DIGITAL RECONSTRUCTION OF AN ARCHAIC COLUMN USING SfM

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Summary

We would like to present a project which was realised in the Digital Media Lab, in the School of Architecture at the Technical University of Crete. The aim of the project is to use 3D models of five very heavy parts of an archaic column for studying and reconstructing the complete column.

Fig.1 The five stone drums of the archaic column are exposed in the yard of the Archaeological Museum of Chania, Greece

Introduction

The use of 3D digitization and modelling in documentation, presentation and digital reconstruction of Cultural Heritage has been increased significantly over the past years. This is due to advances in laser scanning techniques, 3d modelling software, image-based-modelling techniques, computer power and virtual reality.

We would like to present a project which was realised in the Digital Media Lab, in the School of Architecture at the Technical University of Crete, in coordination with the Ministry of Culture of Greece, via Ephorate of Antiquities of Chania.

The aim of this paper is to use 3d models of five very heavy parts of an archaic column (constructed ca 540 BC) for studying and reconstructing the complete column. The column was part of an archaic temple unique in size and in type for the area of Chania, in West Crete. The five stone drums found in a salvage excavation in the town of Chania. Now they are exposed in the yard of the Archaeological Museum (Fig.1) but in near future will be hopefully reconstructed and exposed in the New Archaeological Museum of Chania.

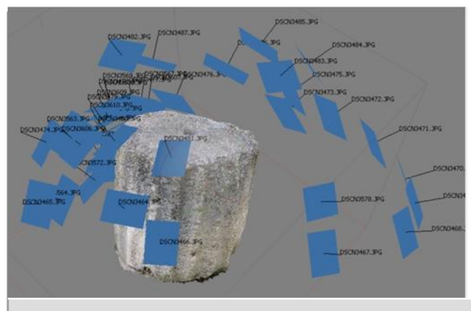

Fig.2 The positions of the cameras used for the 3D reconstruction of the drum S1

3D Models Production

In order to produce the accurate 3D models we used Structure from Motion (SfM), which is a photogrammetric range imaging technique for estimating three-dimensional structures from two-dimensional image sequences. A different number of images of every object were added in Agisoft Photoscan software. For the photo shooting we used two cameras, a Nikon Coolpix P530 and a Canon EOS 700D.The images were chosen to be clear and 60% overlapped (Fig.2).We followed the steps of the Agisoft software controlling the parameters. The final results were acceptable despite the fact that the 3d models of the five items were not completed.

During the photo shooting we had to deal with several problems, most important of which was the fact that we were not able to take pictures all around them since it was impossible to move them due to their weight. Furthermore we did not have the ideal light conditions because the five parts of the column are exposed in the yard of Archaeological Museum of Chania. We decided to execute the photo shooting early in the morning of a cloudy day. Targets were placed around the objects and the dimensions were carefully measured.

The 3d files exported from Agisoft were in obj format and were imported in 3ds Max. Each file was rescaled and the adjustment of the scale was realised manually according to the measurements of the items. The rescaled models were then merged into a single file (Fig.5).

*Fig.3 The point cloud of drum **S1***

*Fig.4 The different types of the drum's **S1** 3D model*

Conclusions

The 3d models of the items were produced using SfM. Afisoft Photoscan software was combined with fast, easy and low cost equipment. The five 3d detailed models of the very heavy objects will be useful to archaeologist and researchers for their study since they can work in their office away from the museum. Also a digital reconstruction of the column and as a result the reconstruction of the ancient temple can be exhibited in a number of ways taking advantage of contemporary digital media such as Virtual, Augmented or Immersive Reality tools.

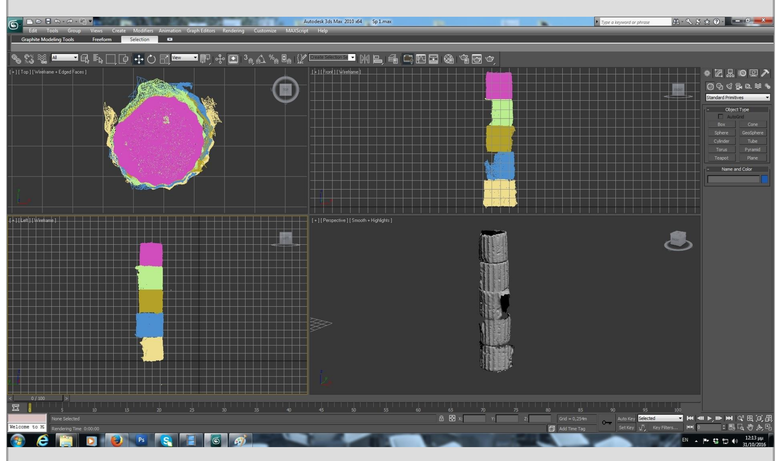

Fig.5 The five items were imported in 3ds Max which produced the final model of the digital reconstructed archaic column

References

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European Commission

FP7-PEOPLE **ITN2013 – ITN-DCH 608013**
Final Project's Conference

Hotel Sotelia, Olimje, Slovenia
23-25 May 2017
www.digitalheritage2017.eu

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