

Study on Construction of 3D Topography by UAV-Based Images

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Abstract : In this paper, a method of fast 3D topography modeling using the high-resolution camera images is studied based on the characteristics of Unmanned Aerial Vehicle (UAV) system for low altitude aerial photogrammetry and the need of three dimensional (3D) urban landscape modeling. Firstly, the existing high-resolution digital camera with special design of overlap images is designed by reconstructing and analyzing the auto-flying paths of UAVs, which improves the self-calibration function to achieve the high precision imaging by software, and further increased the resolution of the imaging system. Secondly, several-angle images including vertical images and oblique images gotten by the UAV system are used for the detail measure of urban land surfaces and the texture extraction. Finally, the aerial photography and 3D topography construction are both developed in campus of Chang-Jung University and in Guerin district area in Tainan, Taiwan, provide authentication model for construction of 3D topography based on combined UAV-based camera images from system. The results demonstrated that the UAV system for low altitude aerial photogrammetry can be used in the construction of 3D topography production, and the technology solution in this paper offers a new, fast, and technical plan for the 3D expression of the city landscape, fine modeling and visualization.

Keywords : 3D, topography, UAV, images

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