

An Improved Mosaicking Algorithm for UAV Photographs of Vegetated Areas

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Unmanned Aerial Vehicle (UAV) photogrammetry is widely used for vegetation research because of its high resolution and superior cost efficiency. However, photographs taken by a UAV at one time are not consistent over the whole study area in terms of geometry, distortion, and color tone. In addition, high resolution aerial images of vegetation usually contain numerous similar features and illumination changes, which consequently brings a huge challenge to mosaicking and processing images using tie points efficiently and accurately. This study aims to propose an improved algorithm to mosaic aerial photographs of a vegetated area efficiently under various situations. The steps for mosaicking images include feature point extraction, point matching, elimination of mismatching points, fusion, and mosaicking. Among them, detecting and matching the feature points of images are the most important part for image mosaicking. In this research we analyzed traditional algorithms for feature point detection including the Scale Invariant Feature Transform (SIFT) and Speed up Robust Feature (SURF) algorithms, and found that both do not perform well. Then we adjusted parameters and used 128-element descriptors inside of 64-element descriptors without computing the orientation, to improve the SURF algorithm in terms of efficiency and accuracy. The improved mosaicking algorithm is expected to be applied in vegetation studies to provide better information with high efficiency.

Keywords: SURF, Image mosaicking, UAV image, Vegetation