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Automatic Image Registration Using Free and Open Source Software

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Abstract. Image registration is the most critical operation in remote sensing applications to enable location based referencing and analysis of earth features. This is the first step for any process involving identification, time series analysis or change detection using a large set of imagery over a region. Most of the reliable procedures involve time consuming and laborious manual methods of finding the corresponding matching features of the input image with respect to reference. Also the process, as it involves human interaction, does not converge with multiple operations at different times. Automated procedures rely on accurately determining the matching locations or points from both the images under comparison and the procedures are robust and consistent over time. Different algorithms are available to achieve this, based on pattern recognition, feature based detection, similarity techniques etc. In the present study and implementation, Correlation based methods have been used with a improvement over newly developed technique of identifying and pruning the false points of match. Free and Open Source Software (FOSS) have been used to develop the methodology to reach a wider audience, without any dependency on COTS (Commercially off the shelf) software. Standard deviation from foci of the ellipse of correlated points, is a statistical means of ensuring the best match of the points of interest based on both intensity values and location correspondence. The methodology is developed and standardised by enhancements to meet the registration requirements of remote sensing imagery. Results have shown a performance improvement, nearly matching the visual techniques and have been implemented in remote sensing operational projects. The main advantage of the proposed methodology is its viability in production mode environment. This paper also shows that the visualization capabilities of MapWinGIS, GDAL's image handling abilities and OSSIM's correlation facility can be efficiently integrated to effectively use in remote sensing based production environment.

[Conference Paper](#) (PDF, 900 KB)

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