

A GRAPHICAL POST-PROCESSOR FOR WEB ORIENTED APPLICATIONS

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Introduction

To show results in graphics is an inevitable function of computer applications in civil engineering today. A graphical post-processor is important to users. But as it is generally not the kernel part of an application, a graphical post-processor is a burden to developers sometimes, especially to a researcher who might be a developer and a user simultaneously and who wants to have a flexible solution soon for several kinds of questions by simply adjusting his/her program. Upon studying common needs of graphical presentation for civil engineering applications, this paper presents a graphical post-processor using Virtual Reality Modeling Language (VRML)^[1] and promotes ideas of developing web oriented applications.

Towards web oriented applications

A traditional application (such as a seismic analysis program) provides solutions by a local computation. As shown in the upper part of Figure 1, it means that both user and machine are in a same physical location. An application can be generally divided into an interface part, which includes an input and an output, and an application kernel. A graphical post-processor is a kind of output interface. It can be separated from the application kernel if the application is not an interactive graphic one. Moreover, to shift traditional applications into a web oriented environment, interfaces should be separated from the application kernels. The interface of output should be able to perform on the client end (Figure 1). In a brief, by separating the output interface from the application kernel, two points of benefit can be gained. The first one is that a general graphical post-processor can be made to serve more than one applications on setting up protocols of data processing. The second one is that this structure supports web oriented applications as long as results of the graphical post-processor can be passed through the Internet.

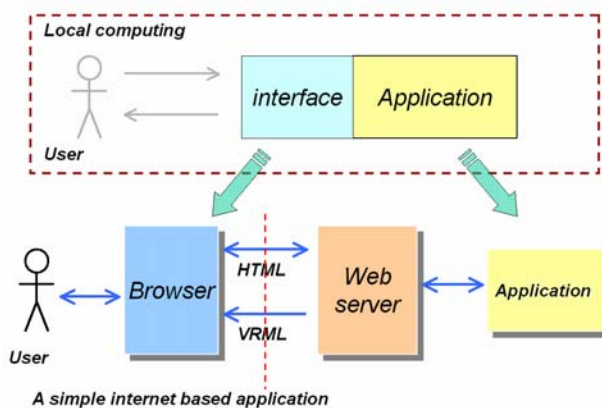


Figure 1 A simplified application prototype

Implementing a graphical post-processor using VRML

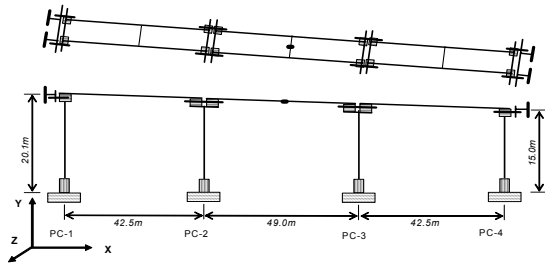
VRML, a script language for creating a dynamic 3D world on the Internet, is suitable for making a graphical post-processor. An initial practice was a post-processor for a general-purpose 3D dynamic analysis program for bridges.

Keyword: Computer graphics, Post-processor, Web application, VRML

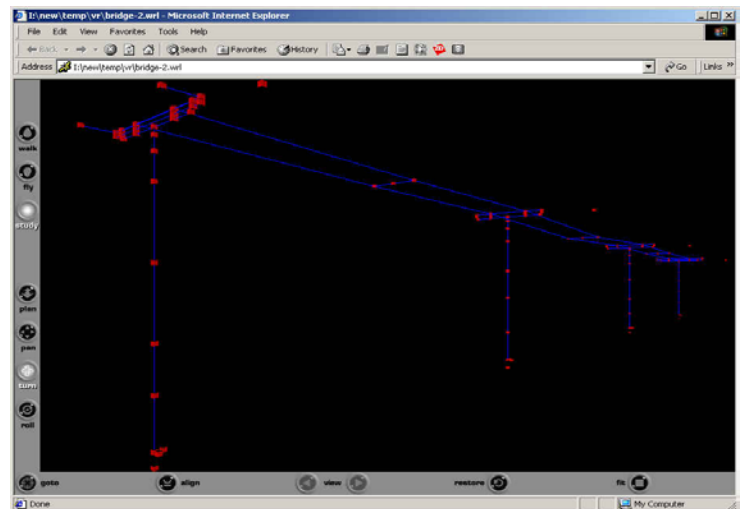
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Figure 2(a) shows a three-span steel bridge analyzed by the program, while Figure 2(b) shows the dynamic seismic response of the bridge viewed by a web browser with a VRML plug-in.



(a) A steel elevated bridge



(b) Seismic response showed by a VRML browser

Figure 2 Seismic response presented using VRML through Internet Explorer

With the same technique, the graphical post-processing work for a simulation of evacuation at a shopping mall has been implemented. Figure 3 gives the result of simulation of people evacuation at different time steps.



Figure 3 Simulation of evacuation of people at a shopping mall

Two examples above show that VRML is good for implementing a graphical post-processor with can pass its results through the Internet. The resources of VRML and the new-generation successor X3D^[2] are abundant throughout the Internet. Several shortcomings of the current version of VRML such as redundancy in describing time-history data should also be mentioned.

Conclusions

Upon studying common needs of graphical presentations and development of web oriented applications, this paper discussed ideas of a simple model for web base applications and implemented a graphical post-processor using VRML. Two applications from analysis and simulation areas showed the possibility of promoting web based applications by dividing the interface from the application kernel.

Reference

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2. <http://www.web3d.org/x3d/>