

Paper Summary

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Date: 10rd February, 2010

I. PAPER CITATION INFORMATION

- Distributed Interactive Learning Environment [1]
- Authors: Jim X. Chen, Christopher J Dede, Xiaodong Fu and Yonggao Yang
- Publication details: Proceedings of the 2008 Conference on Human Factors in Computing Systems, CHI 2008, 2008, Florence, Italy, April 5-10, 2008. Pages 883-892.

II. SUMMARY

A. Problem Statement

Understanding abstract scientific concepts is difficult. It becomes much harder for students in school to understand these concepts. For example, students understand swirling waterforms present in swimming pools, but find it hard to understand how Navier-Stokes algorithm models this. The number of parameters used in these kind of equations add to the complexity. The paper tries to develop strategies and approaches to implement an synthetic learning environment. Such an environment will help students to interact with each other in a better way and collaborate on exercises. Learning things in a collaborative way helps students understand the abstract concepts better. Hence, the paper deals with the problem of implementing a realistic, scalable solution to help students.

B. Proposed Solution

In this paper the authors construct a virtual class room to help distance education using computational steering and interactive visualization. Using existing technologies like Distributed Interactive Simulation(DIS) they implement their research results in a network infrastructure. DIS is a field of networked simulation research and technology, which helps in real-time display and synchronization.

DIS is a multi-cast application that requires low latency and high reliability. But, currently it uses UDP protocol to transfer messages which is a best-effort protocol and hence does not ensure reliability. Other protocols like transfer protocol provide such guarantees, but they are currently not used in DIS. The main problem in implementing this application is the mutually conflicting requirements of real-time performance and reliability. Hence, the authors implement a version of protocol that satisfies these conflicting requirements. They also ensure that their solution gives high performance and scalability.

Another important requirement is ensuring synchronization. Since the application is collaborative in nature, it is important that the actions users take are synchronized. Synchronization also ensures fast and accurate simulations. To provide this feature the paper uses a uniform time scale proportional to the clock-time and variable time-slicing to synchronize physical models.

C. Results

The paper presented a DIS environment learning and training purposes. It provided an interface, that students, instructors and experts, who are all geographically separated, can use to collaborate. Their application gives a real-time virtual learning environment that links these users. The application is implemented such that all manipulations and numerical simulations are synchronized in DIS. Using the interface learners can discuss common experience with other learners and learn their experiences with manipulating

parameters and perspectives. This helps them to master the theories they are trying to learn. In addition to this instructors and subject matter experts can demonstrate abstract concepts using graphics animations and other multimedia related techniques. Thus the tool provides a real-time collaborative environment.

III. CRITIQUE

A. Strengths

The problem of providing a real time collaborative environment is very interesting. The problem is important because, such a solution can be used in distance learning. The paper does a good work of identifying, potential problem such a solution may face and gives satisfactory solutions to overcome those problems. The paper is organised well. They first identify the problems, give solutions to these problems and then give details about the implementations.

B. Weakness

The evaluation can be improved if the authors could test the performance of actual collaborative environments. In the paper the authors give no detail about any user study conducted on their application. Such a study may help us understand the effectiveness of the solution. We will be able to better understand the scalability and performance of the application.

IV. FUTURE WORK

The paper could improve in their implementation details. They don't explain the details of their implementation, like the tools they used, the architecture of the solution etc. Giving those details would have made their solution much more clear.

REFERENCES

- [1] J. Chen, C. Dede, X. Fu, and Y. Yang, "Distributed interactive learning environment," in *Distributed Interactive Simulation and Real-Time Applications, 1999. Proceedings. 3rd IEEE International Workshop on*, 1999, pp. 49 –56.