

QUICK PHOTOGRAMMETRIC SYSTEMS FOR CULTURAL HERITAGE DOCUMENTATION

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ABSTRACT

The critical process in reading the artifact has been helped by introduction of Computer science in the field of documentation and acquisition of architectonic artifacts. In fact, computer based techniques have strongly modified acquisition phase and successive operations such as computation and management of information coming from different fields. For instance, it is possible to add further information such as qualitative data, morphology, color information and so on to photogrammetry acquisition. These operations can be performed avoiding the plot which represents a subjective abstraction from the truth.

Nowadays, there are several quick acquisition techniques. Nevertheless, each of them has a specific field of application and then they cannot often be applied to the same case of study. For instance, ortoprojections are not able to acquire curved surfaces while laser scan has a high cost yet.

Authors work at a CNR Institute whose task is to study advanced technologies for preservation, safeguard and valorization of Cultural Heritage. In particular, they are interested in historical architecture oriented to the knowledge of artifacts preservation.

This paper focuses on a comparison of the performances of the same technique applied to different fields (architecture, archeology, wall pictures) and at different scales (town-planning, architectural).

Experiments are based on Cyclop system produced by Menci Software in Arezzo and distributed by Leica. It is an innovative stereoscopic system with three-dimensional plot and measure which allows us to make an acquisition without topographic reference points. Moreover, any camera can be used (whenever its calibration parameters are known) if it is chosen depending on the features of the object to be acquired along with required precision. Cyclop is a monocular system which has the advantages of a bi-camera based system and allows us to make stereoscopic acquisition that can directly be used for restitution. It is composed of a sliding bar and a software which allows us a quick processing of images concerning measure and three-dimensional vectorial restitution. It can be made without preliminary operations such as acquisition of topographical reference points, orientation of frames and stereoscopic calibration, guaranteeing, at the same time, a good quality with a reduced cost and weight of the traditional structure.

In fact, measure and plot directly follow the acquisition. Precision of the measure depends on image resolution, errors caused by objectives and acquisition structure; for that reason the calibration of the camera, of its objectives and sliding bar is performed. A digital camera Nikon D100 has been used for our experiments.

Experimental results are oriented to compare the proposed approach with traditional acquisition techniques in terms of gain-cost ratio. In particular, we highlight the advantage of a quick documentation based method, looking at the following aspects:

- reduction of both required time and cost
- reduction of required specialist knowledge
- acquisition quality
- overcoming a possible vectorial phase.