Construction of Multiuser Virtual Environments for the
Virtual Teaching of Embryology

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Abstract. This poster describes the construction process of multiuser Virtual Environments - VE integrated to multimedia for the virtual teaching of embryology. The system is supported by the MPEG-4 standard and will be integrated, as experimentation environments, to a virtual course of embryology, which is being built and will be made available as part of the Embryology course for medical students.

1 Introduction

The traditional teaching of embryology presents several limitations to transmit to the students abstract concepts which can be difficult to grasp. This happens because traditional teaching makes extensive use of static resources such as: laminas, microscopes, illustrations of books, etc., which are not enough to enlighten abstract concepts. A work is under development in the Computer Science Department at UFSCar that proposes the construction of multiuser VEs integrated to multimedia for the virtual teaching of embryology. These VEs will make use of the SVRT-MM [2] (Virtual Shared Reality Tool integrated to Multimedia), a plataform to support distributed VEs for the sharing and interaction among multiple users in the same VE supported by the MPEG-4 standard [1]. MPEG-4 is used for compressing, transmitting and visualizing multimedia objects, and will be used as an alternative to the VRML language. VRML presents several limitations, such as: lack of browsers conformity to the complete VRML specification; difficulties of insertion of text in the environment; lack of synchronization when multiple media are present in the environment; limited flexibility for video support which are mapped as textures on 3D objects; etc.

2 Description of the Construction Process of Multiuser VEs for the Teaching of Embryology

The construction of the VE started with the digitalization of oblique sections of forty eight hours bird embryos. The sections were captured from laminas by a microscope adapted to a computer. Eighty seven sections were selected out of three hundred and eighty images. The process for the VE construction is described bellow:

- Position adjustement of all the resulting images in relation to the first image (this process was necessary because the capture of the embryo sections was strictly manual)

- Application of "Grayscale" to all resulting images;

- Removal of all "noises" (structures that were not important in the embryonary process, such as the involving membrane) from the images,

- Modification of the images resolution;

- Construction of the 3D embryo with the VTK software - Visualization ToolKit

- Exporting of the 3D embryo (in VTK) to VRML and later to MPEG-4;

The VEs to be constructed will be integrated, as experimentation environments, to a virtual course of embryology (e-lecture), that is being built and will be made available through the Learning Space tool – a tool to support virtual courses in the Web [3].

3 Bibliographical References

[1] O. Avaro et all. MPEG-4 Systems: Overview. Signal Processing: Image Communication 15, 281-298, (2000).

[2] M. A. S. Oliveira. A Communication Model for the Construction of VR Systems. Dissertação de Mestrado, PPG-CC, UFSCar, São Carlos, Julho (1999) (in portuguese).

[3] Learning Space, Available in: http://www.lotus.com/home.nsf/welcome/learnspace (1999).