

Ratchawit Sirisommai 2012: A MRF-Based Approach for a Multisensor Land Cover Mapping of Mis-Registered Images. Master of Engineering (Information and Communication Technology for Embedded Systems), Major Field: Information and Communication Technology for Embedded Systems, Department of Electrical Engineering. Thesis Advisor: Assistant Professor Teerasit Kasetkasem, Ph.D. 61 pages.

In this research, we proposed the joint registration and classification technique based on the Markov random field model (MRF) to obtain the land cover map of the scene. Instead of following the traditional approach to obtain the land cover map, where the registration and classification processes are performed separately, the proposed joint approach allows us to automatically evaluate the performance of both processes simultaneously. The expectation maximization (EM) algorithm is employed to solve our joint process problem by iteratively estimating the mapping parameters to obtain an optimal land cover map. In addition, spatial-context information of image pixels is exploited by using the Markov random field model to achieve better classification performance. We conducted experiments on two pairs of multisensor images to investigate the effectiveness of the proposed technique on practical use of satellite images. Results show that contextual information, derived from the MRF model, plays an important role in improving the classification performance. With our proposed algorithm, we achieve the correct mapping parameters and obtain the near perfect registration of multisensor images. However, as we continue to amplify the geometric difference of input images, we receive the poorer registration performance in the process. Our experiment on adjusting the initial mapping parameters suggests that the registration performance is most sensitive to errors in the scaling factors.

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