

THE COMPONENT DEVELOPMENT OF DIGITAL CLOSE RANGE PHOTOGRAMMETRY FOR THE CONSTRUCTION STRUCTURE DISPLACEMENT ANALYSIS

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ABSTRACT

The 3D measurement method using digital images is expected to be applied widely in displacement measurement and monitoring area for the safety of various construction structure by automatization of data acquisition and process and developing real time digital image analysis with high accuracy.

The possibility of Digital Photogrammetry to be referred to as Vision Metrology is being increased by making the synthetic, systematic foundation of image analysis.

In this study, image analysis routine was designed with object oriented concept to increase the efficiency of displacement analysis of construction by the digital image analysis.

For the hierarchical connection management of analysis routine, the object inheritance of photogrammetry was made by making classes such as target management, coordinate transformation of scan image, bundle adjustment and direct linear transformation. And sub-pixel coordinate measurement was performed efficiently by producing additional function module, such as target recognition, grouping, image segmentation, image coordinate measurement routine including location measurement, the size decision of sub-pixel and recognized target indication. Analysed errors of sub-pixel coordinate measurement, the image segmentation (T-3) method using the value of mean and standard deviation in search window, and the ellipse fitting(EL1) method by the edge detection and the edge thinning could be produced for the development of digital photogrammetry components enabling the high-accuracy sub-pixel measurement, and it was known that the measurement accuracy was increased according to the increase of threshold values.

As the result of this study, the displacement measurement of structures could be done more efficiently by developing components of classes designed with the subject of image analysis process by object oriented concept. The displacement measurement of a sham bridge and the relocation measurement of an auto-control robot were done for the test of this.

Hereafter, if a lot of studies on practical use of digital photogrammetry are performed, the possibility of its application is expected to be enlarged as a means of displacement measurement in various industry including civil engineering.

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