A NEW ARTIFICIAL INTELLIGENCE OPTIMIZATION METHOD FOR PCA BASED UNSUPERVISED CHANGE DETECTION OF REMOTE SENSING IMAGE DATA

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Abstract: In this study, a new artificial intelligence optimization algorithm, Differential Search (DS), was proposed for Principal Component Analysis (PCA) based unsupervised change detection method for optic and SAR image data. The model firstly computes an eigenvector space using previously created $k \times k$ blocks. The change detection map is generated by clustering the feature vector as two clusters which are changed and unchanged using Differential Search Algorithm. For clustering, a cost function is used based on minimization of Euclidean distance between cluster centers and pixels. Experimental results of optic and SAR images proved that proposed approach is effective for unsupervised change detection of remote sensing image data.

Key words: *unsupervised change detection, differential search, PCA*

Received: May 26, 2014 **DOI:** 10.14311/NNW.2016.26.008
Revised and accepted: March 10, 2016

1. Introduction

One of the most important subjects of remote sensing discipline is to examine the temporal variation of a specific zone. The existing differences in land cover or land use can be identified by using satellite images of different periods. Change detection approaches can effectively be used for solving important problems such as observing forest and agricultural areas, identifying the changes in land cover and identifying the spatial difference after a forest fire [7, 10, 12, 14, 20]. Change detection is separated into two groups as supervised and unsupervised. But in solving real world problems, unsupervised approach is more preferable than supervised approach. The reason lying under preference is that to provide the training data to be used in supervised approach is difficult while unsupervised approach does not need a training data [17]. Although there are a lot of unsupervised change detection methods for both optic and SAR remote sensing images, pre-processing steps consisting of geometric and radiometric corrections are generally needed [10, 17].

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