

UDC 681.3

## APPLICATION OF COMPUTER GRAPHIC IN MEDICAL DIAGNOSTIC SYSTEM

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The aim of paper is to describe how we can use 3D imaging in medical with help of medical image registration and 3D Slicer. The example of the Medical Image Registration and 3D Slicer is presented.

### Introduction

The main directions of the application of computer graphics in medicine are:

- diagnostics;
- combining information from multiple imaging modalities;
- studying disease progression;
- monitoring changes in size, shape, position or image intensity over time;
- image guided surgery or radiotherapy;
- relating pre-operative images and surgical plans to the physical reality of the patient;
- patient comparison or atlas construction;
- relating one individual's anatomy to a standardized atlas.

### 1 Application of 3D SLICER system

Slicer's platform [1] provides functionalities for segmentation, registration and three-dimensional visualization of multimodal image data, as well as advanced image analysis algorithms for diffusion tensor imaging, functional magnetic resonance imaging and image-guided radiation therapy (fig.1).

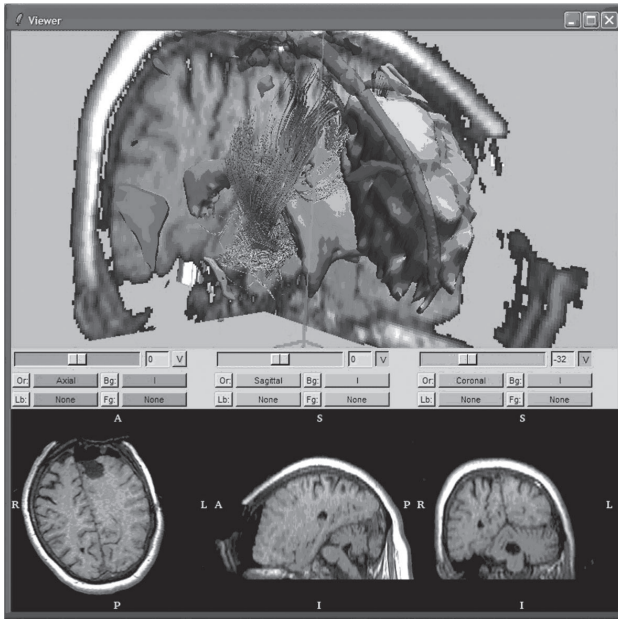


Figure 1 - Example of 3D Slicer system

## 2 Advantages of 3D Slicer

Slicer has been used in a variety of clinical research. Slicer system is:

1. A platform for exploring novel image analysis and visualization techniques.
2. A freely-downloadable program Source code and executables available for Windows, Linux, and Mac OS X.
3. A research platform.

3D Slicer supports the next operation (fig.2):

- Visualization.
- Registration.
- Segmentation.
- Measurements.
- Realtime Integration.

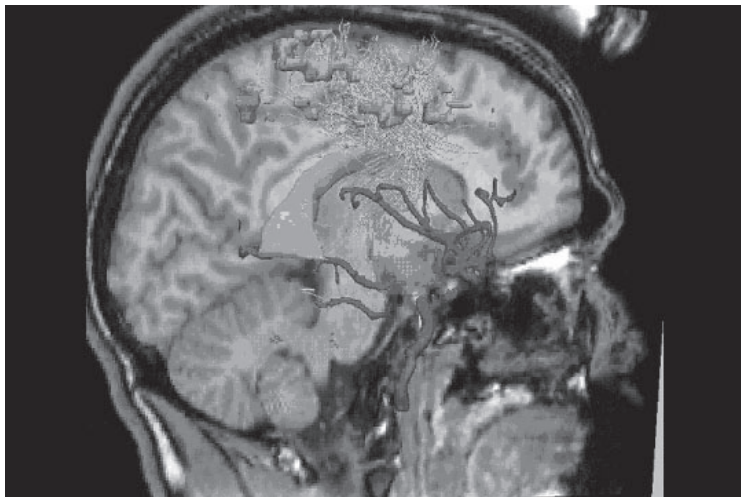


Figure 2 - Example of 3D Slicer Segmentation-operation

### **3 3D Slicer DEMO mode**

The most expressive possibility of 3D Slicer system is mode “DEMO” (fig.3), which allows user to see dynamical demonstration of selected 3D images [2].

### **Conclusion**

Recently, techniques have been developed to enable CT, MRI and ultrasound scanning software to produce 3D images for the physician. Traditionally CT and MRI scans produced 2D static output on film. To produce 3D images, many scans are made, then combined by computers to produce a 3D model, which can then be manipulated by the physician. 3D ultrasounds are produced using a somewhat similar technique [3].

With the ability to visualize important structures in great detail, 3D visualization methods are a valuable resource for the diagnosis and surgical treatment of many pathologies. The 3D equipment was used previously for similar operations with great success.

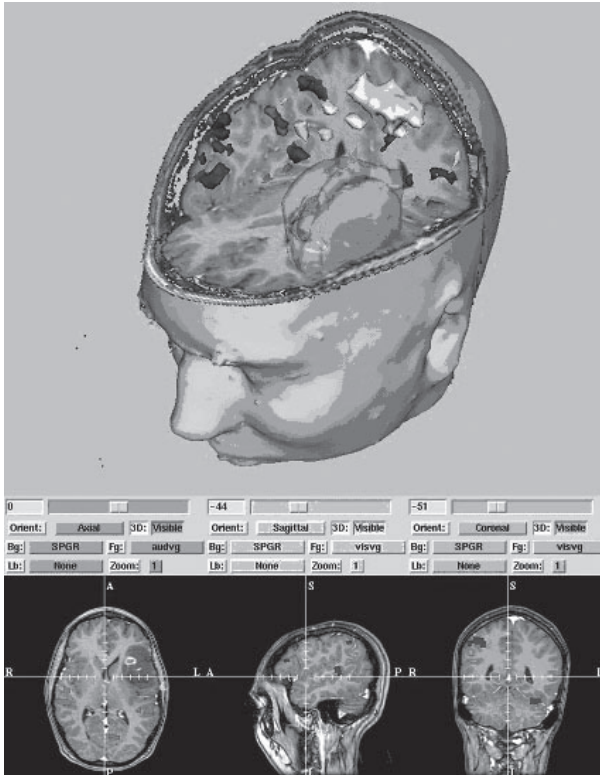


Figure 3 - Example of 3D DEMO

## Literature

- [1] Slicer:Workshops:User Training 101. Electronic recourse. Access mode: [http://wiki.na-mic.org/Wiki/index.php/Slicer:Workshops:User\\_Training\\_101](http://wiki.na-mic.org/Wiki/index.php/Slicer:Workshops:User_Training_101)
- [2] Slicer3.2:Training Electronic recourse. Access mode: <http://wiki.na-mic.org/Wiki/index.php/Slicer3.2:Training>
- [3] The Online Resource for Research in Image Fusion. Electronic recourse. Access mode: <http://www.imagefusion.org/software.html>