FUSION OF 3D INFORMATION FOR EFFICIENT
MODELING OF CULTURAL HERITAGE SITES
WITH OBJECTS

To model a complex environment (one composed of several objects with various characteristics), it is essential to combine data from different sensors and information from different sources. We propose a general approach based on sensor fusion techniques that combine models created from multiple images, single images, range sensors, known shapes, CAD drawings, existing maps, survey data, and GPS data. This approach minimizes the impact of uncertainties characterizing each source of information.

Sites description

The results of the two sites presented here are aimed at the general public and to a certain degree to the expert. The first site is the Byzantine Crypt known as the Crypt of Santa Cristina, which is located in Carpinzano (LE), Italy. Already, results on a CDROM, a DVD, a virtual 3-D theatre, holograms and a video animation have been prepared for this project. Figure 1 shows the entrance page to the CDROM while Fig. 2 shows a snap-shot of the video animation on the DVD. The second site is Temple C of Selinunte, Sicily. Information from two different laser scanners, photogrammetry and CAD were combined together. For the acquisition of detailed 3D information with texture, laser scanning and digital photographs using a calibrated camera/lens were used. At the moment the museum room (regional Museum of archaeology of Palermo, Italy) containing mainly metopes from Selinunte was modelled using a mixture of the above mentioned technologies. In this poster, results from this last site will be presented in more details.

The three Metopes of Temple C

The 3D model of the remains of the frieze from Temple C including three Metopes is shown on Figs. 3 a and b. The first laser scanner was used to acquire details in the order of 0.5 mm while the second scanner captured details in the range of 2-10 mm. A rendering of the complete museum room (21 m × 8.1 m × 7 m) (see Fig. 4a for a photograph) dedicated to Selinunte is shown on Fig. 4b. High quality textures were realized using flash lamps, a MacBeth chart and Photoshop. A video animation was realized using a model containing 5 million triangles, the maximum resolution available, 64 lights, and 6700 frames at a resolution of 720 × 576 (see Fig. 4b). In order to access hard to reach areas on the metopes, a mirror had to be used as shown on Fig. 5. A wire mesh on Fig. 6 shows the multi-resolution model that was created.

Conclusion

Models of large objects, structures and environments are possible but require the combination of a number of techniques. More research work is required to speed up the process of acquisition and modelling. The problem we addressed in this paper is the use of 3D modelling to enhance the understanding of a cultural heritage site that needs to be preserved and shown to more people in order to raise awareness and understanding.

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