Machine Learning And Satellite Images For Agricultural Areas Determination

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Keywords **-** Machine learning, Sentinal-2A, Satellite images Classification, Agricultural areas.

Abstract **-The determination of agricultural areas, agricultural products and their yields distribution are extremely important in directing domestic and foreign market conditions. This paper introducing the ability of using machine learning and satellite images to determine agricultural areas. Classification of satellite images for agricultural areas maps is performed based on supervised classification. ArcGIS environment utilized to applied the analysis. Karabuk Satellite images utilized as cases study for agricultural areas determination. Classification accuracy was 87%. The outcomes displayed that agricultural areas determination in GIS environment is accurately and easily can be implement.**

I. INTRODUCTION

Considering agricultural practices, it is very difficult to monitor and determine the agricultural activities in large areas by local methods. At this point, it is possible to determine the spatial distribution of agricultural lands by using satellite images from remote sensing. Remote sensing is the most widely used method to produce field boundaries of agricultural areas. In order to determine the spatial distribution of the product range and then to monitor the growth periods of the products, accurate cell size of the satellite images is highly recommended.

To determine agricultural areas from satellite images, several processing steps should be performed and the properties of the objects to be considered should be extracted. Recently, different methods were recommended in studies to detect or identify agricultural lands. Machine learning techniques among other methods area extremely recommended. Machine learning methods can be utilizing to perform satellite image classification to determine agricultural areas. The overall objective of the classification method is to assembly entities with the similar spectral features in the surface. The aim is to distinct every pixel in the satellite pictures into dissimilar sets based on their spectral features. Later, allocate the pixel to the matching sets on the earth based on their reflectance content. In addition, ArcGIS software comprises both training data manager and relevant tools for classification. ArcGIS permit to end-users to collection and examination spatial data of assessment features across the desired geographic landscape. So, ArcGIS is appropriate atmosphere to execute satellite image classification machine learning techniques.

The objective of this paper is presenting the ability of using machine learning and satellite images to determine agricultural areas. Classification atmosphere is geographic information systems GIS.

II. METHOD

2.1. Satellite image collection Landsat 8

In 1972, the LANDSAT satellite program was launched by NASA in order to investigate the natural resources on Earth. The first Landsat satellite was sent to space on July 23, 1972 and served for about six years. The last satellite in the Landsat satellite program was launched on February 11, 2013. Landsat 8 has 2 new sensors: OLI (Operational Land Imager) and TIS (thermal infrared sensor).

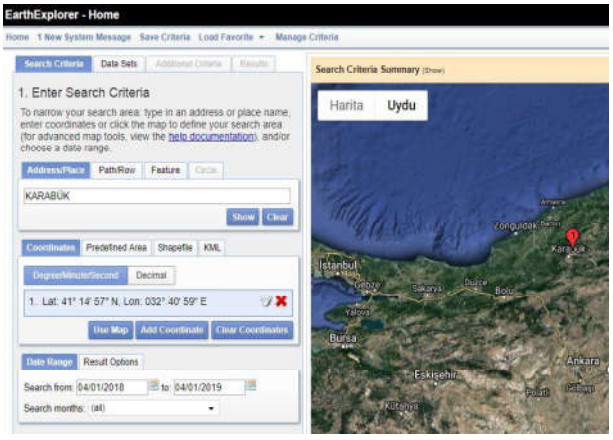

Figure 1 USGS satellite images platform

For Landsat 8 satellite images of Karabük province, 'earthexplorer.usgs.gov' address was used to obtain the image (United States Geological Survey (USGS) earth explorer website) Figure 1. After the location data was entered, a specific

date range was selected and satellite images of Landsat 8 were downloaded Figure 2. Then, image transferred to ArcGIS software.

Figure 2 Satellite image collection

2.2 Agricultural areas classification

A controlled classification algorithm requires a collection of data points for each class. Therefore, classification is based on how the point is close other training samples to be classified. Training samples represent the known interest classes of the analyst. The three basic steps in a typical controlled classification procedure are as follows: (A) Training stage: The analyst defines representative training areas and develops numerical explanations of spectral signatures of each type of agricultural areas at the scene. (B) Classification stage: each pixel in the image data set is classify, to its most similar. If the Pixel does not look like any training data, it is usually labeled 'Unknown'.

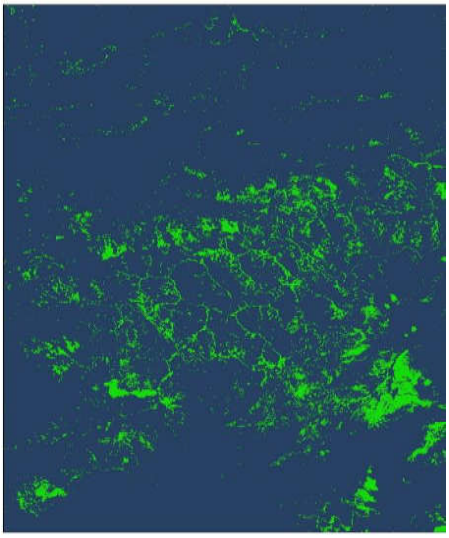

Figure 3 Classified satellite image (Agricultural areas)

ArcGIS, the GIS software, was used in our project. Landsat footage uploaded to ArcGIS. Later, training areas were created to classify the image. Image classification toolbar used. Then, polygons are drawn by selecting the agricultural areas. The polygons saved as signature file for training samples reflectance. Then Maximum Likelihood Classification tool from the classification tab were utilized. The obtained agricultural areas map as a result of these applications is given in Figure 3.

III. CONCLUSION

In this study, satellite images of agricultural areas in Karabük province were obtained from Landsat 8. The appropriate classification tool used to determine the agricultural lands from the available satellite images. Classification of satellite images for agricultural areas maps is performed based on supervised classification. ArcGIS environment utilized to applied the analysis. The identification and classification of agricultural lands is the most important element to achieve these objectives. The outcomes displayed that GIS environment accurately and easily determin agricultural areas.

IV. ACKNOWLEDGMENT

This study has been supported by 2221 – Fellowship Program of TUBITAK (The Scientific and Technological Research Council of Turkey). We are indebted for their supports.

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