THE PROMOTION OF CULTURAL HERITAGE THROUGH INTERNET USING ADVANCED AUDIO-VISUAL INFORMATION : THE VENETIAN CASTLES OF PELOPONNISOS

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ABSTRACT:

The Venetian Castles of Peloponnisos consist important monuments of the cultural heritage of Greece as well as a tourists' attraction. The precise recording of the characteristics of each castle, namely the construction, architectural, historical, folklorist information, is a very important job that needs to be accomplished by the archaeologists that are responsible for these monuments. The 5th Ephorate of Byzantine Antiquities of Greece co-operated for this reason, with the Department of Cadastre, Photogrammetry and Cartography of the Aristotle University of Thessaloniki. This paper describes the product of this co-operation, namely the creation of an Information System with the purpose to record, process and browse all the concerning data in an internet/intranet configuration.

The photogrammetric data that have been produced, were digital orthophotomaps of the castles' surrounding areas using 1:4,000 aerial images. These orthoimages present the most recent and updated views the castles' condition on large-scale maps (1:2,000). Additional information has been supplied to the system concerning information, which describes verbally the historical, architectural, and other qualitative information about the castles. Also, many multimedia files have been used to enhance and present visually some of the above-mentioned qualitative information, e.g. images of blasted parts of the castles' fortification. Also, panoramic images and video sequences have been produced providing a virtual tour inside and around the archaeological site of each castle and a new 3D visualization tool was developed, using the draped models of the castles' produced by photogrammetric process of the aerial images.

An Internet site has been created through which a scientific user or a candidate visitor of the castles can obtain valuable information about them (i.e. accessibility options, distance from neighbouring cities, etc) as well he can also make a virtual tour inside and around the castle.

1. INTRODUCTION

Photogrammetry has been used quite a lot lately (Grün and Beutner 2000, Gemenetzis et. al., 2000, Ogleby 2000) for the promotion of Cultural Heritage objects and monuments in general. Many advantages of the photogrammetric techniques such as

- the ability to produce an accurate model of an archaeological site or object
- the extremely accurate measurements that are obtained (using the least amount of time and money)
- the visualization and virtual reality techniques that provide a better inspection of the object in study

have been used in a special case of a documentation and presentation project of cultural heritage monuments: the Venetian castles of Peloponnisos.

The 5th Ephorate of Byzantine Antiquities is responsible for the restoration and conservation of several of the most impressing and beautiful castles that were built during the occupation by the Venetian of the southern part of the Greek mainland. For the most of them i.e. Koroni, Methoni, Malvasia, Mpourtzi, Akronafplia, Palamidi a digital orthomap of their surrounding area has been created using aerial photogrammetric techniques. These orthomaps will be used for the future creation of maps and guides for touristic purposes.

2. PHOTOGRAMMETRIC PRODUCTS

In order to create the orthomaps of the castles' surrounding area, aerial photos were obtained in a 1:4000 scale. The control points were collected form the Greek Military Service maps (of 1:5000 scale).

The creation of a Digital Terrain DTM from the stereoscopic image models lead to the creation of the desired orthomaps at scale of 1:2000 (fig. 1).

The combination of the DTM and the orthomap has been used for the creation of the image-draped model of the castles surrounding areas. In that way a realistic view of the castle area has been created (fig. 2).
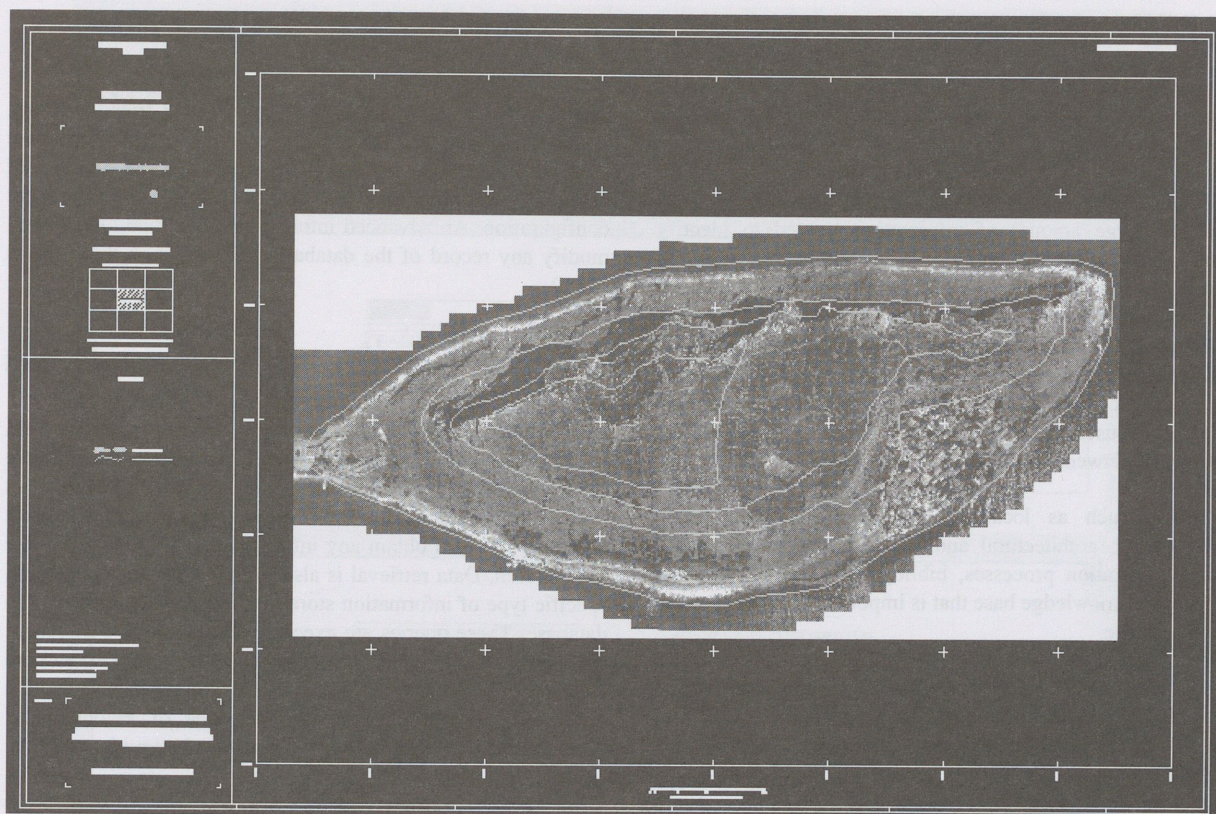
Fig. 1 AutoCAD Drawing file of the Malvasia area

