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APPLICATION OF SENTINEL-2A DATA AND PIXEL-BASED ALGORITHMS FOR LAND COVER MAPPING IN ILAM-IRAN

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Abstract

The western forests and rangelands of Iran in Zagros Mountain are valuable ecosystems for protecting the water and soil resources and providing the habitat for endemic fauna and flora. These ecosystems have widely destroyed by human interferences in the recent years. The land cover mapping using an accurate method is the first step to prevent the further destruction of these ecosystems. The aim of this study was to generate a land cover map of Ilam (Western Iran) using Sentinel-2A data at 10 m spatial resolution using the best suited classification algorithm. For this purpose, the supervised classification of Sentinel-2A image was performed by seven pixel-based algorithms (Maximum Likelihood, Minimum Distance, Spectral Angle Mapper, Spectral Correlation Mapper, Mahalanobis Distance, Neural Network and Support Vector Machine). For accuracy assessment of the land cover maps, the stratified random points were created and controlled in the field. After checking out the current land cover of each point in a plot area at the field, the real land cover of each one was compared with the defined land cover of the same point based on classification maps. Finally, the accuracy of the algorithms was evaluated by accuracy indices. The results showed that Support Vector Machine algorithm had the highest accuracy in classification of Sentinel-2A image with overall accuracy 79% and Kappa Index 0.70. This algorithm usually shows a good efficiency for land cover mapping in the heterogeneous regions like the study area. The analysis of the land cover map obtained from this algorithm showed that the dense, semi-dense and sparse forests have covered 319.64 ha, 361.44 ha and 1832.36 ha of the study area, respectively. The human-made land covers such as agriculture and understory agriculture have widely extended in the study area and have covered 658.42 and 4504.64 ha, respectively. The results of this study could be used as a baseline for managers to monitor land cover changes in the region. For the optimum management of the study area, land cover mapping using SVM algorithm in the certain temporal intervals is recommended to discover the forests change and to control the agriculture development.

Key words: Ilam, Land cover map, Pixel-based algorithms, Sentinel-2A satellite image e

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