

Conversion of DICOM Multi-Frame Medical Image into Multimedia Format using MATLAB

Prachi Patil, S. V. Patil, D. D. Chaudhari

Abstract: Conversion of DICOM Multi-frame medical image to multimedia format is implemented. Parse DICOM file using Matlab programming and pixel data in DICOM multi-frame images are written in to Multimedia format. Numbers of images are tested from different imaging equipment such as Computed Tomography (CT), Magnetic Resonance (MR), X-ray Angiography (XA), Ultrasound Multi-frame Image (US) etc and all of them can be converted to multimedia format. It is necessary to parse DICOM files and convert DICOM multi-frame medical images into multimedia format in order to reflect the dynamic process of the multi-frame of the images and facilitate physician to observe dynamic information for diagnosing patients. 1) Convert multi-frame DICOM images in AVI multimedia format. 2) Convert multi-frame DICOM images in WMV multimedia format. 3) Convert multi-frame DICOM images in MP4 multimedia format.

Keywords: DICOM, Medical Imaging; Image conversion; Multi-frame Imaging.

I. INTRODUCTION

DICOM (Digital imaging and communication in medicine) is a standard for handling, storing, printing and transmitting information in medical imaging. It includes a file format definition and network communication protocol. The communication protocol is an application protocol that uses TCP/IP to communicate between systems. DICOM file can be exchanged between two entities that are capable of receiving image and patient data in DICOM format. Computed Tomography (CT), Magnetic Resonance (MR), X-ray Angiography (XA), Ultrasound Multi-frame Image (US) and other imaging equipment which supports DICOM standard emerge increasingly, so digital treatment becomes possible. A number of multi-frame images exist in DICOM medical images, which reflect the dynamic process of the examining position of patients. Because of the particularity of the DICOM image format, the common image processing software cannot display, process and convert this file format. It is difficult to see all images one by one and detect disease. Hence, it is necessary to parse DICOM files and convert DICOM multi-frame medical images into multimedia format in order to reflect the dynamic process of the multi-frame of the images and facilitate physician to observe dynamic information for diagnosing patients.

Manuscript published on 30 December 2014.

* Correspondence Author (s)

Prachi Patil, PG Student, Department of E & TC Engineering, J. T. Mahajan College of Engineering, Faizpur, North Maharashtra University, Jalgaon, India.

S. V. Patil, Prof., Department of E & TC Engineering, J. T. Mahajan College of Engineering, Faizpur, North Maharashtra University, Jalgaon, India.

D. D. Chaudhari, Senior Technical Officer, Visual Computing and Big Data Analytics, Centre for Development of Advanced Computing, Pune, Maharashtra, India.

© The Authors. Published by Blue Eyes Intelligence Engineering and Sciences Publication (BEIESP). This is an [open access](http://creativecommons.org/licenses/by-nc-nd/4.0/) article under the CC-BY-NC-ND license <http://creativecommons.org/licenses/by-nc-nd/4.0/>.

II. RELATED WORK

Types of images

JPEG image:

JPEG stands for "Joint Photographic Experts Group". This means is the specific way that the image is compressed has been approved by the photograp hics expert group to be the best format for an internet-displayed photographic image. JPEG format supports 8-bit gray-scale images and 24-bit color images (8 bits each for red, green, and blue). Size of JPEG image is small. It uses millions of colors. It is viewable from internet. When JPEG is saved it lose some picture. It is lossy compression method. JPEG-compressed images are stored in the JFIF (JPEG File Interchange Format) file format. Every digital camera can save JPEG format images.

GIF image:

GIF stands for "Graphics Interchange Format". GIF isuses for menu buttons or icons for a webpage. GIFs are extremely tiny in file size and have no complex colors, so they load almost instantly on any webpage. It is Useful for Transparencies, Animations or Image Maps. It Supported by all web browsers. File size is very small.it use only basic colour.in this details is not allowed. GIF is limited to an 8-bit palette, or 256 colors. GIF format is used for storing graphics with relatively few colors such as simple diagrams, shapes, logos and cartoon style images. GIF format supports animation and is used to provide image animation effects. . Its LZW lossless compression is more effective when large areas have a single color, and less effective for photographic images.

