HIGH ACCURACY CALIBRATION OF MULTIPLE CAMERAS BY TAGUCHI METHOD AND MULTIPLE VIEWPOINTS TRACKING OF HUMAN MOTION FLOWS

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Main subject(s): *motion capture, camera calibration*
Fluid: *human motion flows*
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Other keywords: *Taguchi method, high accuracy calibration*

ABSTRACT : *This paper describes two things. First is that Taguchi method-based improvement of the dynamic calibration method (DCM) accuracy of multiple cameras, which calibrates multiple cameras at the same time by tracking one moving object. Though the static calibration method, for example by Zhang, has been usually used for the camera calibration, we have proposed the DCM because the static method is not suitable for the calibration of two or more cameras. This study adopts Taguchi method to adjust the control parameters that are used in the DCM to their optimum combinations. That is, we estimate Homography matrix which projects some points in the image planes onto a floor surface and determine extrinsic parameters which show the position and orientation of cameras. In this process, we give the series of optimum parameters including the number of the object tracking points, the threshold for the judgments of outliers, the number of the correspondence points used for the least square approximation. Then, as shown Fig 1, we compare the signal noise (SN) ratio and average which are obtained as the difference between the results of the DCM and the static method, and reveal the utility of the DCM. Second, as shown in Fig 2, we introduce the system that observes the motion of multiple moving objects such as human motions from different directions at the same time and verifies the synchronization. This system judges the synchronization of positions and velocities of the targets associated with each other arbitrarily. This system also identifies the preregistered motions from many moving objects. In addition, we describe that Taguchi method-based improvement of extraction of moving objects. This system can quantitatively measure the correlations of the human motion flows and can specify the target that performs prescribed movement in a crowd's flow. These functions are available to score the group performance and to detect the group doing abnormal action and so on.*

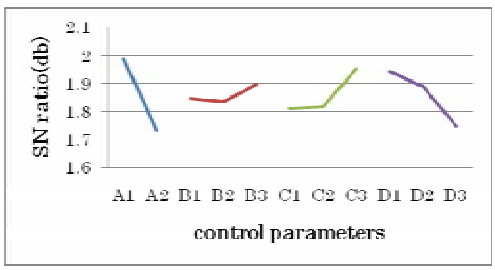

Fig. 1 A part of the factor analysis table

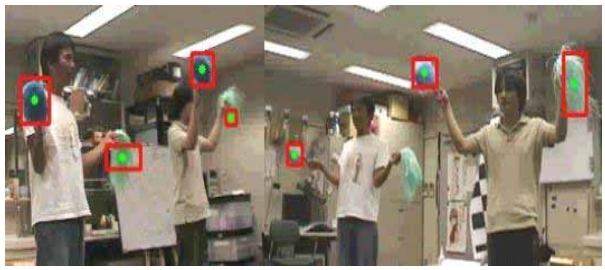

Fig. 2 Human motion from two viewpoints