SIECG – An Interactive Tool to Teach Computer Graphics

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Abstract. Several approaches used to teach Computer Graphics can be found in the literature. This paper describes the design and implementation of an interactive graphic system developed to aid on the Computer Graphic teaching. It has interactive examples and texts describing the objective and functionality of each step of the tri-dimensional viewing pipeline. Algorithms and commented source codes of the implementation using OpenGL and VRML (when applicable) are also available.

1. Introduction

Computer Graphics (CG) educators have been using demonstrations programs to help teaching the different subjects of this field. The motivation for the development of such programs comes from the opportunity to learn "by doing" through interactive applications [1]. One of the main CG subjects is the 3-D viewing pipeline, which typically includes the following stages: modeling, viewing, projection and workstation transformation [2]. We developed an application, called SIECG (Interactive System to Teach CG), to provide interactive tools to aid the teaching of this important topic.

2. System Description and Available Tools

The SIECG interface is shown in Figure 1: the user chooses the desired subject to study by selecting the corresponding tab in the top; the text bellow, describes the theory related with this subject; the two black windows in the left represents, respectively, the universe (with the objects and the camera) and the final image exhibited in the viewport; through the buttons on the right side it is possible to select the available options, change parameters, and verify the corresponding OpenGL and/or VRML code. Figure 2 illustrates the alternatives when the modeling tag is selected.

3. Final Comments and Future Work

SIECG provides a beginning tutorial and interactive tools to help in the study of the 3-D viewing pipeline. In order to evaluate the system, it was used by different groups of students (some of them already know Computer Graphics concepts, and other do not). The majority of them were satisfied with the system, mainly because it is easy to use, has interesting tools and helps in the learning process. Future works include the extension of the system to provide other steps of the 3D visualization pipeline, as well as another tools related to illumination models and texture mapping techniques.

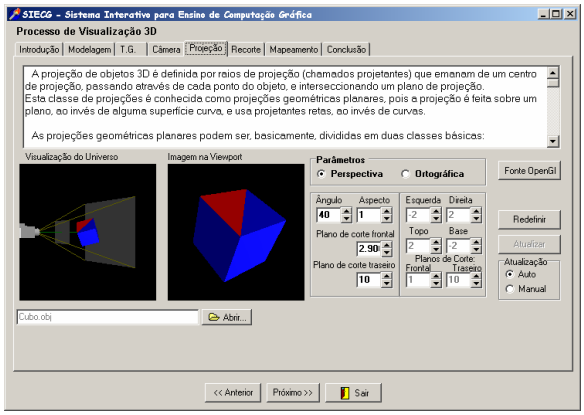

Figure 1 User can choose between orthogonal and perspective projection, setting the desire parameters.

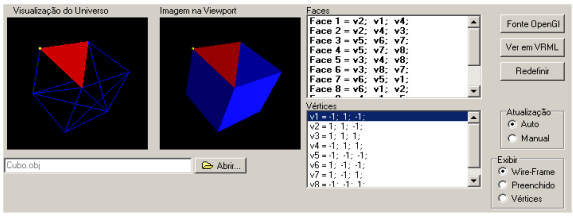

Figure 2 Modeling step: the user can identify the selected face and vertex and see the OpenGL and VRML code.

References

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