

## Comparison of Performance in Image Classification Algorithms of Satellite in Detection of Sarakhs Sandy zones

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Article History (Received: 1398.08.20 Accepted: 1398.09.18)

### Extended abstract

#### 1- Introduction

Wind erosion as an “environmental threat” has caused serious problems in the world. Identifying and evaluating areas affected by wind erosion can be an important tool for managers and planners in the sustainable development of different areas. nowadays there are various methods in the world for zoning lands affected by wind erosion. One of the most important methods is the use of satellite images and various classification methods. Satellite imagery with features such as wide coverage, repeatability and continuous updating is particularly important in determining land cover. classification methods include pixel based, object oriented and map decision tree. Field studies on the spatial development of wind erosion sites are difficult and expensive to replicate and monitoring studies in these areas are not possible. the purpose of this study is to evaluate the classification methods in the detection of the Sarakhs plain sandy zones in order to identify endangered sources of these zones.

#### 2- Methodology

In this study, the Landsat ETM + satellite data was used from USGS web site and all the processed satellite images was done with ENVI software and Arcmap 10.3 GIS. After pre-processing the images, including geometric, atmospheric and radiometric corrections, the land use map was prepared using a supervised classification method in six classes. These classes include agricultural lands, barren lands, sand dunes, wind deposition, lakes and rangelands. Classification was performed based on all the algorithms of pixel based, object oriented and map decision tree methods. These algorithms include maximum likelihood, minimum distance, neural network, and support vector machine in the pixel based method and The object-oriented approach used the nearest-neighbor algorithms on the scales of 1, 3, 5, 7 and the support of vector machine. The final classification was done by a decision tree method map. Parameters used for validation of the results include total accuracy, kappa coefficient, accuracy matrix of the producer and the produced, quantity and allocation disagreement.

#### 3- Results

The results of the classification show that the number of pixels in the training samples is 25049 pixels obtained by random sampling. The number of ground points used to estimate the overall

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accuracy of the produced maps are 90 control points from Google Earth satellite imagery, 50 control points from 1: 50000 topographic maps and 45 field control points. The evaluation of classification methods showed that higher accuracy percentage for decision tree method is 87%, kappa index 82%, Quantity disagreement 6.7% and allocation disagreement 5.6% Compare to other methods. These coefficients in the pixel based method are respectively 83%, kappa coefficient 78%, quantity disagreement 10.4% and allocation disagreement 6.1% And in object-oriented method, the overall accuracy is 80%, Kappa index 75%, quantity disagreement 83% and allocation disagreement 7.6%. The least producer and user accuracy in all three methods is related to sand dune class and the highest amount of quantitative disagreement is assigned to the pixel based method for the class of wind deposition and rangelands, In the object-oriented method, it is related to the class of agricultural lands and sand dunes, and in the decision-tree method, it is related to the classes of agricultural lands and rangelands. This may be due to the lack of acceptable separation of the sand dune class.

#### 4- Discussion & Conclusions

In this study, it was assumed that the object-oriented classification method would more accurately classify sand dunes and zones but since the sand dunes of Sarakhs do not follow specific morphology and geometry and they are more longitudinal Therefore, the classification of these zones was performed better with the pixel based method. But the land use, such as agricultural that follows geometric shapes, was more accurately classified in the object-oriented method.

The area of sandy lands, including hills and sandy zones, was estimated to be about 1349 km<sup>2</sup>. Most of these lands are located in the central part of the study area in the vicinity of biological and physical elements. Also, the comparison of the area maps shows that the area of land using water levels and agricultural lands are close to each other. And the area differences are mostly related to rangelands, barren lands and sandy areas. Based on the results of this study, it can be suggested that decision tree method is more suitable than pixel based and object oriented methods for classifying land cover and detecting sandy zone changes and the most important reason is the use of both algorithms.

**Key Words: Sandy zones- Pixel based- Object oriented- map decision tree. Sarakhs plain**