-format image archive has shown in Figure 5.

VR. Because Patient's name corresponds to implicit VR, it is same effective on the results for the case of

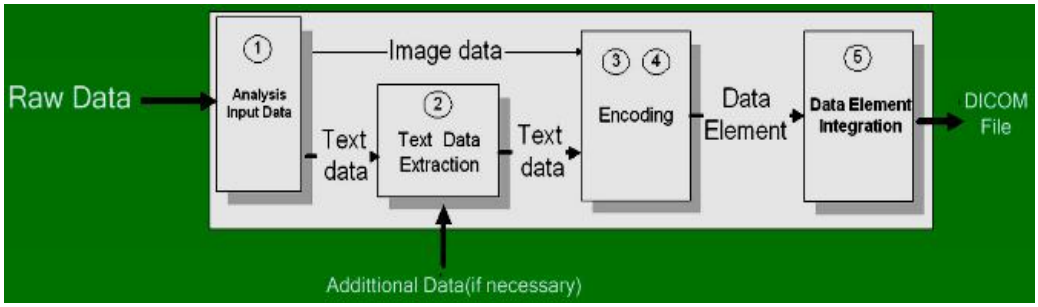

Fig 3. The steps of data transformation to DICOM format

First analysis and type selecting of data which to analyze whether raw (input) data be compressed or other archive, and then separate the data by text data – such patient's curing history and binary code data – such image data from medical instrumentation then, additional text data for user to adding which important to the original image not have curing history or data then, decoding text data from the first step to the stimulation (model) of DICOM format by sending the tag number into encoding module from (respective number) first to end which image data on the last place. Finally, decoding into DICOM format taking the tag number from the third step to compare with standard dictionary program, and then get the value (number) for encoding to absolutely data element.

2.1 IMAGE COMPRESSION

A medical image requires very high quality unlike an image that is used usually. For example, a chest image that is acquired in Compression Ratio (CR) amounts one image size to 7 - 8 MB. Like this, when an image acquiring from various equipments is deciphered by interpretation doctor or stores for conservation to long term storage device etc., it should be compressed in extent that do not influence on next Interpretation. Therefore,
compression technology in PACS is more important part than any part in store or transmission.
In DICOM standard, the compression technology specifying lossy or lossless methods such as JPEG, run-length encoding, or JPEG-LS. Currently, JPEG2000 in is added in new standard of DICOM image compression. Thus, compress The original imaging data based on the JPEG and JPEG2000 image compressing standard. The JPEG standard for image compression is comprised of a toolkit that has three distinct components: baseline lossy, extended lossy, and lossless. Baseline lossy JPEG, the most widely implemented of the three, utilizes the discrete cosine transform (DCT) to decompose an image into sets of spatial frequency coefficients. Figure 6 show the main procedure for all DCT-base encoding and decoding processes, The DCT is done on an 8x8pixel block-adaptive basis. Baseline lossy JPEG supports 8 bits-per-pixel source imagery, offers a simple quantization scheme that enables users of the algorithm to trade off the degree of file size reduction, i.e., compression ratio, with image quality, and utilizes sequential Huffman entropy coding. Extended lossy JPEG is also based on the 8x8 pixel block adaptive DCT.

III. PROPOSED METHOD:

1 **.READ DCM FILE *:* The DCM file is use as input in this function ,This function Read the DCM File Content and Extract the metadata of file.**

2 .VALIDATE CONTENT*:* After Extraction of DCM file this function check or Validate file content about corrupt or data loss or invalid File Format.

3.DCM PARSER:

2D VIEW: In that we have to improve Visual quality of X-ray image and remove the noise from it, finally disply the 2D view.

3D VIEW TRANSFORMATION*:* The Vector generation algorithm used to transform 2D into the 3D view

4 .*RENDERING OPERATION*: The Rendering engine performs various image operation like as Zoom, Rotate, slicing.

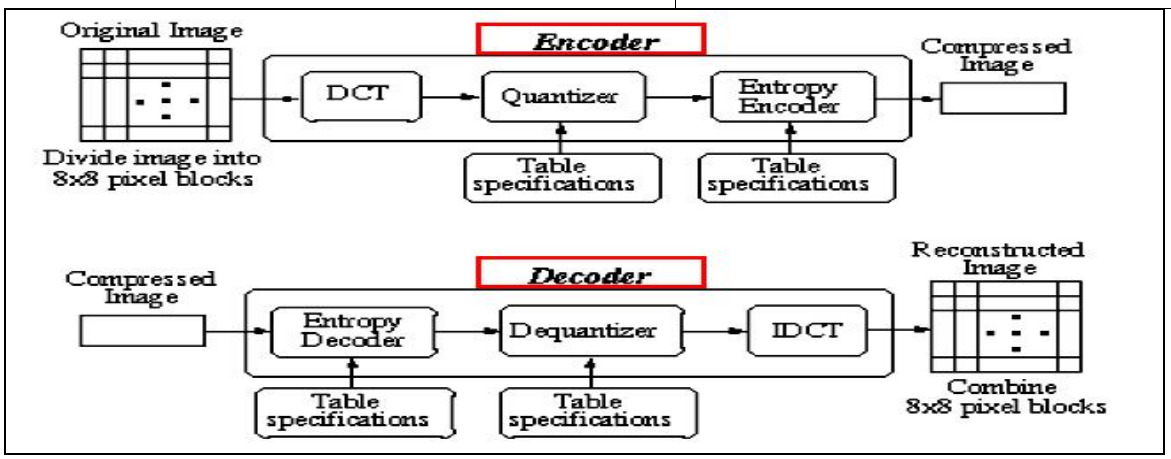

Fig 4. DCT-based encoder and decoder simplified block diagram

The reconstruction of the human head is necessary for the numerical modeling. In order to be imported in this software, the three-dimensional object must comply with the following conditions:

A. ADEQUATE SHAPE – the object must have a shape similar to the human head so that the results can be compared with results obtained from measurements

B. SOLIDITY – the object must be solid in the way compatible with FEMLAB's processing methods (it should be closed by a mesh) The primary data used are CT images scanned from a patient (fig. 1), as a series of plane cross-sectional images made along an axis, a few millimeters one of another. The initial images are in shades of gray; a set of such images is called a volume.

C. SIMPLICITY – the object must be simple enough so that the numerical problem is solvable in a reasonable amount of time

D. COMPLEXITY – the object must be complex enough so that the results are as close to reality as possible

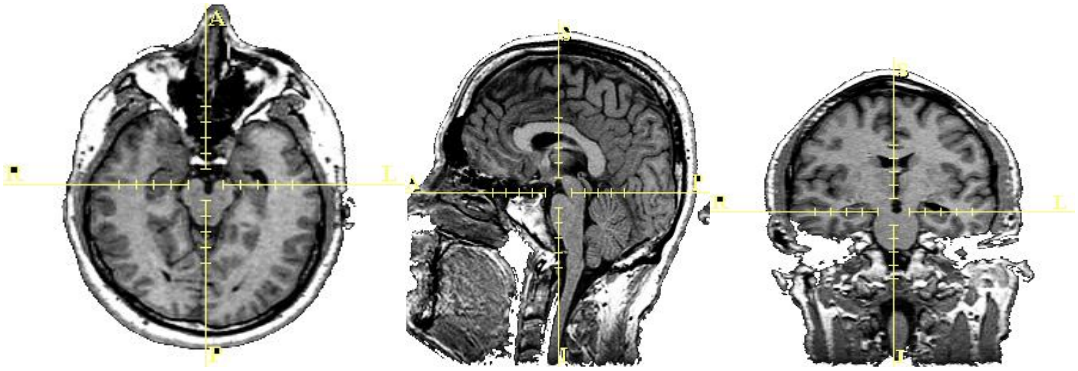

Fig. 5. Primary data (CT scans)

The images are segmented (the regions of interest are identified on the image – in our case the whole head) using a combination of manual and semiautomatic segmentation. The results of the segmentation are presented in the following image (Figure 6) From these images the head is reconstructed in 3D Slicer as Figure 7 shows.

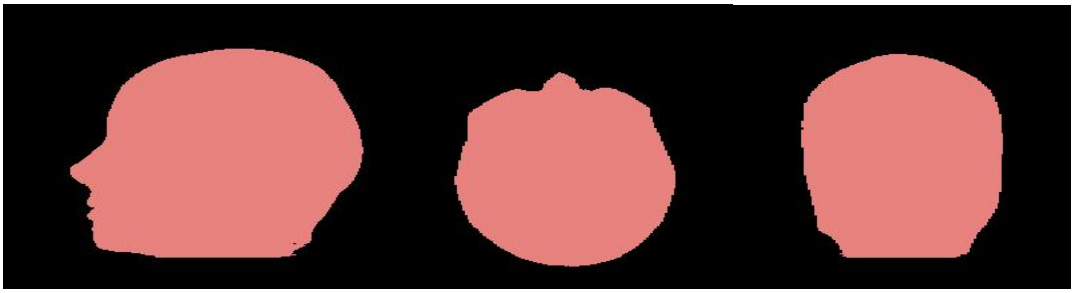

Fig 6. The result of the segmentation in 3D Slicer

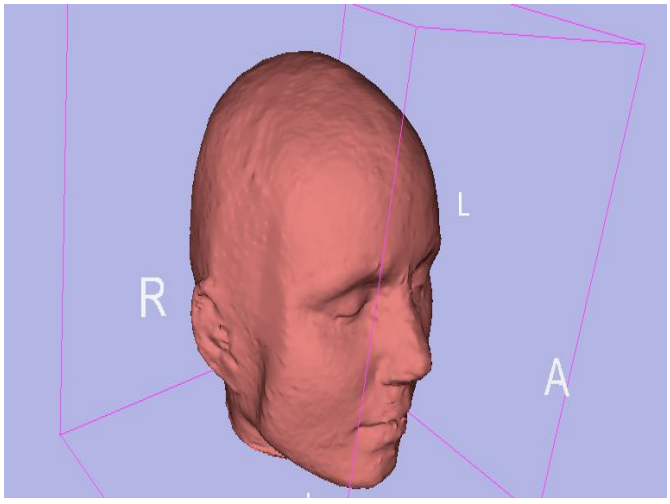

Fig7. The head, 3D reconstructed

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V. CONCLUSION

A Medical X-Ray image Viewer method to improve the visual quality of x-ray CR images has been presented. We have demonstrated that the proposed technique not only can offer effective noise removal in noisy medical images and enhancing sharpness, but also can generate 3D view and perform various image operations on the commercial display successfully.

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