Using Microstation SE and rendering techniques a series of images were created and composed. A fly-through video sequence around the object's model has been created as an AVI file format that can anyone use to fly virtually around the castle. Additionally, Microstation SE provides the ability to export the textured model of a CAD model in a VRML format file. This way interactive navigation around the area of the castle became feasible through Internet.
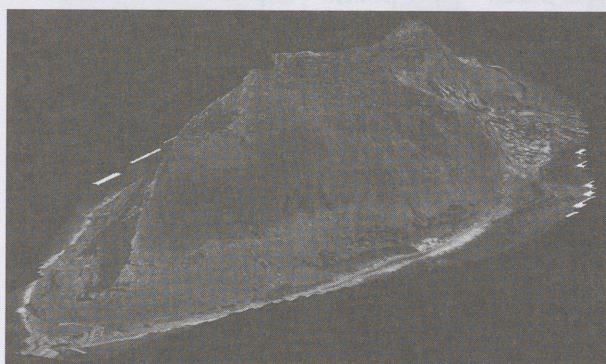

Fig. 2 Draped image model of the Malvasia area

3. VISUALIZATION & MULTIMEDIA TOOLS AND PRODUCTS

Video sequences of the castle and its surrounding area were captured using a typical amateur video camera that was operated by an archaeologist of 5th Ephorate of Byzantine

Antiquities. The video was originally stored in magnetic tape (VHS) and the Miro DC-20 frame grabber was used to produce the video sequences in digital form. Finally, the Ulead Video Studio v.4 Software Application was used to produce the final digital video product that was created based on a scenario of a tour around the castle. Appropriate music setting has also been used in the background. These digital video files consist part of the visualization material of the official site of the 5th Ephorate of Byzantine Antiquities and they were also recorded on tape.

Besides, a new type of artificially generated digital video file based on the virtual tour around the image-draped model, has been created.

Once the rendered 3D model has been created, a virtual pair of cameras captured images of the draped model from different positions. Images taken from these two different positions contain the epipolar geometry and can be combined to produce stereo images. In an active polarization system using 3D glasses, these images can be interlaced producing a 3D scene. Additional 3D scenes can be produced from any other position across a virtual path that is drawn above or in front of the object's model. Finally all the scenes taken along the path defined by the user have been combined and a 3D video is generated. (Sechidis et. al., 2001).

The tools that are used to visualize the images and video sequences are a typical Internet browser and the Window's Media Player application. In the case of the 3D Video a specific graphics card with Virtual Reality capabilities must be used.

4. INFORMATION AND DATABASE STRUCTURE

The current database configuration has been implemented in Microsoft Access Database Application, although it can be converted to any other platform such as FoxPro and Oracle.

The designed tables contain all the appropriate fields that can embed the large amount of information needed to identify several features of the castles. A generalization of this information was necessary to categorize the data, which is common to all castles. In cases where such a categorization was not adequate, further miscellaneous fields were included in the database design. Using primary key fields and linking between these tables a complicated network of information (not visible to the simple user) has been created. Figure 3 illustrates the relationships between the tables and their fields.

Information such as location, admittance, facilities, main historic events, architectural and construction characteristics, previous restoration processes, bibliography and many other, composes the knowledge base that is imported for each castle in the database file.

The data type of tables' fields is not just text or numeric values but also hyperlinks, images, videos and other OLE objects. All these different kind of files have been used to describe all kinds of information.

