Technical Note

N·

OsiriX: Is it really a suitable software for 3D visualization of neuroanatomical structures acquired from DICOM images?

Ilkan TATAR ✦

Department of Anatomy, Hacettepe University, Faculty of Medicine 06100, Ankara, TURKEY.

✦ Ilkan Tatar, MD
Department of Anatomy, Hacettepe University,
Faculty of Medicine, 06100 Ankara, TURKEY.
☎ +90 312 305 21 14
🖷 +90 312 310 71 69
✉ ilkan@hacettepe.edu.tr

ABSTRACT

In this paper, compatibility of OsiriX software with 3D visualization of neuroanatomical structures acquired from DICOM images was examined. OsiriX, as a multi-dimensional image navigation and display software, was designed for display and interpretation of multidimensional and multimodality images. This software was used in some new thesis on anatomy about 3D reconstruction and volume calculation of the intra-orbital part of the optic nerve successfully. Advantages and features of the software in 3D visualization, multidimensional image navigation and display were summarized in this brief technical note. © **Neuroanatomy. 2008; 7: 20–21.**

Introduction

One of the most common difficulties in neuroanatomy learning is misperception of structure's spatial position. Three dimensional (3D) reconstruction and modeling is one of the easiest ways of understanding spatial position. 3D reconstruction and modeling from traditional imaging modalities requires too many slices and expensive image display and processing system. Is there any software, which allows users to efficiently and conveniently navigate through large sets of multidimensional data without the need for high-end expensive hardware or software? This brief technical note is addressed to answer this question.

OsiriX

Nowadays digital data modalities are used in archiving and interpretation of the medical data. Digital Imaging and Communication in Medicine (DICOM) images have been used as standard radiological imaging format since 1988 [1].

OsiriX is multidimensional image navigation and display software. It can be freely downloaded from the Internet [2]. OsiriX, marks the transition to a completely new platform with the added 'X' indicating the migration to the new Macintosh operating system version 10, also called MacOS X (Fig. 1). The X also indicates the compatibility with underlying Unix platform and the adoption of the open-source paradigm.

OsiriX has many revolutionary features for image navigation and display. Some of them are listed below:

1) *GNUstep/Cocoa* is an object-oriented and cross-platform framework for the development of the graphical user interface. This framework allows the user to quickly design and develop complex graphic user interfaces.

2) *OpenGL* is an industry standard graphic library for 3D image visualization function. It has been developed for 3D rendering but it also performs extremely well 2D rendering functions. By adopting it, large sets of over 1000 MRI slices can be displayed in few seconds.

3) *Visualization Toolkit (VTK)* is an object-oriented open-source and cross-platform library for 3D image processing and visualization that is widely adopted in the scientific community. VTK is actually the only true cross-platform and hardware accelerated 3D rendering library for personal computers.

4) *Insight Segmentation and Registration Toolkit (ITK)* is an extended set of libraries for specific medical image processing. This library is, like VTK, under active open-source licensing and benefits from updates and improvements provided by a large number of users.

5) *Papyrus Toolkit* for DICOM file management. It allows for the extraction of image data but also for all numeric and textual meta-data associated to a DICOM.

6) *DICOM Offis* for DICOM network functions. This library provides a complete set of functions that greatly facilitate the management and implementation of the extremely complex and convoluted DICOM network protocol.

OsiriX: Is it really a suitable software for 3D visualization of neuroanatomical structures acquired from DICOM images?

21

Figure 1. The OsiriX interface in Apple® MacOS X operating system shows a sample MRI sequence taken for the author's thesis. Color version of figure is available online.

7) *Altivec of Power PC 20* is a low-level assembly function for accelerating digital signal processing (DSP) functions. It offers great performance when manipulating large sets of data such as 3D volume data.

8) *QuickTime®* for exchange of multimedia image file formats. It allows the export of any image data to all standard multimedia image formats such as TIFF, Adobe® Photoshop, JPEG, JPEG2000 and BMP22 and any image sequence to movies file formats such as AVI, MPEG, and MPEG4 [3].

Conclusion

Imaging modalities are evolving from conventional 2D slices to 3D volumetric acquisition extending to a fourth or fifth dimension with temporal and functional data, which can be acquired with ultra fast scanners. Although OsiriX is mainly used for 3D image visualization and processing, it has many handy features such as archiving data, forming data pool for future studies, helping tools for region of interest (measurements, rotations etc.), surface and volume rendering. It is very useful with simple, clever interface and synchronization feature, which works bilaterally between imaging center and its users [4].

Finally it is free, Apple® Macintosh® based, multidimensional navigating and displaying software. It can be used for 3D modeling and visualizing in DICOM based studies, which focused on neuroanatomy as well as any area of interest in the body.

References

[1]   [No authors available]. Digital Imaging and Communication in Medicine. http://medical.nema.org/dicom/ (Accessed Dec 2007)

[2]   [No authors available]. OsiriX Imaging Software. http://www.osirix-viewer.com (Accessed Dec 2007)

[3]   Rosset A, Spadola L, Ratib O. OsiriX: An open-source software for navigating in multidimensional DICOM images. J. Digit. Imaging. 2004; 17: 205–216.

[4]   Tatar I. Computer aided 3D reconstruction and volume calculation of the intraorbital part of the optic nerves of healthy adults with high resolution (3T) MRI sections. [Thesis on Anatomy] Ankara: Hacettepe University, 2005.