



Application of Digital Image Correlation Method to Improve the Accuracy of Aerial Photo Stitching

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Satellite images and traditional aerial photos have been used in remote sensing for a long time. However, there are some problems with these images. For example, the resolution of satellite image is insufficient, the cost to obtain traditional images is relatively high and there is also human safety risk in traditional flight. These result in the application limitation of these images. In recent years, the control technology of unmanned aerial vehicle (UAV) is rapidly developed. This makes unmanned aerial vehicle widely used in obtaining aerial photos. Compared to satellite images and traditional aerial photos, these aerial photos obtained using UAV have the advantages of higher resolution, low cost. Because there is no crew in UAV, it is still possible to take aerial photos using UAV under unstable weather conditions.

Images have to be orthorectified and their distortion must be corrected at first. Then, with the help of image matching technique and control points, these images can be stitched or used to establish DEM of ground surface. These images or DEM data can be used to monitor the landslide or estimate the volume of landslide. For the image matching, we can use such as Harris corner method, SIFT or SURF to extract and match feature points. However, the accuracy of these methods for matching is about pixel or sub-pixel level. The accuracy of digital image correlation method (DIC) during image matching can reach about 0.01pixel. Therefore, this study applies digital image correlation method to match extracted feature points. Then the stitched images are observed to judge the improvement situation.

This study takes the aerial photos of a reservoir area. These images are stitched under the situations with and without the help of DIC. The results show that the misplacement situation in the stitched image using DIC to match feature points has been significantly improved. This shows that the use of DIC to match feature points can actually improve the accuracy of stitching images.