A novel approach to co registering multi-temporal remotely sensed data in a vulnerability monitoring framework

Mostapha Harb (1,2), Daniele De Vecchi (1,2), Fabio Dell'Acqua (1,2)

(1) Department of Industrial and Information Engineering, University of Pavia - 27100 Pavia, Italy, (2) Aerospace section, Eucentre Foundation - 27100 Pavia, Italy

The paper introduces a novel approach for the geometric co registration of optical remote sensing imagery. In the context of disaster mitigation and preparedness, a multi-temporal set of several remote sensing images often has to be processed separately to extract the required information. Then, a comparison among the obtained results would provide clues towards the time-evolving extent and distribution of risk. Therefore, it is of significant importance to achieve a proper geometric matching among the compared images. The traditional procedure of using manually-determined ground control points is not viable for large stacks of images, and automated methods may fail short of ensuring image conformity. The established method uses image data itself to effectively perform the co registration among the images relying on feature extraction and matching, without the necessity of using ground control points (GCPs). The approach has been tested using both high and medium resolution images on different test cases in a context of multi-risk vulnerability monitoring. The obtained results were highly promising in resolving the mismatching problem of objects in images taken from different dates and allowing smooth extraction of vulnerability proxies from multi-temporal moderate resolution optical satellite images. In conclusion, the methodology would be a useful contribution towards easing the tracking of temporal variation of ground features in the wide domain of risk-related application of remote sensing (e.g. urban development, deforestation, wild fire, damage assessment. . .)