

Automated but Accurate Georeferencing of High Resolution Satellite Imagery Using Digital Maps

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Abstract: Georeferencing of satellite images is an important pre-processing step to relate accurate geodetic or map coordinates to the pixels of the images but the process has required manual operation for better accuracy. Large scale mapping using high resolution satellite images or conflation of the maps with satellite images requires automated but accurate georeferencing. Rational polynomial coefficients (RPCs)-based positional accuracy keep increasing but accurate positioning still requires user's intervention. To this end, we propose the use of digital maps as the reference source for fully automated but accurate georeferencing. In the approach, RPCs enable the image projection of the map into the satellite image space to remove local discrepancy except the shift, followed by the template edge matching between the projected features and image features to find the local positional shift. This enables modeling of RPCs bias compensation parameters over the entire image space for accurate georeferencing. During the adjustment, outliers are detected and warned based on the data snooping. Experiments were carried out for a Quickbird image with 1:5,000 scale Korean national topographic maps. The proposed method was applied to the data and orthoimage was generated for overlaying the data. This allows us to perform visual quality check. The experimental results showed the automated approach successfully improve the georeferencing accuracy enabling the overlay of the data for hybrid map presentation.

Keyword: High-Resolution Satellite Imagery, Georeferencing, RPCs, Digital Map