5. MAINTENANCE & UPDATING OF INFORMATION

The data insertion was feasible through user-friendly forms, that can be loaded using the Microsoft Access Database Application, but they were also exported as HTML files so that data entry and browsing is also available using Internet/Intranet configuration. An advanced intranet user can load, update and modify any record of the database tables through these forms (fig 4).

6. RETRIEVAL & DISTRIBUTION OF INFORMATION

The simple users of the Information System are separated from the advanced users, whose responsibility is to insert and update the information in the database tables. A simple user can browse the data using the HTML files of the Access Microsoft Database file, and obtain any information that is necessary for his research. Data retrieval is also available using queries on a specific type of information stored in the separate tables of the database. These queries are executed using simple CGI forms. Links to the multimedia files (images, video sequences, etc) are also stored in separate HTML files that all together constitute the official site of the Venetian Castles of Peloponnisos, sponsored by the 5th Ephorate of Byzantine Antiquities.
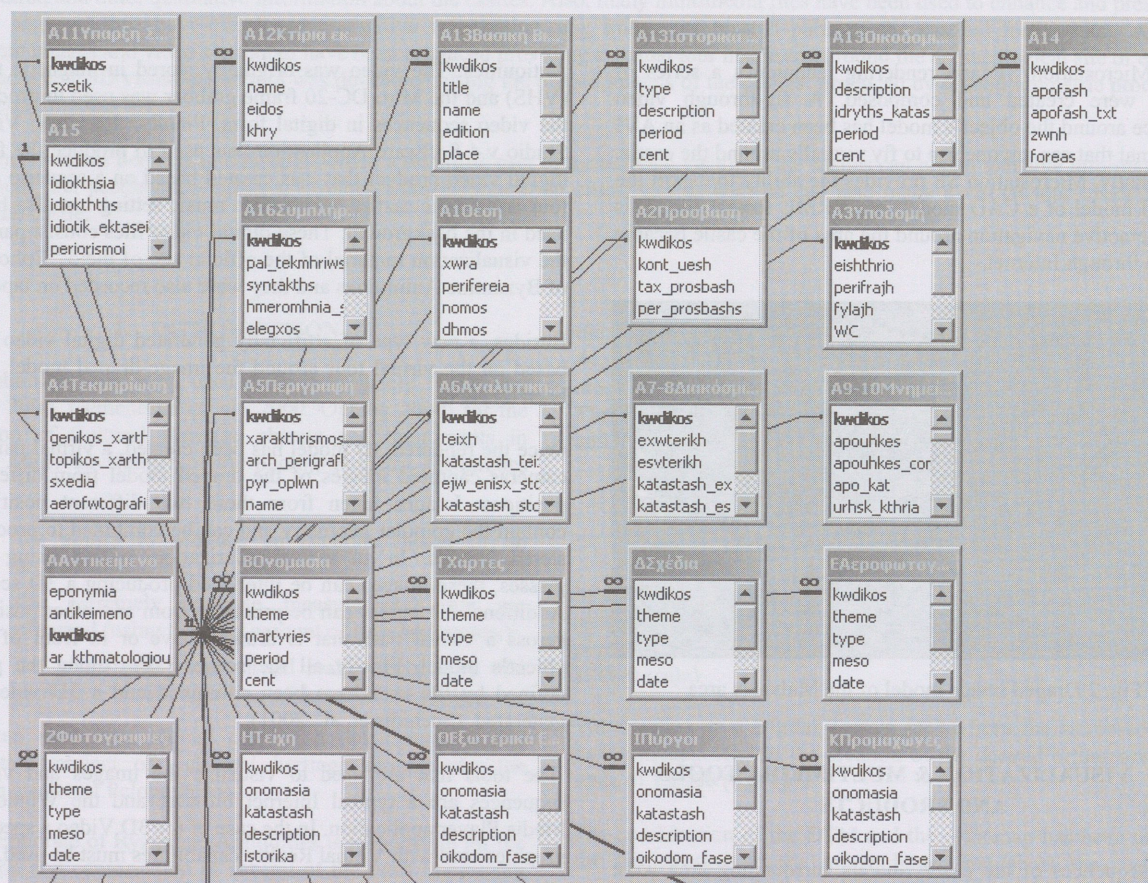

Fig. 3 Relationships of the Database tables

Fig. 4 Append and modify forms

7. CONCLUSION

The documentation of the Venetian Castles of Peloponnisos in order to provide better administration capabilities and an even better promotion of its cultural value was a very difficult job to do.

Many different kinds of information such as

- maps
- aerial images and orthoimages
- close range images
- image-draped model
- documentation text
- video sequences

had to be organized and linked in an interactive and easy way.

The creation of new forms of electronic visualization material (3D Video, VRML files) surely provides an innovative way to present the castles and their surrounding areas. The combination of these products with the conventional textural information have been realized in a Microsoft Database file, which can be easily extracted through the Internet/Intranet since it is fully compatible with the Internet Explorer Application.

8. REFERENCES

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