Selection of Calibration Method for Non-Metric Digital Camera and Its Influence in Stereo Model Establishment

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Abstract

Generally, camera calibration is applied to metric camera. This method is intended to mapping purposes. On the one hand, non-metric digital cameras are getting cheaper and easily available in the market so it is potential to be used for mapping application. However, due to large geometric distortion of low cost digital camera, it needs to be calibrated. Operationally, camera calibration can be conducted in 2 ways: in laboratory (in-lab) or in-flight. This research aimed to study the methods of camera calibration which applied to non-metric digital camera and evaluated its influence in stereo model establishment.

This research was conducted in 7 stages. Firstly, design and development of premark points which will be utilized as targets. Placement the targets in laboratory and in the field based on flight plan. Three dimensional position measurement the target using Total Station equipment. Adjustment of observed data using least squares method in order to obtain high accuracy of 3D target position. Execution of terrestrial and aerial photography that covers all targets, Perform BASC adjustment to estimate parameters of camera calibration and stereo model. And, finally analysis the result.

Based on the standard deviation of IOP (interior orientation parameter) and stereo model establishment, in-flight calibration is better than in-lab calibration method. Development of stereo model which utilizing IOP values obtained from in-lab calibration, y-parallaxes were still detected in some stereo pairs. This condition is not support process of automated stereomatching. For non-metric digital camera, it can be concluded that in-flight camera calibration is more recommended than in-lab calibration.

Key words: camera calibration, in-lab, in-flight, IOP, non-metrik digital camera, stereo model.