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Development of visualization facility at the GIS and Remote Sensing Core Lab, University of Nevada, Las Vegas

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Introduction

With an immense influx of data being generated, visualization tools play a key role in transforming data into information and knowledge. The ability to develop understanding of natural and human systems. A visualization facility provides an infrastructure of visualization tools and expertise to provide researchers, decision makers, and policy makers with turnkey solutions to everyday visualization needs. Such a facility with added ability to communicate (e.g., webcasting, teleconferencing) can serve to community at large and promote collaborative discovery processes.

There is a need to build this capacity on the University of Nevada Las Vegas (UNLV) campus. The purpose of this facility would be to provide the UNLV community with visualized concepts and data on a multiscreen-multimedia projection system with the option to interactively study behaviors of models, data, and systems. The facility would also be used as a decision support tool by decision and policy makers. Added videoconferencing capability would provide a collaborative environment across campus and with other research institutions.

Visualization Facility will be part of the GIS and Remote Sensing (GISRS) Lab established in rooms 3216/3217 of the Science and Engineering Building (SEB). The facility will be built in room 3215 of the lab. Fig. 1 shows the floor and ceiling plans of the room 3215. Fig. 2 shows the floor plans of the process used to develop the Visualization Facility.

Visits to Similar Facilities

Before building any high cost and high impact facility, it is beneficial to visit other similar facilities. We have visited the following facilities across the country:
1. Arizona State University – Decision Theater;
2. San Diego Supercomputing Center (SDSC) and California Institute of Telecommunication and Information Technology – Visualization Center;
3. San Diego State University – Visualization Lab;
4. Penn State University – Invasive Construction Lab, Immersive Environment Lab, and Meteorology Tiled Display;
5. Center for Advanced Visualization, Computation, and Modeling, Desert Research Institute.

Fig. 1. (Left) Floor plan and (right) selected ceiling plan of room 3215.

Needs Assessment Survey

Needs assessment survey is conducted where the potential user community is informed about the proposed facility and asked to provide feedback and comments on the possible benefits of such facility to them. The needs assessment survey is in progress and its report will be prepared in near future. Fig. 3 shows the survey that is being conducted. This survey has been sent to researchers, policy makers, and decision makers at UNLV and in the Las Vegas area.

Visualization Facility would consist of two video display systems, i.e., (i) project/wide screen wall and (ii) tiled display wall, and four speakers audio system. The video display and audio systems will be connected to the sources through a matrix switch and a backend management system to direct data to the target area. The sources of video and audio data would be desktop computer, visual conferencing camera, DVD player, document visualizer, computer, microphone, and cable video connectors (for connecting external source e.g., laptop).

The backend system of the projection system would be a management platform to run the video walls, stereo 3D projection on the wide screen display. This system will consist of two pairs of front projectors with passive stereoscopic capability. Each pair would provide stereo 3D projection on the wide screen display. The two pairs will form the two channels that would be orthogonal to provide uniform projection of the displayed information. The projectors would be placed in a pair to provide a wide screen installation in 18 feet and it is desired to optimize the design to largest possible screen without compromising the quality of the projected data (See Fig. 4).

Design of the Facility

Visualization Facility Usage

The facility would be used by researchers, policy makers, and decision makers to visualize data for better understanding and communication. The facility setup would be to provide a collaborative environment where 12 to 15 persons can interact for various uses such as data visualization, interactive modeling, scenario analysis, teleconferencing, webcasting etc. It is recommended that the users be provided with desks and retractable lapwriting table. Such seats would be easily oriented to face any wall or group in various formations. Two example seating configurations are shown in Fig. 5.

Summary

Visualization using advanced computational and graphic equipment has become a standard way of present day research. Availability of low cost and fast processing units, high resolution displays with graphic processing units, and specialized software has brought complex visualization capabilities to an office desktop. Nevertheless, when dealing with large datasets such as, global climate, geospatial, and social data the office equipment falls short and the facility needs a central visualization facility with high end computing and graphic equipment.

Visualization Facility at GIS and Remote Sensing Core Lab would be a useful and important addition to the UNLV infrastructure. It would provide multiple audio and video facilities for facilitating research, decision support, and collaboration. The video system would consist of a wide screen display capable of 3D and picture in picture visualization and a tiled display wall. The audio system would consist of microphones and speakers. The backend management system would provide capability to route data from multiple sources to the video and audio systems. The source would include local sources as well as remote sources from video teleconferencing.

UNLV Visualization Facility would support the integration of visualization tools and expertise to provide researchers, decision makers, and policy makers with turn-key solutions to everyday visualization needs. This facility would provide the UNLV researchers ability to visualize concepts and data on a multiscreen-multimedia projection system with the option to interactively study behaviors of models, data, and systems.