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PERFORMANCE EVALUATION OF NON-PARAMETRIC CAMERA FOR 3D RECONSTRUCTION OF BUILDING

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ABSTRACT

The demand for three-dimensional (3D) geospatial data and modelling for urban development has been continuously increasing because many GIS problems can only be adequately solved in 3D rather than the traditional 2/2.5D spatial representations. This paper explores the applicability of using non-parametric camera for 3D reconstruction of building using 3DF Zephyr, an open-source photogrammetric software. About fifty (50) overlapping images were acquired with the aid of an amateur non-parametric camera; a Casio Exilim EX-Z3 with couple charged device (CCD) of 3.2 mega pixels. The process of reconstructing the building from the acquired overlapping images involved automatic camera orientation and generation of sparse and dense point clouds of the object. The result showed that the estimated percentage errors in the total area and length of the reconstructed building when compared to the real object are 5.65% and 7.4%, respectively. The findings of the study shows that relatively accurate 3D reconstruction of objects can be achieved efficiently and with less budget using a non-metric camera and thus recommended the use of non-parametric cameras for 3D reconstruction of buildings especially for reconnaissance applications. Further studies will investigate the performance of other available open-source photogrammetric software packages for 3D object reconstruction.

Keywords: object reconstruction, non-parametric camera, 3D modelling, photogrammetric tools