**Efficiency Improvement of SfM/MVS by Omni-directional Camera Network Estimation for Water-borne MMS**

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***ABSTRACT***

In recent years, the development of real-space base data for urban digital twins has been promoted. The main methods for generating base data for urban river spaces are those using LiDAR and those using cameras. The LiDAR method has the advantage of being able to directly measure distance data, making it easy to generate point clouds. However, the point cloud generation method used in mobile mapping systems is highly dependent on the accuracy of exterior orientation, so the performance required for GNSS/IMU is high, and the equipment is extremely expensive. In point cloud generation using cameras, Structure from Motion and Multi View Stereo (SfM/MVS) is mainly applied. Although it is inferior to the LiDAR method in terms of point cloud generation time, the measurement system can be constructed relatively inexpensively. It has been confirmed that LiDAR-SLAM combined with GNSS positioning is effective in 3D measurement of urban river spaces, but in high-frequency 3D measurement and detection of abnormalities in civil engineering structures, the camera method has an advantage over the LiDAR method. However, in wide-area measurements, the increase in point cloud generation processing time due to the large number of captured images is a major issue. Therefore, in this study, with the aim of improving the efficiency of point cloud measurement in urban river spaces, we propose the possibility of improving shooting efficiency by utilizing omnidirectional cameras, and a method to improve the processing efficiency of SfM/MVS by estimating an omnidirectional camera network that takes into account the fixed baseline relationship of each camera and the improved multi-perspective nature of round-trip shooting.

**Keywords:** Water-borne MMS, Structure from Motion, Multi View stereo,Camera network estimation