Abstract

One of the ways to capture an object is photogrammetry. Currently, we offer to create 3D models for new advanced methods by digital photogrammetry. Its advantage is high degree of process automation and precise realism. To digitize and create 3D models by using this method, we need a digital camera and image processing of taken pictures with the help of photogrammetric software and PC.

Key words: Photogrammetry, methods of digital photogrammetry

INTRODUCTION

One of the ways to digitize an object is also photogrammetry. Currently, we offer to create 3D models for new advanced digital photogrammetry method. Its advantage is high degree of process automation and precise realistic painting. To digitize and create 3D models by using this method, we need a digital camera and image processing of taken pictures with the help of photogrammetric software and PC.

“PHOTOMODELER” SOFTWARE

PhotoModeler (Fig.1) is a photogrammetric system for contact-free creation of 3D models. Also, the creation of a model we can perform by 2D and 3D measurements.

Object must be captured so that, different image capture of same part of the object at least two different angles [1]. The evaluation of object on multiple frames is increased measurement accuracy.

PhotoModeler software environment allows calibrating digital photogrammetric camera and then using acquired data for accurate measurement and then evaluation of images taken by a calibrated camera with calibration field.

Environment of photomodeler allows us to export result to CAD and DCC software such as AutoCad, MicroStation, 3ds Max, Rhino, Maya etc. (Figure 7). Modeled and textured object can be fitted to the real coordinate system and exported as a list of coordinates, orthophotos, 3D model, or video [2].

METHODOLOGY

PhotoModeler is software for Windows which transmits powerful options in photogrammetry computer, so that we can model real objects and scenes from photos [3]. The basis of this method is to measure spatial position of intersection point of frame at pre-measured coordinates of these points. The intersecting method requires at least two overlapping images. All calculations are performed automatically in the appropriate photogrammetric software.

If we want to create a 3D model of object, we first have to create its images. These will subsequently be treated in photogrammetric software [4]. The way the object will be taking pictures should not be anything. The following recommendations indicates that optimum shooting positions to choose from (where make photos) and how to choose direction of axis of image (such as images orient to object). Recommendations to object capturing for 3D model create:

1. Axis image should be at an approximate right angle (Figure 2). If it does not permit conditions of capturing, may be smaller intersection angle (less than 10°). The smaller angle of intersection greatly affects accuracy of the resulting 3D model.
2. Photographing object should fulfill the maximum area of the image. Each point should be shown on at least three images (Figure 3).

3. The spatial model will be more accurate if points are displayed on multiple images [5].

4. For capturing, we can use circle method or method for multiple ring rings (Figure 4).

5. The optimal position of cameras with capturing object displays Fig.5.

6. Check the battery status before frame rate of object, because during capturing cannot turn off digital camera, it could be a change in values of elements at internal orientation photographic apparatus [6].

7. Also, when we have switched mode for power saving of digital camera so we must it turn off in the camera menu.

8. All images we take picture with same focal length (not using zoom - disable auto focus), with which the subject later be captured.

9. It is appropriate to manually set focus on a given distance.

10. Set maximum resolution for digital images.

11. Images must be a contrast.

12. Turn off image stabilizer.

13. We will ensure sharpness so that we use a tripod when shooting.

14. We will keep the original format image, do not change their size by adjusting the graphic programs, or otherwise alter.

**CREATE 3D OBJECT FROM REAL OBJECT**

Methodology for creating of 3D models of real objects describes process from photographing images of real object according to the principles of imaging to export 3D models into a suitable format (Fig. 6). When creating 3D models of complex objects must monitor and eliminate factors that influence the resulting uncertainty model [7].

It is especially suitable photographic camera calibration and the size of calibration field, because the very process of creating a 3D model occurs in images created by cameras, therefore it should be appropriately chosen photographic camera [8].

If is 3D model completed, the final phase is its export. Before export we must recognize for what purpose model were created to serve and depending on him export to the corresponding output format.
CONCLUSION

Digital photogrammetry represents modern technology to create 3D models of objects by using digital photos. It is a new method that still looking for their place in the creation of 3D models and if we compare with laser scanners, is much cheaper. The application of this method can be found in construction and architecture. Development of this method brings into the field of 3D models of real objects new business possibilities based on digital photos.

Creating 3D models from digital photos by using photogrammetric software offers a potent and powerful tool for acceptable price for use in different areas. It can be assumed that the development of ICT technologies together with ever-increasing power of computers, this method simplifies and will be available for a wider range of applications.

References


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