BMP-Bitmap image:

Bitmap files are the standard in basic image editing.in bitmap image a map containing many bits of an image. A bitmap file would look like very close up.it has high image quality.it is easy to edit and change.it has large file size.it is not displayable on internet.it has no loss of image through process. The BMP file format (Windows bitmap) handles graphics files within the Microsoft Windows Operating system. It is uncompressed file format. It is large and lossless.

TIFF image:

TIFF stands for "Tagged Image File Format". A TIFF file is the industry standard in perfect image editing.it has zero compression for lossless editing. TIFF are the default image type for using a professional editing package, such as Adobe's Photoshop.

TIFF is used for scanner to get large and detailed image with no loss in quality. It is not viewable on internet. TIFF format is a flexible format. It saves 8 bits or 16 bits per color (red, green, blue) for 24-bit and 48-bit totals. Some digital cameras can save TIFF format images. Digital camera uses LZW compression algorithm for lossless storage. TIFF image format is not widely supported by web browsers.

DICOM image:



Figure 1: DICOM Image

DICOM stands for “Digital imaging and communication in medicine”. It was created by the National Electrical Manufacturers' Association (NEMA). It was created for improve compatibility and workflow efficiency between imaging systems, medical devices, and other information systems used in a hospital environment. This has become the principal standard for the communication of medical images. The basic difference between a DICOM image and an image in other formats like JPEG, TIFF, GIF is that DICOM image contains a ‘header’ with information (such as patient demographics, machine, scan parameters, and a host of other non-image data). DICOM image also contain image data. Thus it is possible to identify the origin of the image, the patient, data acquisition parameters of the study and so on, even if a single image is analyzed in isolation. The adoption of DICOM standards by medical imaging equipment vendors has helped in effective cross-machine communications and made possible integration of imaging equipment from different manufacturers.

Types of video file format

AVI (Audio video interleave):

AVI files is a standard developed by Microsoft and it is very popular video file format. It is an uncompressed file format. AVI file is too huge and it will be difficult to be transferred over the Internet. AVI files are mainly used for editing. They are not much of a video sharing format. Most popular video players can open in AVI file format. AVI file can be coded using a variety of codecs. AVI file supports multiple video or audio streams. IT supported by video players and mobile devices. AVI contain video and audio data in file container.

FLV (Flash Video Format):

Flash video file format is the most common and popular video sharing file format used over the Internet. Almost all browsers are compatible with Flash and can the play the video with ease. Most online video games are also done in a Flash video format.

WMV (Windows Media Video):

File size is small. File size after compression is very small, which results in poor quality. WMV files are used for streaming and downloading content over the Internet. Windows Media Player is mainly used for play. WMV is used to store video data in a compressed format. WMV was basically Microsoft’s version of Real Video’s online streaming formats. WMV is a file type which can contain video in one of several video compression formats developed by Microsoft. It is Difficult to play WMV on Apple or Linux players.

MOV (Apple Quick Time Movie):

MOV is a popular type of video format amongst MAC users. MOV files are of high quality. It has big size. MOV files can be opened with a variety of players available on PC.

MPEG-4 (MP4):

The Motion Picture Experts Group is an international group that was created to develop standards for audio and video file formats. MP4 is a video format mainly used by camcorders and cameras that is gaining popularity. The quality of a video coded using MP4 is very high. Size of file is relatively small. .MP4 standard is becoming more popular than FLV for online video sharing. It is compatible with both online and mobile browsers .it also supported by the new HTML.MP4 audio and video can streamed over internet. MP4 is container format. It can used to store audio and video data. MP4 does not have standard method for coding audio and video information. In MP4 codec is affects on video quality and compression.

