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Using IPhone Camera in Photomodeler for the 3D Survey of a Sculpture as Practice for Architecture´s Students

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Abstract

The introduction in the market of portable devices with digital cameras with enough resolution makes rethink to photogrammetric people use them to obtain a 3D model with acceptable precision for technical jobs. If we add that the practice most students have this kind of device makes photogrammetry can be available at any time by the rise in no time.

Keywords: 3D Model; Photogrammetric; iPhone Camera

1. Introduction

Most students have some portable device with high resolution camera.
The iPhone 4 has a 5 megapixel camera which has applications to regulate or set the camera focus. This makes us wonder if we can make photogrammetric work practices of the subject of Architectural Photogrammetry[1]. This paper describe a 3D survey of a sculpture simple and will be analyzed the accuracies acquired.

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2. Methodology

PhotoModeler software [2] is used:
- Camera Calibration with PhotoModeler´s model grid printed on A0.
- It create a 3D model of the sculpture chosen students have some portable device with high resolution camera.

The camera and characteristics used in this project are available to the iPhone 4 (fig.1) and table 1[3].

Table 1. Characteristics iPhone 4

Feature	iPhone 4
Nº pixels (mpixels)	5
Nominal focal (mm)	4.2

Fig. 1. iPhone 4

3. Camera calibration

The camera calibration was performed using the template available to the PhotoModeler attached to the ground and photographed with the focus locked to infinity and canceling the flash, with the following results:

- Focal Length: 3,8362mm
- Principal point x: 2,0356mm, y: 1,4802mm
- Format: width: 4,0571mm, height: 3,0299mm
- Radial Distortion: K1:-0,01239, K2:0,003462
- Tangential distortion: P1:-0,00027, P2:-0,00036
- RMS:0,3053mm

The program as a warning we have photo covers only 46% when the recommended is 80%, which was already foreseeable issue.

4. 3D Model

Photos were taken without a tripod around the sculpture at a similar distance, surrounding the sculpture, making sure that all the points were visible from at least two photos.

The 3D model generation was performed with PhotoModeler, points, which introduced more error, is fixed best. The greatest mistake was in almost a pixel and a half, quite acceptable (fig.2).
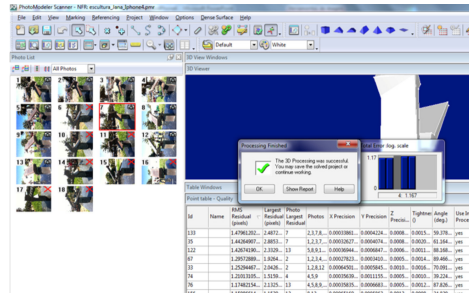
Fig. 2. We refines the error better specifying certain points

Scaling performed with in situ measurement of a distance, and see the final residual (fig.3)

Fig. 3. Final residuals

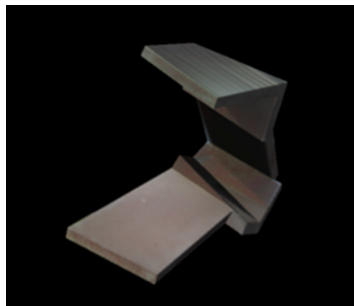Finally we give texture to surfaces and export the 3D model with the extension to go to work finally

Fig.4. 3D Model

5. Conclusions

Camera of a mobile device can be a tool interesting to obtain optimal results in the production of an architectural 3D model with an accuracy of around one centimeter and using just a few hours to get the final result.

References

[1] Smith MJ, Kokkas N. Assessing the photogrammetric potencial of cameras in portable devices. International Archives of the Photogrammetry, In: XXII ISPRS Congress of the International Society for Photogrammetry and Remote Sensing, Vol. XXXIX-B5, 2012, Melbourne, Australia

[2] PhotoModeler 2012. http://www.photomodeler.com

[3] iPhone 4. http://www.apple.com/