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Comparing Efficiency of Artificial Neural Network and Decision Tree Methods In Preparing of Land Use Layer Using ETM$^+$ Data (Case Study: Darashar Catchment)

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Abstract

Land use maps are the most essential tools and information in the hand of natural resources managers. Over the last years, many applications of neural network classifiers for land use classification have been reported in the literature, but few studies have assessed the use of decision tree classifiers and their comparison. In this study, first, geometric and radiometric corrections were performed on ETM$^+$ data. Then, with field surveying, the various land cover classes were defined and training areas were selected. The main objective of this study is to compare three artificial neural network methods for land cover classification in Daresher catchment of Ilam province. Meanwhile, the performance of these algorithms has been compared with

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that obtained using decision tree (with three siplitting methods). The obtained results of accuracy assessment of the classified images showed that neural network classification methods (except Kohonen method) outperformed with overall mean accuracy of 92 and Kappa coefficient of 0.90 than by decision tree with mean overall mean accuracy of 90 and Kappa coefficient of 0.88. In addition, when different neural networks classifiers were analysed, fuzzy artmap approach outperformed than by perceptron multi-layer and Konohon classifiers in terms of overall Kappa coefficient accuracies (with more overall accuracies of %2, %22 and Kappa coefficients of %3 and %24). The highest accuracy of artificial neural network was with fuzzy artmap method. So, this study confirms efficiency and capability of artificial neural network methods for land cover classification.

Keywords: Land use, Image classification, Perceptron multi-layer classifier, Kohonen classifier, Fuzzy Artmap classifier, decision tree, ETM^{+}, Daresher Catchment, Ilam province.