III. PROPOSED SYSTEM:

Convert DICOM image to AVI Multimedia format

Audio Video Interleave, known by its acronym AVI. It is a multimedia container format. It is introduced by Microsoft in November 1992 as part of its video for Windows technology. Image quality is great. it can be used across multiple platforms. it is predominant video format because Windows are versatile and Application Program Interface (API) is simple for developing AVI. Core principle of converting DICOM multi-frame image to AVI format is that the pixel data in each frame are written into AVI stream sequentially and then AVI files are created. First of all, parse DICOM file for getting pixel data in it. If file parse in DICOM standard, it indicate that format conversion can be done. Secondly, initiate AVI structure. AVI file is created and AVI stream type is set to video stream format. After that AVI file is created successfully. All frames are read from DICOM multi-frame image. It is specified by the data element (0028, 0008) in data set.



Pixel data in each frame are written into AVI frame correspondingly from the first frame to the last frame.

Convert DICOM image to WMV multimedia format

Windows Media Video (WMV) is a compressed video compression format for several proprietary codecs developed by Microsoft generally contain. WMV files both video and audio components. WMV video uses Windows Media Video encoding, and WMV audio uses Windows Media Audio encoding. Core principle of converting DICOM multi-frame image to WMV format is that pixel data in DICOM multi-frame image serves as WMV sample. Then the sample is written into WMV and is compressed. Parse DICOM file for getting pixel data in it. If file parse in DICOM standard, it indicate that format conversion can be done. Secondly, initiate WMV structure. WMV file is created and WMV stream type is set to video stream format. After that WMV file is created successfully. All frames are read from DICOM multi-frame image. It is specified by the data element (0028, 0008) in data set. Pixel data in each frame are written into WMV frame correspondingly from the first frame to the last frame. WMV is compressed format. hence, pixel data from DICOM multi-frame image cannot be written directly into WMV frame .before that , compress sample and then write compressed sample data into WMV file. First of all, parse DICOM file for getting pixel data in it. If file parse in DICOM standard, it indicate that format conversion can be done. Secondly, initiate MP4 structure. MP4 file is created and MP4 stream type is set to video stream format. After that MP4 file is created successfully. All frames are read from DICOM multi-frame image. It is specified by the data element (0028, 0008) in data set. Pixel data in each frame are written into MP4 frame correspondingly from the first frame to the last frame.

Convert DICOM image to MP4 multimedia format

MP4 is method of defining compression of audio and visual digital data.it was introduced in 1998 by ISO/IEC moving picture expert group.MP4 is used for CD distribution, compression of AV data for web, used for steaming media, for voice broadcast television application. Core principle of converting DICOM multi-frame image to MP4 format is that the pixel data in each frame are written into MP4 stream sequentially and then MP4 files are created. First of all, parse DICOM file for getting pixel data in it. If file parse in DICOM standard, it indicate that format conversion can be done. Secondly, initiate MP4 structure. MP4 file is created and MP4 stream type is set to video stream format. After that MP4 file is created successfully. All frames are read from DICOM multi-frame image. It is specified by the data element (0028, 0008) in data set. Pixel data in each frame are written into MP4 frame correspondingly from the first frame to the last frame.

IV. CONCLUSION

As per the above context and the overall description regarding theory used we have did analysis to generate the new inference view. We are concluding our document with the bottom line as we proposed a very new and the novel technique to improve the conversion of DICOM multi-frame medical image in to multimedia format. It is difficult to see all images one by one and diagnose disease. It makes easy to diagnose the disease.

REFERENCES

- [1] Xiaoqi LU, Yu GU, Baohua ZHANG, Zhengguang DENG, Yunzhou FAN, School of Information Engineering, Inner Mongolia University of Science and Technology, Baotou, Inner Mongolia, China.
- [2] LIU Ying, LI Kai-yang. Research and Implementation of Medical Image DICOM Format Conversion. Journal of Mathematical Medicine, 2008, 21(4) 479-480.
- [3] University of Zagreb, Faculty of Electrical Engineering and Computing Department of Wireless Communication
- [4] Unska 3/XII, HR-10000 Zagreb, Croatia.
- [5] Indian Journal and Radiologic Imaging. Feb 2008; 18(1): 12-16. doi: 10.4103/0971-3026.38503.
- [6] ISO 12052:2006, Health informatics -- Digital imaging and communication in medicine (DICOM) including workflow and data management.
- [7] Digital Imaging and Communications in Medicine (DICOM) <http://en.wikipedia.org/wiki/DICOM>.