A Multimodal Visualization Framework for Medical Data

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Abstract. Although the use of information acquired from multiple sources to help in medical diagnosis is increasing, the integration of multivariate data into a unique 3D representation is non-trivial. Multimodal visualization techniques have been proposed with the goal of finding suitable strategies to integrate important characteristics of multiple data sets providing better insight. Considering the requirements of multimodal visualization systems, this work describes a framework for interactive multimodal visualization of volume data.

1 Motivation and Requirements

Multimodal visualization is concerned with the proper integration of data obtained from separate scanners like MRI and PET. The motivation for the development of a new system architecture for interactive multimodal visualization comes from the usefulness of the integrated display of functional and anatomical images in several medical applications. Also, in spite of the evolution of volume rendering techniques, there are open issues regarding the development of an integrated, flexible, extensible and portable system capable of solving a large range of visualization problems [3].

The requirements for multimodal visualization can be summarized as follows: 1) a procedure referred to as **registration** [2] that actually aligns different data sets; 2) a volume **visualization tool** that also provides **interaction** with the data through a good user **interface**. Suitable input and output devices including haptic devices should be considered; 3) a **segmentation** tool may be necessary for visualization, registration or, especially, to allow proper measurement of structures (**quantification**).

2 Framework Description and Final Comments

Our framework represents a strategy for integrating registration, segmentation, and interactive visualization of multimodal data sets. Figure 1 shows a simplified UML description of the conceptual model of the framework, which is based on the MVC pattern [1]. The *Scene* class represents the model, while the *UserInterface* class is the system controller, responsible for user action management, and the *View* class deals with data presentation. Registration is just a method of the *Volume* class.

The use of object-oriented paradigm allows easy integration of existing tools as well as framework extension. The framework is being implemented using Standard C++ language, OpenGL and the GUI toolkit FLTK [4].

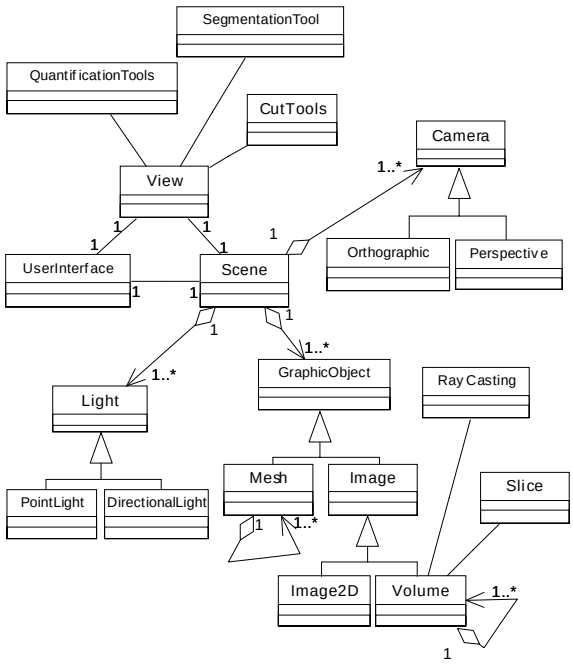

Figure 1 Framework classes.

References

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