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Application of New Visualization Methods with Interactive Elements for Monument Preservation

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This project is based on modern visualization methods used in photogrammetry and computer modeling for monument preservation. We work with digital cameras and images, up-to-date hardware and software for getting and processing data from images. The goal of the project is to apply these methods to a historical monument, to create an information system of this monument. It includes a 3D model of the monument, a database with data, describing the monument, and a platform necessary for comfortable work with graphical data and database content. Interactive elements are built in this informational system. If you click on a chosen object of the 3D model, you will display the data describing this object. Our system will be available on the Internet. We have a platform, including a model and a database which you can view simultaneously. It also includes an administration system, allowing remote users to manage and edit the stored data.

For practical applications the citadel in Erbil, Iraq, was chosen as a worldwide known historical monument. The citadel is a place of 8000 years continuous settlement and it forms the historical core of the city Erbil. This project is unique because the whole citadel has never been documented before. Our system will store the data from archaeological excavations. Archaeologists will use this system and update the database. For general users of the system, there will be some restrictions.

The components of the system are the 3D model, the database and the platform.

3D model

So far, a wireframe of the citadel has been produced as a result of photogrammetric surveying of houses from the digital images and has been produced by means of the photogrammetric software "PhotoModeler 4.0". The wireframe consists of points and lines and is exported into a CAD format file. We also have some terrain points because the citadel is situated on the top of a small hill. We need to edit the wireframe, texture the houses and the terrain and export the complete model with textures into VRML (Virtual Modeling Language) format. Then we are able to interconnect the model with a database. In the project, there is also a demand for connecting the model with satellite images of the inner part of the citadel and a ground vector plan of houses. For the purpose of texturing the houses, we have tested different kinds of modeling software. With a new version of the PhotoModeler (the version 6.0), we have good experience. Photo texturing and exporting to VRML works perfectly, but it is rather slow.

Database

The VRML export file was then connected with a MySQL database, containing detailed information on individual houses of the citadel. The VRML code was manually edited in the "VRML Pad" software to add links (anchors) to each house, referring to a dynamical web page (PHP) that lists the available information from the database for the given ID number of the house. The database content is composed of data describing the monument (e.g. building characteristics, type of damage, other photographs, etc.). The content and the structure of the database were created in the database administration tool "phpMyAdmin". It is a freeware tool intended to handle the administration of MySQL over the Web. Currently it can create and drop databases, create/drop/alter tables, delete/edit/add fields, execute any SQL statement, manage keys and privileges, and export data into various formats.

Platform

Using PHP (a language for creating the dynamic web pages), SQL (a language for communicating with the databases), and HTML (a language for creating web pages), we created the user interface for viewing the 3D model of the citadel and managing the content of the database. You can click on a house in the 3D model, and in the neighbouring window you can see all the information about this object stored in the database. If you are registered in the system and logged in, you can add or edit the information. It is also possible to add other images of the object, longer text descriptions etc.

The creation of the 3D model of the citadel still continues. The wireframe of the citadel is finished, the texturing of the houses is in progress. It is necessary to integrate the satellite image and ground vector plan of houses into the model to achieve natural appearance of the model. A trial version of main components of the described information system is also finished. It will be tested and improved in the near future. This grant is a part of PhD thesis of Veronika Kralova.

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