

Abstract

The basic data source of 3D modeling of regular or irregular surfaced objects are known (or calculated) point coordinates. Obtaining 3D model of the irregular surfaced objects need plenty of points to represent the surface exactly. These points can be easily obtained both traditional methods and from the measurement of the photographs.

This study is achieved in three stages. The first stage the calibration of camera. Two cameras have been used in this study; NIKON COOLPIX AW100, and SANYO E1075. They were calibrated in two different focal lengths, five times for each camera. The results obtained were varying in focal length (c) and (x_p , y_p) the coordinates of the center of projection of the image (principal point), the difference was ranged (0.02 - 0.04) mm. It could be considered as big compared to the proposed accuracy of photogrammetry. So, to obtain a high accuracy from close range photogrammetry, the camera must be calibrated in the field without shutting down the camera is an important matter.

The second stage is the production of 3D object in cloud points depend on the sampling rate and taking many captures. In this case, an object of face-shaped clay was used and a 3D object is performed with (5563) 3D points with sampling rate (1 mm). The smaller sampling rate results in longer processing and more points. This case could be beneficial in documentation of cultural and historical heritage in a digital library in observing the variation with time.

Photomodeler Scanner (version 6) program software was used in the last stage as a measuring tool for a sample of small house. There were two cases of measuring the sides of such house, the first case used coded targets were defined automatically to the program. These targets were fixed on the sides of the sample. The accuracy of measurement was high, ranging from (10) to (30) micrometer. The second case measures without coded targets, the points defined manually using mouse to referencing points in images and production of a 3D points to measure a distance between points, the accuracy from this case was about (0.1) to (0.5) mm. A photomodeler needs to include any known distance between two points on the object to the photomodeler software, and then the program will calculate the three dimensional coordinates to any point.

An image of building located in the University of Babylon was taken as a final case of the study. The image was 25 m. distance from the camera. The building was represented in 3D model with tremendous number of points about (53715) points and the standard error in calibrating the coordinates was $\delta x = \pm 0.057mm.$, $\delta y = \pm 0.11mm.$, $\delta z = \pm 0.33mm.$

Key words: Digital non-metric camera, Close range photogrammetry, Photomodeler software