

ARCHAVE: A VR Interface for Archaeological Research

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The goal for this semester was to finalize a first testable version of the system so we could bring a group of archaeologists to try the system in a controlled experiment. This would give us a first evaluation of how we are doing in designing this new research tool.

There were two main reasons why this was not accomplished. The first one, and most important, the creation of the user interface, so users could use the system as naturally as possible, turned out to be the stopping point for the experiment.

During the summer we iterated three or four times over a design for a user study, trying to define tasks that would allow us to compare performance of users in our system and using classic methods of studying a site. A number of new issues and factors came up during this process:

- The impossibility of creating a set of comparable tasks valid for both the virtual (Cave) and the non-virtual environment (database).
- Characterization of our main task, look for areas of high concentration of artifacts, as a “Visual Search”. This term relates to a well studied area of Cognitive Science, providing us with extensive literature about experimental methods and techniques to perform this type of task. Nevertheless, our case is more complicated because our search is in 3D, which involves another set of problems.
- The density of the user’s field of view, and the visual clutter introduced by the complicated geometry of trenches and loci, make the three dimensional visual search very complicated.
- We created a “cluster” method to visualize artifact concentration in the different loci.
- Orientation on the virtual site is key. This affects not only the comfort of the user (he or she actually know where they are) but also the results of any search task.
- The scale at which our tasks have to be done is not clear. At first we planned on using the “life-size” scale the cave naturally provides us. As mentioned before, problems with visual clutter suggested we approach the problem from a different perspective: Perform the search at a smaller scale and do any further, more detailed investigation at a real scale, being immersed in the excavation trenches.

With all this information I started creating a basic interface. It allows users to directly access the database for bulk finds concentrations and displaying the results both as color saturation gradient on the loci or as a cluster of objects randomly distributed inside the geometry of the loci. Although the task was clear, creating a simple enough interface so archaeologists wouldn't have trouble learning it and using it is really difficult. Several computer scientists, specialized in graphics, tried the interface and the main concern was that there were too many buttons, modes and gestures to learn.

A first conclusion is that even the simplest tasks require a complicated interface. Also, the generality of the data and geometry makes the problem even harder because no general methodology to develop things is valid all the time (of course, novel users will find those cases that the interface doesn't work after 10 seconds of being in the Cave. It takes more time for experienced users).

I'm developing now a "World In Miniature" metaphor to be used as site map that is used for orientation, for navigating long distances in the site and for visualizing the data in the context of the whole site, avoiding the visual clutter of being immersed in the data. I'm also trying to include other projects that are being developed in the Graphics Group for navigation and interaction in virtual environments.

During this semester I also presented the project at two conferences: VIS 2000 and VAST 2000. The conclusions of the first were not very good. The attendance to the presentation was not very big and we didn't get as much feedback as we wanted. The second conference was precisely related to the use of virtual reality in archaeology. We got a lot of comments and suggestions that, although useful, are difficult to implement for the reasons commented before. From what I saw at this last conference, we are attacking the problem of creating a new research tool for archaeologists from multiple, important fronts. Nobody else is trying to do it, not even close to the level we are doing it.

There were also 2 TV crews, from PBS and MSNBC, filming the project for a series of documentaries.

Looking at the semester, and the summer, as a whole I believe we advanced a lot in the sense that we realized the potential of the system and also the great difficulty of developing it. Results were not as big and noticeable as in spring of 2000, although they are more important towards their effect in the future of my research. I am in a position now to establish the relative importance of the different factors that affect the development of the system. This will be one of the points that I'll be highlighting in my Master's thesis.

Final grade: A.

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